



**RICS**

the mark of  
property  
professionalism  
worldwide

DAUPHINE  
UNIVERSITÉ PARIS

# COBRA 2010

## The Construction, Building and Real Estate Research Conference of the Royal Institution of Chartered Surveyors

**Held at Dauphine Université, Paris, 2-3 September 2010**

ISBN 978-1-84219-619-9

© RICS

12 Great George Street  
London SW1P 3AD  
United Kingdom

[www.rics.org/cobra](http://www.rics.org/cobra)

September 2010

The RICS COBRA Conference is held annually. The aim of COBRA is to provide a platform for the dissemination of original research and new developments within the specific disciplines, sub-disciplines or field of study of:

### **Management of the construction process**

- Cost and value management
- Building technology
- Legal aspects of construction and procurement
- Public private partnerships
- Health and safety
- Procurement
- Risk management
- Project management

### **The built asset**

- Property investment theory and practice
- Indirect property investment
- Property market forecasting
- Property pricing and appraisal
- Law of property, housing and land use planning
- Urban development
- Planning and property markets
- Financial analysis of the property market and property assets
- The dynamics of residential property markets
- Global comparative analysis of property markets
- Building occupation
- Sustainability and real estate
- Sustainability and environmental law
- Building performance

## The property industry

- Information technology
- Innovation in education and training
- Human and organisational aspects of the industry
- Alternative dispute resolution and conflict management
- Professional education and training

## Peer review process

All papers submitted to COBRA were subjected to a double-blind (peer review) refereeing process. Referees were drawn from an expert panel, representing respected academics from the construction and building research community. The conference organisers wish to extend their appreciation to the following members of the panel for their work, which is invaluable to the success of COBRA.

Rifat Akbiyikli	Sakarya University, Turkey
Rafid Al Khaddar	Liverpool John Moores University, UK
Ahmed Al Shamma'a	Liverpool John Moores University, UK
Tony Auchterlounie	University of Bolton, UK
Kwasi Gyau Baffour Awuah	University of Wolverhampton, UK
Kabir Bala	Ahmadu Bello University, Nigeria
Juerg Bernet	Danube University Krems, Austria
John Boon	UNITEC, New Zealand
Douw Boshoff	University of Pretoria, South Africa
Richard Burt	Auburn University, USA
Judith Callanan	RMIT University, Australia
Kate Carter	Heriot-Watt University, UK
Keith Cattell	University of Cape Town, South Africa
Antoinette Charles	Glasgow Caledonian University, UK
Fiona Cheung	Queensland University of Technology, Australia
Sai On Cheung	City University of Hong Kong
Samuel Chikafalimani	University of Pretoria, South Africa
Ifte Choudhury	Texas A and M University, USA
Chris Cloete	University of Pretoria, South Africa
Alan Coday	Anglia Ruskin University, UK
Michael Coffey	Anglia Ruskin University, UK
Nigel Craig	Glasgow Caledonian University, UK
Ayirebi Dansoh	KNUST, Ghana
Peter Davis	Curtin University, Australia
Peter Defoe	Calford Seaden, UK
Grace Ding	University of Technology Sydney, Australia
Hemanta Doloi	University of Melbourne, Australia
John Dye	TPS Consult, UK
Peter Edwards	RMIT, Australia
Charles Egbu	University of Salford, UK
Ola Fagbenle	Covenant University, Nigeria
Ben Farrow	Auburn University, USA
Peter Fenn	University of Manchester, UK
Peter Fewings	University of the West of England, UK

