

## Use of Knowledge Management in Mitigating Performance Impediments of Construction Organisations in Tanzania

Harriet K. Eliufoo\*

### Abstract

Mitigating performance impediments in the construction industry can be done through managing knowledge effectively, and specifically through best practice in the transfer of knowledge. This article investigates the knowledge transfer process of 68 construction organisations that consists of professional consulting firms and contractors in the Tanzania construction industry, factors that hinder best practice in these; and how best this can be enhanced. Using a knowledge transfer model as a data collection and an analytical tool, the study establishes hindrances to top performance which include: lack of explicit organisational goals, non-codification of experience, the absence of training programmes, and pro-active information sharing.

**Keywords:** best practices, construction organisations, knowledge management

### Introduction

The Tanzania construction sector reflects typical problems inherent in a developing economy. The market is divided into a regulated and non-regulated sector with a low capacity institutional set-up; the construction industry policy is only about four years old; the country's building regulation still in the making; and advanced projects are designed and constructed by foreigners using codes and standards of their home countries (Bjorklof et al., 1992). Also, consulting firms are small sized, on average not employing more than 10 permanent employees, while registered contracting firms are similarly small but many in the year 2004 (TCRB, 2004).

There are always impediments in the delivery of construction projects right from inception to commissioning. Typically these may include: poor understanding of client's requirement that may necessitate introduction of changes throughout a project's life; and poor design that results to works that is dysfunctional or aesthetically of very low standards.

---

\*School of Construction Economics and Management (SCEM), Ardhi University: [harriet@aru.ac.tz](mailto:harriet@aru.ac.tz)

Performance impediments in the Tanzania construction industry have also been explicitly stated in the country's construction industry policy, (CIP) (URT, 2003). These include: low productivity and quality; low technological base; and low capacity and capability of the local contractors and consultants due to a weak resource base and inadequate experience.

The CIP has sequentially taken aboard actions aimed at improving capacity and performance of the local construction firms (URT, 2006). Training has featured strongly in the proposed action plan. Since research is one of the pre-requisites to training, we hope that the empirical research in this study will contribute in identifying training needs as stipulated in the plan.

The research questions that this study addresses are:

- What is the practice of knowledge transfer of professional consulting firms and contractors?
- What are the factors that hinder best practices in the transfer of knowledge in professional consulting firms and contractors?
- How can best practices in the transfer of knowledge be promoted by consulting firms and contractors in construction projects?

## **Literature review**

### ***Knowledge Management***

Knowledge is a basic success factor for an entity (Nonaka & Takeuchi, 1995; Probst et al., 2000); a dynamic organizational asset that creates sustainable competitive advantages for a firm (Davenport & Prusak, 1998); and one that works towards enriching firms' strategic goals. Probst et al. (2002) defines knowledge as cognition and skills that people use to solve problems, or simply representing 'know-how'. Skills or 'know-how' for organisations has to be managed to be effective. This is known as knowledge management.

This definition conforms to the knowledge model of McAdam and McCreedy (1999) that views knowledge as intrinsically linked to the social and learning process that constitutes knowledge construction, knowledge embodiment, and knowledge dissemination and use. Such a model is similarly close to the knowledge management building blocks of Probst et al., (2000) that constitute knowledge identification, acquisition, development, sharing and distribution, utilization, and retention.

Cowie (1989) views experience as an outcome of knowledge, describing it as "knowledge or skill acquired from seeing and doing things," while Kolb (1984) views it as knowledge created in organisations undergoing a transformation,

identifying the process as 'learning.' In the course of undertaking construction projects, therefore, knowledge and skills is acquired amongst the actors, which later becomes individual or firm's experience.

There has been a need for specialisation within the construction industry due to increasing complexity of buildings, and requirements of civil and industrial engineering created by technological developments. In consequence, professions associated with construction have emerged as separate skills (Walker, 1984). These include architects; quantity surveyors; and structural, mechanical, electrical, electronic, acoustic, safety, and transport engineers. Hence, on any project, a large number of contributors and skills are involved. According to the adopted definition of knowledge, such a situation is an ideal ground for 'inter-skill transfer' or 'knowledge transfer'.

