

# **Beyond the boundaries of the project team**

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**Abstract :** Knowledge Management is widely becoming a key element in the operations of successful organizations. It is considered as a strategic asset for which many organizations formulate strategies and tools to capture, and re-use. This paper starts with a concept development for knowledge and its acquisition through project delivery. It then elaborates on the strategic importance of knowledge for project-based organizations and the barriers in its flow amongst members and between teams. It then examines the initiatives employed by a public sector organization in Bahrain. It explains the practical mechanisms to disseminate knowledge to where it is most needed. The writer argues that knowledge management has a significant bearing on the success of projects and then concludes that organizations need to develop strategies to push knowledge attained through project delivery to beyond the project team boundary to benefit other teams, and also to benefit future projects. The paper recommends that culture change and top management commitment are key factors for the success of such initiatives.

**Key Words :** Knowledge Management, barriers to knowledge sharing, project teams, IT-based knowledge systems, project performance, learning organization

## **1.0 Introduction**

Knowledge is considered an important asset in organizations whose work relies very much on the flow of information. The success of organizations worldwide is attributed to their ability to manage the intellectual capital they have, employing their knowledge to achieve their strategic objectives.

The availability and ease of access to information in organizations is vital for effective decision-making. Equally important is their use in the creation of a learning organization.

It has been the norm that project teams measure project success only through the attainment of results inputs and outputs, and ignore to capture knowledge gained for re-use in future projects.

In an organization whose fundamental work is the delivery of projects, knowledge generated through projects is often scattered amongst teams, which makes it difficult to locate this knowledge and put it for re-use. This is further exacerbated because construction teams constantly change as they get disintegrated and restructured upon project

completion. The construction industry is also Multi-party with various organizations being involved at various stages of the project life cycle. These organizations often have different objectives and sometimes competing interests. The temporary nature of project teams or organizations resulting in a continuously changing supply chain is another dimension that further complicates the issue of learning, knowledge acquisition and dissemination.

## **2.0 Concept Development**

Knowledge comes in different forms. Fundamentally, it can be tacit (personal), or explicit (documented). While explicit knowledge can easily be codified for a database entry, tacit knowledge is an intangible asset that is more difficult to extract. The transfer of explicit knowledge is a person to document relationship. It is the retrieval and transfer of tacit knowledge that poses real difficulties for organizations. As complex as it can be, capturing and distributing (tacit) knowledge, its substantial value makes it worth the effort (Davenport and Pruzak, 1998).

Knowledge is considered important for the realization of strategic goals of organizations. It is not always possible to convert tacit into explicit knowledge. The skills and expertise remain a personal asset of people. Gurteen (1999)

suggests that the best and most effective approach for extracting and sharing tacit knowledge is by direct interaction or socialization. Individuals use explicit knowledge to broaden, extend and reframe their own tacit knowledge in a process called internalization.

The successful running of projects greatly depends on the flow of information. Projects are generally multi-party by nature. That is, there are many parties involved in the execution of projects. This generates a network of communication resulting in the exchange of information necessary for the implementation of the project.

Engineers on projects encounter difficulties, conflicts, unforeseen conditions and changes. They use various individual techniques and innovations to overcome such difficulties. Through this process, the execution of projects generates a wealth of knowledge. That knowledge is generally kept within the team on that project.

Every process in the real world has information and a set of methods related to it. Most of the times these methods are passed on in an unorganized manner, that is the information related to these procedures or methods is not stored at one place, so that they can be reused. This results in the loss of some critical information, which might be of need at some time in future. The same goes for information gained through experience, which is not well documented. When all the related information is compiled and put together in an orderly manner, it is called knowledge. This area of compiling knowledge and making it available, so that it can be reused efficiently is called Knowledge Management.

All projects go through the same process of learning. The enormity of information generated and knowledge acquired through a project and the need to share that knowledge warrants research into the means of achieving this task.

### **3.0 Acquisition of Knowledge through Project Delivery**

Projects, whether small and simple, or large and complex, pose real threats and challenges to the project team. Knowledge acquired through project delivery generally resides in people's minds. Knowledge management attempts to extend the use and benefit of such acquired knowledge to other individuals and teams within the organization, thereby making it available to others

outside the boundaries of the project team. The consequence is converting this individual or team knowledge to become part of the organization's intellectual capital. This is strategically important as such knowledge can become unreachable when its possessors leave their employing organizations. The re-use of knowledge is important if the organization wants to improve its performance in delivering future projects.