Peter Fisher	University of Northumbria, UK
Chris Fortune	University of Salford, UK
Valerie Francis	University of Melbourne, Australia
Rod Gameson	University of Wolverhampton, UK
Abdulkadir Ganah	University of Central Lancashire, UK
Seung Hon Han	Yonsei University, South Korea
Anthony Hatfield	University of Wolverhampton, UK
Theo Haupt	Cape Peninsula University of Technology, South Africa
Dries Hauptfleisch	University of the Free State, South Africa
Paul Holley	Auburn University, USA
Danie Hoffman	University of Pretoria, South Africa
Keith Hogg	University of Northumbria, UK
Alan Hore	Construction IT Alliance, Ireland
Bon-Gang Hwang	National University of Singapore
Joseph Igwe	University of Lagos, Nigeria
Adi Irfan	Universiti Kebangsaan Malaysia, Malaysia
Javier Irizarry	Georgia Institute of Technology, USA
Usman Isah	University of Manchester, UK
David Jenkins	University of Glamorgan, UK
Godfaurd John	University of Central Lancashire, UK
Keith Jones	University of Greenwich, UK
Dean Kashiwagi	Arizona State University, USA
Nthatisi Khatleli	University of Cape Town, South Africa
Mohammed Kishk	Robert Gordon's University, UK
Andrew Knight	Nottingham Trent University, UK
Scott Kramer	Auburn University, USA
Esra Kurul	Oxford Brookes University, UK
Richard Laing	Robert Gordon's University, UK
Terence Lam	Anglia Ruskin University, UK
Veerasak Likhitrungsilp	Chulalongkorn University, Thailand
John Littlewood	University of Wales Institute, Cardiff, UK
Junshan Liu	Auburn University, USA
Champika Liyanage	University of Central Lancashire, UK
Greg Lloyd	University of Ulster, UK
S M Lo	City University of Hong Kong
Mok Ken Loong	Yonsei University, South Korea
Martin Loosemore	University of New South Wales, Australia
David Manase	Glasgow Caledonian University, UK
Donny Mangitung	Universitas Tadulako, Malaysia
Patrick Manu	University of Wolverhampton, UK
Tinus Maritz	University of Pretoria, South Africa
Hendrik Marx	University of the Free State, South Africa
Ludwig Martin	Cape Peninsula University of Technology, South Africa
Wilfred Matipa	Liverpool John Moores University, UK
Steven McCabe	Birmingham City University, UK
Annie McCartney	University of Glamorgan, UK
Andrew McCoy	Virginia Tech, USA
Enda McKenna	Queen's University Belfast, UK
Kathy Michell	University of Cape Town, South Africa
Roy Morledge	Nottingham Trent University, UK

Michael Murray	University of Strathclyde, UK
Saka Najimu Stanley Njuangang	Glasgow Caledonian University, UK University of Central Lancashire, UK
Henry Odeyinka Ayodejo Ojo Michael Oladokun Alfred Olatunji Austin Otegbulu Beliz Ozorhon Obinna Ozumba	University of Ulster, UK Ministry of National Development, Seychelles University of Uyo, Nigeria Newcastle University, Australia Bogazici University, Turkey University of the Witwatersrand, South Africa
Robert Pearl Srinath Perera Joanna Poon Keith Potts Elena de la Poza Plaza Matthijs Prins Hendrik Prinsloo	University of KwaZulu, Natal, South Africa Northumbria University, UK Nottingham Trent University, UK University of Wolverhampton, UK Universidad Politécnica de Valencia, Spain Delft University of Technology, The Netherlands University of Pretoria, South Africa
Richard Reed Zhaomin Ren Herbert Robinson Kathryn Robson Simon Robson David Root Kathy Roper Steve Rowlinson Paul Royston Paul Ryall	Deakin University, Australia University of Glamorgan, UK London South Bank University, UK RMIT, Australia University of Northumbria, UK University of Cape Town, South Africa Georgia Institute of Technology, USA University of Hong Kong, Hong Kong Nottingham Trent University, UK University of Glamorgan, UK
Amrit Sagoo Alfredo Serpell Winston Shakantu Yvonne Simpson John Smallwood Heather Smeaton-Webb Bruce Smith Melanie Smith Hedley Smyth John Spillane Suresh Subashini Kenneth Sullivan	Coventry University, UK Pontificia Universidad Católica de Chile, Chile Nelson Mandela Metropolitan University, South Africa University of Greenwich, UK Nelson Mandela Metropolitan University, South Africa MUJV Ltd. UK Auburn University, USA Leeds Metropolitan University, UK University College London, UK Queen's University Belfast, UK University of Wolverhampton, UK Arizona State University, USA
Joe Tah Derek Thomson Matthew Tucker	Oxford Brookes University, UK Heriot-Watt University, UK Liverpool John Moores University, UK
Chika Udeaja	Northumbria University, UK
Basie Verster Francois Viruly	University of the Free State, South Africa University of the Witwatersrand, South Africa
John Wall Sara Wilkinson Trefor Williams	Waterford Institute of Technology, Ireland Deakin University, Australia University of Glamorgan, UK

Bimbo Windapo	University of Cape Town, South Africa
Francis Wong	Hong Kong Polytechnic University
Ing Liang Wong	Glasgow Caledonian University, UK
Andrew Wright	De Montfort University, UK
Peter Wyatt	University of Reading, UK
Junli Yang	University of Westminster, UK
Wan Zahari Wan Yusoff	Universiti Tun Hussein Onn Malaysia, Malaysia
George Zillante	University of South Australia
Benita Zulch	University of the Free State, South Africa
Sam Zulu	Leeds Metropolitan University, UK

**In addition to this, the following specialist panel of peer-review experts assessed papers for the COBRA session arranged by CIB W113**