This article has taken effective knowledge transfer as a component of effective knowledge management, based on the close resemblance to knowledge management models and knowledge transfer models as given by Sverlinger (2000), Probst et al. (2000), McAdam and McCreedy's (1999), Bhatt, (2001), Vito et al., (1999), and Davenport and Prusak, (1998). The article also acknowledges the simple fact that knowledge management embraces the optimal way of managing knowledge, of which effective knowledge transfer would be part. The knowledge management model is represented by a knowledge transfer model as given in Fig. 1.

Exploring and understanding how knowledge is transferred in construction organisations in a developing country like Tanzania is an opportunity to identify, document and even mitigate obstacles to effective transfer of knowledge, to subsequently improve the industry. This is especially relevant to Tanzania, bearing in mind that the development of the country's infrastructure has been identified as an important ingredient towards attainment of a faster economic growth, and as an essential catalyst for attainment of the country's Vision 2025 (URT, 2003).

#### *Performance improvement*

The debate on performance has been mainly on how it can be measured in terms of performance indices or indicators such as time, cost, or quality (Sokhail & Baldwin, 2004). In this article performance is viewed as an outcome, or a measure of the degree of accomplishment as given by Ho Ming et al., (2002). For construction projects, this would mean delivering the final physical product at the agreed time, cost and quality.

#### *Construction Knowledge*

Basing on the adopted definition of knowledge, construction knowledge here is taken to mean skills and know-how in design, bidding, estimating costs, constructability, and project management. In short, construction knowledge

constitutes all that is required to meet typical performance measures of a construction project, i.e., time, cost, and quality. How these performance measures are achieved reflects the knowledge management practice of an organisation.

*Mapping best practices in the transfer of knowledge*

In addition to acknowledging that 'practice' is a contested concept within the social theory, Kalling and Styre (2003) characterize 'practice' as "...constituting semi-structured operations and undertakings that draw on institutional behaviours and beliefs while giving the individual significant space for individual interpretations." The concept of practice enables an analysis of how knowledge is employed and developed in organisations. As per Schindler (2001) (in Kalling & Styre, 2003: 16) "...practice involves routines organizations use to process people and things..." Hence, with reference to the research questions, this refers to organisations routines that facilitate the transfer of knowledge.

Davenport and Prusak (1998: 88) states: "Knowledge is transferred in organizations whether or not we manage the process at all." In addition to this, it is our opinion that organizations stand to benefit more if the transfer is strategically done. Hence, in mapping best practices in the transfer of knowledge for professional consulting firms and contractors, the study adopts a five-stage knowledge transfer model modified from Dixon (1992) and Sverlinger (2000). Thus, a best practice of knowledge transfer as modelled constitutes knowledge acquisition, knowledge distribution, make meaning/interpret, organisational memory, and retrieval of information (see Fig. 1.) We conceptualise from Fig. 1 that performance improvement in construction organisations can be realized through best practice in the knowledge management (KM) process.

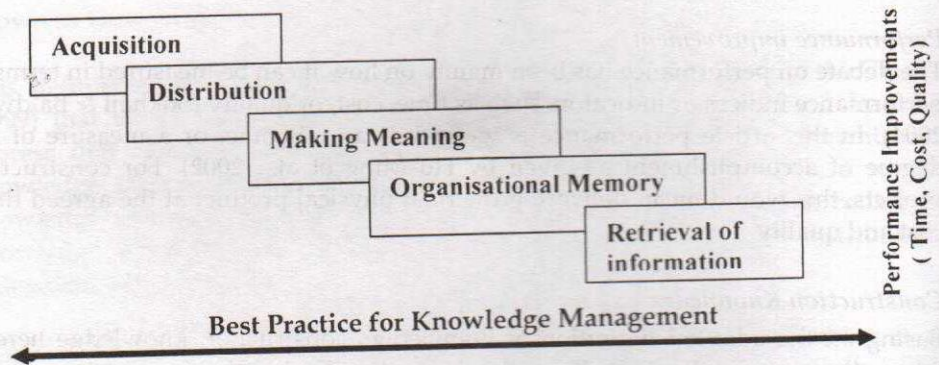


Figure 1: The knowledge transfer process model

## *Mitigating Performance Impediments of Construction Organisations*

To make the processes in the model operational, corresponding activities as given in Dixon (1992), Sverlinger (2000), and Eliufoo (2005) for a similar knowledge transfer model were adopted and used as a basis of analysis. These activities formed main areas of enquiry in questionnaires to respondents; and were taken as indicators of 'best practices' in the firms.