The world is full of success stories of projects that represented efficient use of resources and valuable contribution to society. These successes are associated with single projects or pilot group in a large organization. To date, there are only few examples of enduring engagement in learning and profound large-scale transformation. Not many succeed in diffusing the organizational learning methods and tools throughout the organization (Senge et al. 1999).

There is great potential of learning capacity inherent in project-based organizations derived from extensive field experience. Project-based learning is a means to deal with the challenge of sustainable growth of learning capacity, i.e. developing learning capabilities that enable reasoning beyond the short term; knowledge creation and sharing beyond the individual or team.

One of the objectives of the Egan report 'Rethinking Construction' (1998) was to integrate the project process and transcend the confrontational consequences of the fragmented nature of the project delivery process. As such, the skills and knowledge of the supply chain is better utilized and should result in better project performance and improve the construction industry learning process.

It has been sufficiently substantiated that the process of delivering a project from conception to completion and operation results in the generation of abundant knowledge. The project encounters difficulties which are addressed by the project team. The endeavour of the project team to achieve the project objectives gives the team members' insight and project specific experience. This knowledge and experience is vital for the performance improvement of other project team and for the successful implementation of future projects.

### **4.0 Strategic Importance of Knowledge**

The competitive edge for organizations is achieved by the proper harnessing and deployment of knowledge. Project performance is an indicator of how effective that

deployment is. There is an abundance of knowledge and expertise contained in individuals of project teams. But often, project teams encounter identical problems on different sites.

The core issue of knowledge management is to place knowledge under management remit to get value from it, to realize intellectual capital, (Gundry and Metes 1996). A number of issues arise seeking answers regarding the re-use of knowledge :

- Key personnel may leave their employing organizations with a lifetime's experience. How can we capture and re-use that?
- Often teams do successful projects over a number of years. Why did they make the decisions they did? How did they deal with the customer? What made the team tick?
- How do we start learning from our experiences and help our people stop repeating others' mistakes?

The search for answers for such issues is on top of strategies aiming at performance improvement.

Simon (1976) suggests that organizations are created to accomplish tasks too complicated for any independent subset of their components. For example, individuals cooperate within organizations to achieve goals beyond the cognitive capabilities of any single agent. Only those organizations which consider knowledge as an asset of strategic significance can achieve competitive advantage in a continuously changing world.

## 5.0 Barriers to Knowledge Sharing

One of the most complicated issues in organizations is sharing knowledge. Often people resist giving their skills and knowledge to others for fear of losing exclusivity. Organizational climate needs to be one of learning in order to motivate individuals and groups to share knowledge, (Kakabadse et al., 2001 and Senge 1990). The presence of a culture supportive of knowledge sharing is critical for the effectiveness and success of a knowledge system, (Kakabadse et al., 2001 and McDermott 2001). People need to feel that while giving their knowledge and skills to others, they will gain benefit in the process.

Chris Cournoyer, CIO of Lotus, says that changing employee attitudes is a critical component of Knowledge Management. Resistance to sharing knowledge has always been an acute problem in organizations. Wiig (2000), notes

that people are often afraid to share their knowledge as they believe that they will lose the advantage that their expertise gives them among their peers and within the organization. He further states that under the best of circumstances, only a small fraction of an individual's applicable expertise can be elicited and shared. Deep, broad insights are generally not available, and may not exist except as a capability to reason until the situation requires it.

Importantly, when experts provide knowledge openly and widely, they tend to be considered important and gain status and recognition. In order to implement knowledge management successfully, an organization needs to cultivate an appropriate working environment: a culture and an incentive scheme that encourages knowledge sharing and a basic understanding of how knowledge management will benefit the organization, (CIRIA 2002).

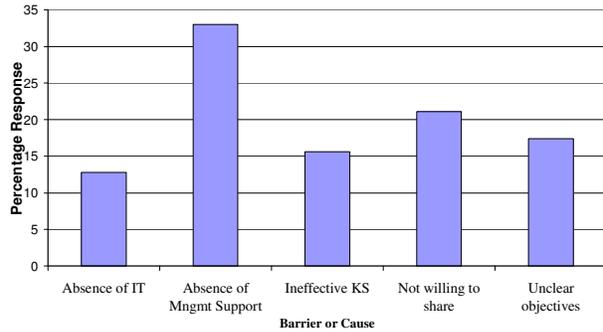
Figure 1.0 below was developed by the Author in a previous research on the Roads Directorate of the Kingdom of Bahrain. It was based on a questionnaire for which 55 respondents were chosen from different hierarchical positions. It shows a graphical representation of the various barriers to knowledge sharing. Of these factors, the management support and unwillingness to share are the most significant. Since culture is the main impediment to knowledge activities (Ribiere and Sitar 2003), what needs to be done is a cultural change. According to Stewart (2000), knowledge sharing might be human nature, but the companies that do it best all have some kind of forcing mechanisms.