John Adriaanse	London South Bank University, UK
Julie Adshead	University of Salford, UK
Alison Ahearn	Imperial College London, UK
Rachelle Alterman	Technion, Israel
Deniz Artan Ilter	Istanbul Technical University, Turkey
Jane Ball	University of Sheffield, UK
Luke Bennett	Sheffield Hallam University, UK
Michael Brand	University of New South Wales, Australia
Penny Brooker	University of Wolverhampton, UK
Alice Christudason	National University of Singapore
Paul Chynoweth	University of Salford, UK
Sai On Cheung	City University of Hong Kong
Julie Cross	University of Salford, UK
Melissa Daigneault	Texas A&M University, USA
Steve Donohoe	University of Plymouth, UK
Ari Ekroos	University of Helsinki, Finland
Tilak Ginige	Bournemouth University, UK
Martin Green	Leeds Metropolitan University, UK
David Greenwood	Northumbria University, UK
Asanga Gunawansa	National University of Singapore
Jan-Bertram Hillig	University of Reading, UK
Rob Home	Anglia Ruskin University, UK
Peter Kennedy	Glasgow Caledonian University, UK
Anthony Lavers	Keating Chambers, UK
Wayne Lord	Loughborough University, UK
Sarah Lupton	Cardiff University
Tim McLernon	University of Ulster, UK
Frits Meijer	TU Delft, The Netherlands
Jim Mason	University of the West of England, UK
Brodie McAdam	University of Salford, UK
Tinus Maritz	University of Pretoria, South Africa

Francis Moor	University of Salford, UK
Issaka Ndekugri	University of Wolverhampton, UK
John Pointing	Kingston University, UK
Razani Abdul Rahim	Universiti Teknologi, Malaysia
Linda Thomas-Mobley	Georgia Tech, USA
Paul Tracey	University of Salford, UK
Yvonne Scannell	Trinity College Dublin, Ireland
Cathy Sherry	University of New South Wales, Australia
Julian Sidoli del Ceno	Birmingham City University, UK
Keren Tweeddale	London South Bank University, UK
Henk Visscher	TU Delft, The Netherlands
Peter Ward	University of Newcastle, Australia

# Knowledge transfer processes in PFI: identification of barriers and enablers

Wisdom Kwawu

Bartlett School of Construction and Project Management University College London  
w.kwawu@ucl.ac.uk

Taha Elhag

Bartlett School of Construction and Project Management University College London  
t.elhag@ucl.ac.uk

Tabarak Ballal

School of Construction Management and Engineering, University of Reading  
t.taballal@reading.ac.uk

## Abstract

Increasingly, the UK's Private Finance Initiative has created a demand for construction companies to transfer knowledge from one organization or project to another. Knowledge transfer processes in such contexts face many challenges, due to the many resulting discontinuities in the involvement of organisations, personnel and information flow. This paper empirically identifies the barriers and enablers that hinder or enhance the transfer of knowledge in PFI contexts, drawing upon a questionnaire survey of construction firms. The main findings show that knowledge transfer processes in PFIs are hindered by time constraints, lack of trust, and policies, procedures, rules and regulations attached to the projects. Nevertheless, the processes of knowledge transfer are enhanced by emphasising the value and importance of a supportive leadership, participation/commitment from the relevant parties, and good communication between the relevant parties. The findings have considerable relevance to understanding the mechanism of knowledge transfer between organizations, projects and individuals within the PFI contexts in overcoming the barriers and enhancing the enablers. Furthermore, practitioners and managers can use the findings to efficiently design knowledge transfer frameworks that can be used to overcome the barriers encountered while enhancing the enablers to improve knowledge transfer processes.

**Keywords:** Communication, Knowledge Transfer, Private Finance Initiative, Translation, UK

## Introduction

Though a range of procurement options for public facilities and services is available to the UK Government, the government's use of Public Private Partnerships (PPP) and Private Finance Initiative (PFI) to procure public facilities and services in the UK has increased



rapidly over the last decade. To date, over 700 PFI projects have been approved and approximately a further 200 projects are planned (Carrillo et al. 2008). Likewise, the UK's National Audit Office (NAO) (2009) stated that the capital value of forthcoming PFI deals is expected to be £13 billion. Introduced in 1992 by the UK government, PFI represents an alternative mechanism for procuring better public services and facilities. The PFI scheme entailed the collaboration of the private and public sectors together to share the risks and benefits of delivering public sector services or facilities (Carrillo et al. 2008, Li et al. 2005).