### **Methodology**

#### *Choice of research enquiry*

An important feature of a survey, that it can best explain the existence of phenomenon, was considered as the best approach to obtain answers to the research questions. That, what is the practice of the knowledge transfers process of professional consulting firms and contractors? or what are the factors that hinder best practices of transfer of knowledge? The survey was conducted by administering questionnaires supported by interviews from practicing consulting and construction firms in the Tanzania construction industry.

#### *Choice of sample and size*

An 'information rich' approach (Patton, 1987) -- what Bless and Smith (1995) referes to as 'judgemental sampling' -- was adopted in the choice of sample. Construction firms considered in the study included those that had undertaken construction projects in the past five years (1997- 2001). Lists of such firms were obtained from relevant statute regulatory bodies. For contractors, samples of active firms were obtained from the Contractors Registration Board (CRB) of Tanzania. As this body has a class categorisation of its members, the study ensured a representation according to the CRB categorisation was made, and it included both large (20) and medium-class (29) contractors. A total of 60 questionnaires were sent to contracting firms, and 49 firms responded hence giving a response rate of 81.6%.

For professional consulting firms the sample covered architects and quantity surveyors as they were considered an adequate representative of consultant professionals in the industry. Respondents that were active in the construction industry were sought from a list provided by the Architects and Quantity Surveyor Registration Board (AQRB). Questionnaires were administered to 25 consulting firms; of which 19 returned, giving a response rate of 76%.

Interviews were spontaneously done whenever there was an opportunity during collection of questionnaires; and a total of ten interviews were conducted to individuals in both the consulting firms and constructing firms.

#### **Data collection and analysis**

##### *Internal knowledge acquisition*

Information was sought as to what extent firms acquire knowledge from internal sources, ie., whether through: congenital means (such as from founders of the firm,

prevailing technology); critical reflection (as in dialogue, questioning assumptions), experiential (as through successes, mistakes); experimenting (as in innovation and research activities); or through awareness of firm's objectives by employees.

The study revealed that large and medium contracting firms (75%) were more innovative than professional consulting firms (36.8%) (see Figs. 2(a) and 2(b)). All contractors affirmed developing own strategy to enhance work, as against slightly above a third (36.8%) of professional consulting firms.

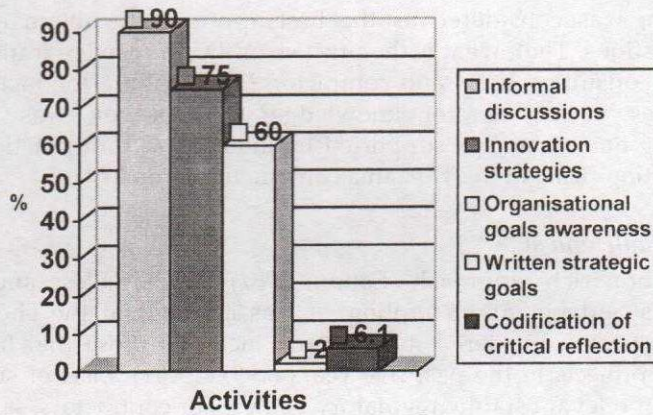


Fig. 2(a): Internal knowledge acquisition: contractors  
 Note: Informal discussions dominate

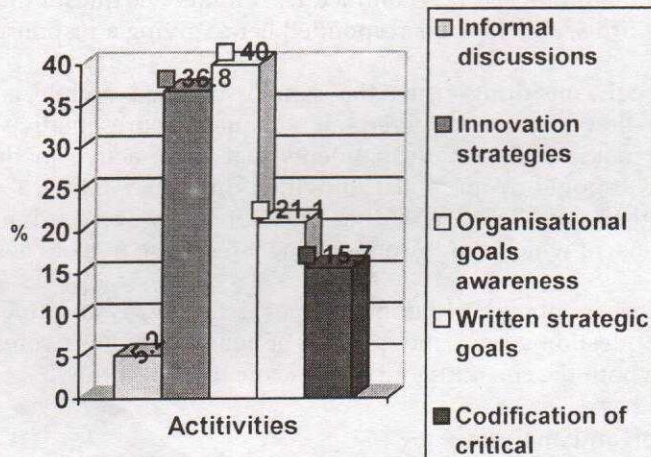


Fig. 2(b): Internal knowledge acquisition: consultants  
 Note: Awareness of organisational goals dominate