The next factor in importance as identified by the survey was unclear objectives. The clear objectives can generate a shared vision amongst the group, thereby creating a unity in purpose and direction. Teams with such characteristics are sufficiently developed that knowledge sharing takes place easily. The ineffective knowledge systems and absence of information technology came last in the survey.

Organizations whose employees manifest cross-cultural differences experience greater difficulties in knowledge sharing and communication. The greatest challenge therefore is in creating an organizational culture in which knowledge sharing will thrive.

The organization culture (routinized ways of doing things that people accept and live by) and atmosphere must be the type that encourages sharing. Incentives need to be made available to motivate people to share their knowledge and at the same time feel that they gain rather than lose

(Gurteen 1999 and CIRA 2002). That culture should encompass the view that knowledge grows by sharing. Alavi & Leidner (2001) suggest that knowledge increases in value with use, while disuse may lead to loss or forgetfulness.



**Figure 1.0 Barriers to Knowledge Sharing, Source, Ali Mohammed (2002)**

The leadership values and encouragement as well as the reward systems employed in the organization are fundamental drivers for the needed culture (Ribiere and Sitar 2003). Often, the leadership style can be inspirational to other employees in their willingness to work effectively towards the company's objectives and values. It is also an effective tool in creating the right communication mechanisms to promote knowledge flow between entities within its structure.

Knowledge sharing starts with the individual. Individuals have to believe that knowledge sharing is the way to help them, their departments, teams or organisation meet their objectives. The journey from competition to cooperation amongst groups requires the right leadership commitment and culture.

## 6.0 Tools to Disseminate Knowledge

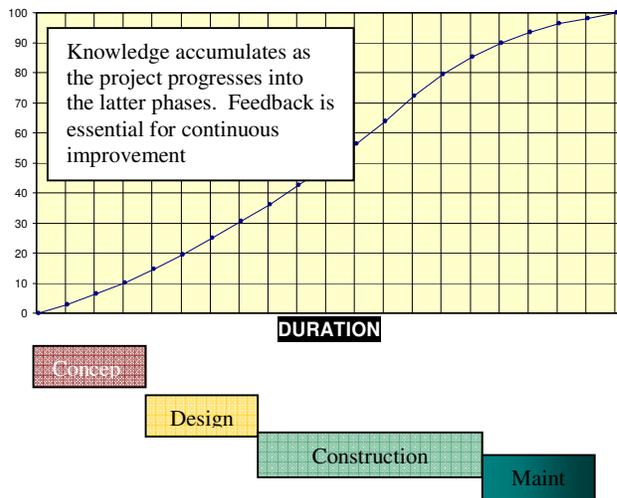
Isolated facts do not equal organizational knowledge. The serious challenge that organizations in the construction industry face today is in the capturing and re-application of the knowledge accumulated within the construction team from years of experience in executing a multitude of projects. There are many tools in practice to disseminate knowledge in organizations, however, the applicability of a certain tool in a particular situation may not necessarily guarantee its success in another. They should be developed

based on the consideration of various management and cultural issues within the organizations.

There are numerous tools employed in organizations for the management of knowledge. However, the scope of this paper will consider only three approaches which the author believes are applicable to the Roads Affairs of the Ministry of Works and Housing in the Kingdom of Bahrain, with minimum cost to the organization.

## 6.1 A Holistic, Life Cycle Approach

Projects get progressively elaborated as they advance into the project life cycle. Special skills and knowledge are employed at each phase of the project as different teams are involved. The different phases of the project also deliver special types of knowledge pertinent to the particular phases. This knowledge can be very valuable for other phases. Many failures in projects are attributed to insufficient project definition in the early stages. This leads to poor scope definition and hence the scope management fails to reach the right objectives.