## Mitigating Performance Impediments of Construction Organisations

Individuals employed in professional consultant firms were more knowledgeable of firm's objectives and strategic goals, as compared to employees in large contractors (40%) and medium contractors (6.8%). However, few professional consultant firms (4 out of 19) had their strategic goals written down. Such a practice was almost non-existent in both the large and medium contractors, where only 1 firm (large contractors) reported the practice. Codification of discussion based on critical reflections of firm's performance was very low for all respondents. Only a few professional consultant firms (3 out of 19); and an insignificant number for both the medium contractors (2 out of 29) and the large contractors (1 out of 20) practised codifying reviews of their performances. A high proportion of contracting firms (90%) had more informal discussion of problems and successes of work undertaken during break hours, as compared with professional consultants (5.2%). R & D activity was absent for all respondents.

### External knowledge acquisition

Information sought from respondents as to the means of external knowledge acquisition included: number of conferences attended in the last 5 years; links with other consulting/contracting firms; relation with clients; recruitment of new members as a means of acquiring knowledge; extent of collaboration arrangements; subscription to construction journals; and access to technical, economic and social reports. The results were as presented in Figs. 3(a) and 3(b).

It was observed that considerable proportions of professional consulting firms (79%) have formal linkages with other firms that facilitate information sharing. Inter-firm linkages in large contractors were much less (5%) when compared to medium contractors (17.2%). Relatively, more contracting firms (30%) recruited individuals to bring in knowledge to the firm than professional consultants (15.8%).

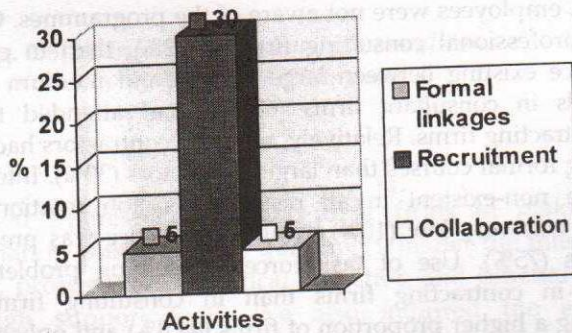


Fig. 3(a): External knowledge acquisition: contractors

Note: Recruitment highest source

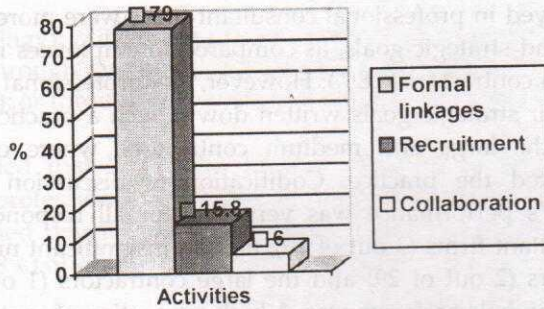


Fig. 3(b): External knowledge acquisition: consultant  
 Note: Formal linkages highest source

As can be further seen from Figs. 3(a) and 3(b), collaboration arrangements such as joint ventures, mergers, and consortium were at a low level (less than 10%) for all respondents. More individuals in contracting firms attended at least one conference per year, as compared to individuals in consulting firms. All respondents subscribed to at least one local construction journal, with a higher proportion of consulting firms subscribing to international construction journals.

**Information sharing and distribution**

Information was obtained on how firms share and distribute information. This centred on the mode of transferring information as through memos, reports, or verbal means; number of formal courses attended by employees since joining the firm, the existence of training programmes, on-the-job training, job rotation; the practice of task forces in solving problems; existence of internal publications such as brochures, journals, newsletters, internal seminars; holding of workshops or courses and informal networks. The results were as presented in Figs. 4(a) and 4(b).

Although training programmes were reported to exist in at least 50% of professional consultant firms, employees were not aware of the programmes. On-the-job training was higher in professional consulting firms (84.2%), than in contractors, with a marked difference existing between large (68.9%) and medium contractors (40%). More individuals in consultant firms (68.4%) had attended formal courses as compared to contracting firms. Relatively, medium contractors had more individuals (55.2%) attending formal courses than large contractors (30%). Internal seminars and workshops were non-existent in all respondents. Job rotation for professional consulting firms was very low (10%), while the practice was predominant in large contracting firms (75%). Use of task forces in solving problems was practiced relatively more in contracting firms than in consulting firms, with medium contractors having a higher proportion of firms (44.8%) and only a small proportion of consulting firms (21%). Informal networks in firms were predominant in contracting firms (90%) than in professional consulting firms (21.1%).



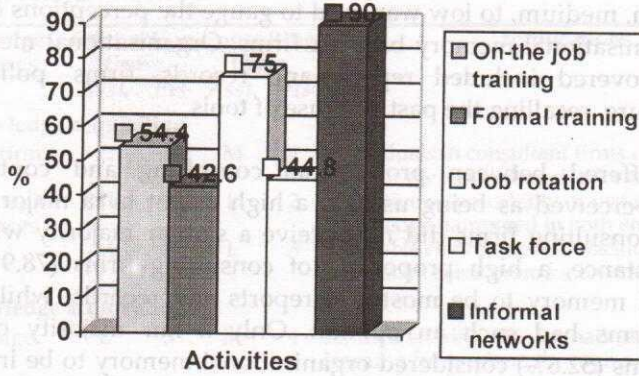


Fig. 4(a): Information sharing: contractors

Note: Informal networks dominate

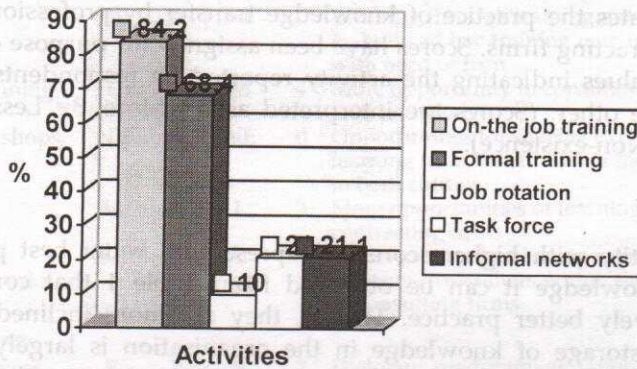


Fig. 2.6(b): Information sharing: consultants

Note: On-the-job training dominates

### Making meaning

The modality used by respondents and their firms in making meaning of distributed information was sought by querying whether the interpretations were through dialogue, process checks, critical reflection and rational analysis of past events, or through support tools. We also inquired the extent to which respondents' firms facilitated such modes of interpreting information. All respondents indicated 'making meaning' as occurring through dialogue when having regular or ad-hoc meetings, working in teams, and in process checks.

### *Organisational memory and retrieval*

A scale of high, medium, to low was used to gauge the perceptions of respondents as to the organisational memory base for firms. Organisational memory bases or repositories covered included reports and records, firms' policies, routines, culture, structure, recalling the past, and use of tools.

Responses differed between professional consulting and contracting firms. Repositories perceived as being used to a high extent by a major proportion of professional consulting firms did not receive a similar majority with contracting firms. For instance, a high proportion of consulting firms (78.9%) considered organisational memory to be mostly in reports and records, while only 50% of contracting firms had such an opinion. Only a fair majority of professional consulting firms (52.6%) considered organisational memory to be in structure of a firm; and a lesser proportion in firm's policy (42.1%) and culture (36.8%). Contracting firms' perceptions of organisational repositories as being in the structure, policy and culture of firms was even less.

### *Implications drawn from data*

Table 1 illustrates the practice of knowledge transfer by professional consultant firms and contracting firms. Scores have been assigned for purpose of comparison with higher values indicating the activity reported by respondents more in one entity than the other. (Scores are interpreted as: 4= More, 3= Less, 2= Low, 1= Exists and 0= Non-existence).