**Figure 2.0 Life Cycle Knowledge Consideration (Adopted and Idealized from PMI)**

For better project definition, continuous coordination and liaison is maintained between the different teams at the various phases. For example, in order to produce a sound design, a designer needs buildability advice, which is available within construction teams. Such skills can be brought to the earlier phases of the project only through regular coordination meetings or by interrogating a well fed

and well maintained database of documented knowledge and lessons learned through previous projects.

Brain storming sessions take place for large and complex projects involving consultants, designers, construction engineers and maintenance engineers. The brain storming sessions address particular issues and use the outcome of the deliberations as the basis for decision making.

Such meetings are also critical for the success of the project. They facilitate an improved understanding of the designer's concept and intentions by the construction team, thus leading to fewer hurdles during the project implementation. More importantly however, they allow knowledge flow between the various members of the organization, ultimately resulting in improved input into the different phases of the life cycle. The consequence is improved project performance.

## 6.2 Intranets and Document Management Systems

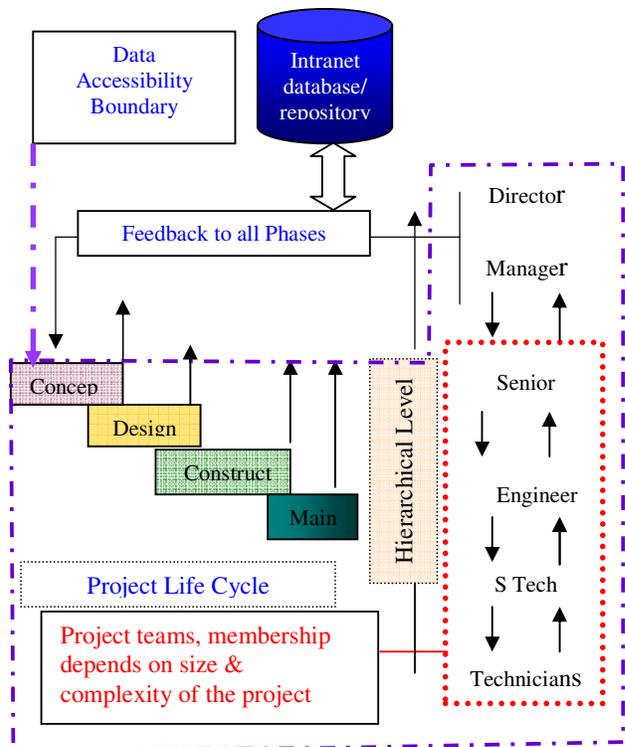
The rapid advances in information technology over the past two decades have facilitated unprecedented opportunities of collaboration and information sharing. The creation and management of functional and geographical groups using collaborative software facilitate the sharing of the information within the whole organization, as they allow for world class expertise to be readily accessed from worldwide project execution locations. This approach is to develop an information repository that organizes project experiences so that subsequent development efforts can find and reuse the accumulated knowledge.

IT-based knowledge management systems are comprised of three main parts, knowledge acquisition, knowledge sharing and knowledge warehouse. For the purpose of an IT knowledge system, knowledge acquisition corresponds to the process of extracting tacit knowledge and converting it to explicit using some knowledge representation software.

The process starts with acquiring knowledge, as knowledge has to be acquired before it can be put to use. It is then stored in the warehouse. The retrieval of the stored information is through an interface application. The power of an IT based knowledge system is in the ability of the user to interrogate the system for the required information.

The document management system, currently under study, came somewhat late to the Bahrain Ministry of Works and Housing, but the importance is in what it represents. The project is an outcome of the new strategic direction of the ministry. Once instigated, it will constitute a fundamental development towards a state-of-the-art data storage and retrieval system.

The concept stage of a project is crucial and is at times not well thought out. The result can be all the problems that then emerge at the implementation stage. The ideal approach for the system to be more effective is to make the feedback more comprehensive. Learning through projects requires a more collaborative approach and an appreciation of the valuable knowledge gained. Although there do not seem to be any problems regarding the relationships between the teams, it is the structure of operation and the management of knowledge flow that may impair the function of the system.



**Figure 3.0 Database Accessibility Structure, Source : Ali Mohammed (2002)**

While explicit knowledge is more successful to store in a repository for future retrieval and re-use, tacit knowledge

resides in peoples' minds and as such technology solutions can only go so far in pursuit of business performance and in managing the knowledge.

The existing technology infrastructure is sufficient to support an IT based knowledge system to store and disseminate project knowledge. But it should not be taken for granted that this will suffice. This system accommodates explicit knowledge only. Serious initiatives should be towards tacit knowledge. It should also be understood that knowledge sharing requires the individuals' willingness as well as the appropriate organizational culture. Technology alone does not guarantee that knowledge will flow in the right channels.