### **Conclusion**

Taking the entity with higher scores as representing better best practice in the transfer of knowledge it can be observed from Table 1 that consultant firms portray relatively better practice. That is, they are more inclined to inter-firm linkages; the storage of knowledge in the organisation is largely in structure, reports, records and organisation policies. The practice of contracting firms, on the other hand, is inclined largely to acquire knowledge through innovative activities, recruitment, and participation in conferences and seminars. Sharing of information by contractors is relatively more through job rotation, teamwork, and informal networks, while organisational storage of knowledge is with individuals.

Factors that hinder best practices in the transfer of knowledge are reflected by an activity rated 'Low' or 'Non-existence' in Table 1. Overall, the investigation has established that factors that hinder best practice in the transfer of knowledge cross-cut in both entities, and include: lack of documentation of organisational goals; non-codification of reviews or critical reflections when made; absence of collaborative arrangements such as joint ventures, peer assistance; and the absence of training programs, internal workshops and seminars for employees

## Mitigating Performance Impediments of Construction Organisations

**Table 1: The knowledge transfer process as practiced by professional consultant vs. contracting firms**

Firms - Knowledge transfer processes	Contracting firms		Consulting firms		Implications
	Asst.	Pts	Asst.	Pts	
<b>I.1 Internal knowledge acquisition</b>					
• Awareness of firm's objectives	L	3	M	4	Individuals in consultant firms responsible not only for the means but also for the end
• Codifying strategic goals, experiences	NE	0	L	2	Collective responsibility, transfer of explicit knowledge hampered in both entities
• Informal discussions	M	4	L	3	A suitable environment for facilitating knowledge conversion exists more for contracting firms
<b>I.2 External knowledge acquisition</b>					
• Inter-firm linkage	L	3	M	4	Limited sharing of information and hence learning from others through socialisation by contracting firms
• Recruitment of new members	M	4	L	3	A positive attribute to learning for contracting firms by bringing in new knowledge through recruitment
• Collaboration arrangements	NE	0	L	2	Opportunities for learning through others exist for consultant firms
<b>II. Information sharing and distribution</b>					
• Training programmes	NE	0	NE	0	Learning through training not highly favoured by both; ad hoc training may not be compatible with need of firm
• On the job training	L	2	M	4	More opportunity in consultant firms to convey tacit knowledge
• Internal workshops, seminars etc.	NE	0	NE	0	Opportunities for sharing experiences and learning from others within the firm inhibited in both entities
• Job rotation	M	4	L	3	More opportunities of learning by doing in contracting firms
• Task forces, informal networks	M	4	L	3	Opportunities for sharing experiences and learning from others within the team inhibited in consulting firms
<b>IV. Make meaning</b>					
• Dialogue, process checks, critical reflection	E	2	E	2	Dialogue, predominant; rational analysis absent. A shortcoming that may bar learning from previous situations
<b>IV. Organisational memory</b>					
• Reports, records	L	3	M	4	Un-codified knowledge may be lost for consultants; both un-codified and codified knowledge for contracting firms may be lost
• Structure, policies	L	3	M	4	Knowledge assimilation higher when it features in firm structure, e.g., routines, norms procedures, etc.
• Individuals	M	4	L	3	Individuals as repositories pose danger of losing firm's knowledge when moving to other firms
<b>Total score</b>		<b>36</b>		<b>41</b>	

**Key:** L = Less, M = More, E = Exist, NE = Non-Exist

It was also noted that the absence of pro-active information sharing approaches such as the best practise replication (BPR) as practiced by Ford, and the peer assist (PA) method as practised by the British Petroleum (BP) (Dixon, 1999) inhibited organisations from learning of best practices from others.

This article has from the beginning identified the needs for construction organisations to adopt best practices in the management of knowledge as a starting point, and hence addressed the shortcomings of construction organisations in the country in this respect. It has noted that specifically organisations need to: (i) document their goals and ensure they are understood by all; (ii) codify reviews and critical reflections done in the organisation, (iii) have in place training programmes for employees: and (iv) venture into collaborative arrangements so as to gain from others.

#### **Implications to construction organisations and industry**

The outcome of the investigation has shown professional consultants and contractors have in place best practices in the transfer of knowledge, and that the practices are not identical between them. This implies they can learn from each other. The study has identified gaps and hindrances to best practices in the transfer of knowledge for both professional consultants and contractors. Working to overcome the identified obstacles can greatly improve performances of the construction organisations in the country.