### 6.3 Objective Driven Task Force

The membership of such task force is cross-functional belonging to different parts of the organization and therefore has different backgrounds and disciplines. The depth and variability of knowledge and skills within the team may offer different perceptions of the issues being deliberated. The objectives the task force works toward are not necessarily project related. But the opportunities available for knowledge flow are great.

The most important and indeed the most difficult type of knowledge that needs to be shared is tacit knowledge. The ability of an organization to extract this knowledge gives a greater competitive advantage than it would if it relied solely on explicit knowledge.

The recognition of this fact has generated enough motivation within the Ministry of Works and Housing to put forward a strategy to encourage a knowledge sharing culture amongst its employees. The formation of temporary Task Forces (Committees) to study issues and develop options is one tool that has proved effective in this regard. Knowledge sharing becomes part of the process of team development.

It is believed that the various systems that are fundamentally based on face-to-face communication orientate the members' thinking and promote a common knowledge base. This directs members' behaviour which aggregates to performance improvement (Ali Mohammed 2002).

The core strength of this initiative is the type of participants who belong to various phases of the project life

cycle, thus making it possible to deploy the lessons learned to the various stages and ensuring that improvements are comprehensive and continuous.

## 7.0 Beyond the Project Team

The discussion so far focused on approaches aimed at pushing knowledge beyond the boundaries of project teams and their effect on the performance of future projects.

As opposed to starting a project from a blank sheet of paper, it would be advantageous for developers to take their initial understanding of the problem through a repository of project experiences that lend access to an organizational memory. This eliminates the duplication of effort by reusing requirements and identifying reusable components. It also supports the process of discovering common pitfalls that others might have encountered and should not be repeated. The process can begin by creating a description of the project by querying and browsing the repository for project characteristics that describe the current project (Henninger, 1995).



**Figure 4.0 An informal meeting involving employees from different hierarchical levels.**

The encouragement of formal or ad hoc gathering of staff is very instrumental in promoting trust, team culture and consequently the flow of knowledge. Much of the project team experiences are shared through such unplanned meetings. However, objective driven formal meeting approach can formalize such knowledge flow, putting it in a business related context. It is particularly critical as it addresses tacit knowledge.

Documenting team experiences after project completion should be part of the closure process. Such readily accessible documentation (lessons learned) makes available valuable knowledge for other teams in the organization. It also represents an important input for future projects effecting fundamental improvements and avoiding mistakes.

## 8.0 Conclusions and Recommendations

The value of knowledge has a strategic importance for the success of organizations. Knowledge generated through project delivery is of profound importance for the continuous improvement in project based organizations.

Often knowledge is confined within the precincts of those who acquired it. Successful organizations devise means and ways of tapping into this knowledge and putting it into gainful use for the advancement of project performance.

The process of capturing knowledge, sharing information between projects and documenting innovative new ways of solving problems are the heart of knowledge systems in organizations.

In order to effectively manage knowledge within an organization, there needs to be a clear framework to operate within : a framework that encompasses processes, people and technology.

An organizational culture that encourages knowledge sharing must prevail. The role of leadership in creating and fostering a knowledge sharing culture is crucial for the success of the organizations. Communication is a very critical element for the knowledge sharing culture to blossom and reap benefit.

Re-using knowledge that is generated through project accomplishments is critical to realize a learning organization capable of facing the challenges from an ever increasing complexity in the construction industry and a constantly changing business environment.

The author therefore concludes that knowledge management initiative is a far broader endeavour than merely functionality in a suite of software. Yes, technology

networks can be used to promote and enable knowledge sharing, but only when these are within the interpersonal interfaces.

Two of the most significant factors for the application of knowledge systems are the cultural change and the leadership commitment.

Current levels of knowledge-tailored efforts in the public sector organizations are sub-optimal for efficient exploitation of knowledge assets. The acquisition, dissemination and sharing of knowledge require active strategies that encompass whole life cycle thinking, socio-cultural approaches, organizational orientation and technology considerations.

Although not necessarily called knowledge systems, the various initiatives employed by the Ministry of Works and Housing were aimed at putting knowledge and skills at the service of other teams and for the betterment of future project performance. However, the new strategic direction of the Ministry identified knowledge as a core business area, thus promising a bright future in its pursuit for a successful learning organization.

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