#### **Policy implications**

As mentioned earlier, one of the essential catalyst for the attainment of Vision 2025 is the development of strategic infrastructure facilities, which are ingredients in attainment of accelerated economic growth. As such, the realisation of Vision 2025 to a great extent hinges on the existence of a reliable and competitive local construction industry (URT, 2006).

Hence, the improvement of best practices in KM by construction organisations suggested by the article, if adopted, would contribute towards increasing the capacity of the industry. The implementation action programme of the Tanzania CIP (URT, 2006) further directs collaboration of the government and the private sector to promote the application of best practices. It is important, therefore, to have an action plan to specifically emphasize and spell out best practices in the 'management of knowledge' for construction and similar organisations.

## Mitigating Performance Impediments of Construction Organisations

### References

- Bhatt G.D. 2001. Knowledge management in organizations: examining the interaction between technologies, techniques and people. *Journal of Knowledge Management* 5(1): 68-75.
- Björklöf, S., T. Klingberg, B. Muhegi, A. Temba. 1992. Birches don't grow in Serengeti: An evaluation of development policy and Nordic support to the construction sector in Tanzania 1975-1990. SIDA Evaluation Report series 1992/1, Stockholm, Sweden.
- Bless, C., & C. Higson-Smith. 1995. *Fundamentals of social research methods: an African perspective, 2<sup>nd</sup> edn*. Cape town: Kenwyn Juta and Co Ltd.
- Davenport, T. H., & L. Prusak. 1998. *Working knowledge: how organizations manage what they know*. Boston, Massachusetts: Harvard Business School Press.
- Dixon, N.M. 1992. Organizational Learning: A review of the literature with implications for HRD professionals. *Human Resource Development Quarterly* 3(1):29-49.
- Eliufoo, H.K. 2005. Knowledge creation and transfer in construction organisations in Tanzania. A doctoral thesis Royal Institute of Technology (KTH), in Building and Real Estate Economics, Stockholm Sweden.
- Fu ,W. K. 2002. The effect of experience on contractors' competitiveness in recurrent bidding. *Construction Management and Economics* 20: 655 -666.
- Ho-Ming, S., & W. Kuei-Yang. 2002. The relationship between total quality management and project performance in building planning phase: An empirical study of real estate industries in Taiwan. *Total quality Management* 13 (1): 133- 151.
- Kalling, T., & A. Styre. 2003. *Knowledge sharing in organizations*. Malmo, Sweden: Liber AB.
- McAdam, R., & S. McCreedy. 1999. The process of knowledge management within organisations: a critical assessment of both theory and practice. *Knowledge and Process Management* 6(2): 101-113.
- Nonaka, I., & H. Takeuchi. 1995. *The Knowledge creating company: how Japanese companies create the dynamics of innovation*. New York: Oxford University Press.
- Patton, M.Q. 1987. *How to use qualitative methods in evaluation*. California: SAGE Publications.
- Probst, G., S. Raub, & K. Romhardt. 2000. *Managing knowledge: building blocks for success*. West Sussex, England: John Wiley & Sons Ltd.
- Sokhail, M., & A.N. Baldwin. 2004. Performance indicators for micro-projects in developing countries. *Construction Management and Economics* 22: 11-23
- Sverlinger, P.O.M. 2000. Managing Knowledge in Professional service organisations. A doctorate thesis, Department of service management, Chalmers University of Technology, Gothenburg, Sweden.

**Harriet K. Eliufoo**

- Tanzania Contractors Registration Board (TCRB). 2004. List of registered contractors, March, 2004, Dar es Salaam, Tanzania.
- United Republic of Tanzania (URT). 2003. Construction Industry Policy (CIP). Ministry of works, Dar es Salaam. Dar es Salaam: Government Printer
- . 2006. Implementation Action Programme for Construction Industry Policy. Ministry of Infrastructure Development. Dar es Salaam: Government Printer.
- Vito, A., A.C. Garavello, & G. Schiuma. 1999. Knowledge transfer and inter-firm relationship in industrial districts: the role of the leader firm. *Technovation* 19: 53- 63.
- Walker, A. 1984. *Project Management in construction* 4<sup>th</sup> (Edn.) Oxford: Blackwell Science.