Over the years, the PFI scheme has evolved resulting in a large number of government reports and academic papers assessing the impact of PFI projects in the UK. HM Treasury (2008) and the National Audit Office (2009) have indicated that PFI procurement has improved project delivery in terms of time, quality of products, greater costs certainties. While many PFI projects have been regarded as successful, PFI procurement has also attracted a fair share of criticism. The main focus of criticism has been the value for money achieved by the projects (Hellowell et al. 2008, Akintoye et al. 2003). Other specific problems have been the time and high bidding cost for PFI projects and the management and transfer of risk by the private and public sectors (Carrillo et al. 2008, Akintoye et al. 2003), the differing objectives of the project stakeholders (Robinson et al. 2004) and restrains on innovation (CABE 2008). The Commission for Architecture and the Built Environment (CABE) noted that the anticipated boost in innovation from private sector providers has not been fully attained. In addition, there are still concerns over the level of knowledge and information sharing in PFI projects (Carrillo et al. 2006). Accordingly, the subject of knowledge transfer in PFI has become a core area for investigation in the UK construction industry (Liyanage et al. 2008, Carrillo et al. 2006). These authors suggest that the boost in innovation can be facilitated by the capture and transfer of expertise knowledge and skills among the project stakeholders. While Carrillo et al. (2006) and Liyanage et al. (2009) have developed different frameworks for knowledge transfer in PFI projects, less is known about the barriers and enablers that can hinder or enhance the knowledge transfer process.

The aim of this paper is therefore to identify, analyse and evaluate the relative importance of the barriers and enablers associated with knowledge transfer processes in PFI projects in the UK construction industry. The rest of the paper is organized as follows: A review of the relevant literature on knowledge transfer, knowledge transfer challenges in PFI projects is undertaken to identify factors or issues contributing to effective knowledge transfer. This is followed by an outline of the research method adopted, a presentation and discussion of the results. Finally, conclusions and implications are presented.

## **Knowledge transfer Process**

Knowledge transfer can be described as a change process involving the movement of knowledge or skills from one specialized knowledge entity such as individuals, groups and organisations to another or from one place to another (Carlile and Reberich 2003, Nonaka 1994). A successful knowledge transfer implies that a transfer results in the receiving unit accumulating or assimilating new knowledge. To be of value to the individual or organisation, the transferred knowledge should lead to changes in behaviour and the development of new ideas, processes and practices.

Although, the mechanisms for transferring any type of knowledge, from an individual or organisation or place to another, include learning, training program, communication, observation, dissemination, implementation, translating, diffusing, activities (Abjanbekov and Padilla 2004, Carrillo et al. 2004), the performance of these mechanisms is context based and therefore influenced by several issues and factors (Harada 2003, Szulanski 1996). This is due to the fact that as the transfer process begins in one context and moves into another context (Oliver 2009, Abjanbekov and Padilla 2004), performance of the processes are influenced by these factors. Thus one way of improving the transfer process is by identifying and understanding the barriers and enablers that influence the process to make a success or failure.

## **Knowledge transfer challenges in PFI projects**

In the UK, the main sectors in which PFI is used to procure public infrastructure and services are education - under the Building Schools for the Future (BSF) programme, health - provision of hospitals for NHS trusts, transport - highways management and street lighting for local authorities, accommodation for military personnel and defence infrastructure (Robinson et al. 2004). It is also expected that through knowledge sharing among the purposely created consortia for the PFI project, the private sector will promote innovation, manage the risks, and provide value for money for the government. These expectations were to be achieved through harnessing the financial, management, and technical skills and expertise of the private sector to provide efficient and effective public facilities and services (Li et al. 2005, Akintoye et al. 2003).

Despite many PFI projects' overall performance being more than satisfactory, several challenges in the procurement, construction and operation of PFI projects have been

highlighted in several publications. For instance, Robinson et al. (2004) identified some of the challenges as the difference in PFI experience between construction organisations and client organisations, the complexity of the PFI management structure and a lack of clear set of strategies to collaborate and communicate with project stakeholders. Carrillo et al. (2008) identified the barriers that affect organisations participation in PFI projects as: high transaction and bidding cost, complex contracts, lengthy negotiation periods and inexperienced staff. These challenges have lead to inefficiencies in the PFI project delivery processes such as communication and information sharing among PFI participants and in the transfer of best practices among stakeholders and projects (H M Treasury 2008). Consequently, Knowledge transfer processes are essential in overcoming these inefficiencies. For better performance of PFI projects, Carrillo et al. (2006) and Liyanage et al. (2009) have proposed and developed appropriate knowledge transfer frameworks for capturing and transferring expertise and lessons learned in order to facilitate innovation and continuous improvement in several aspects of PFI projects. Carrillo et al.'s framework consists of three stages that explored PFI participation and opportunities, mapping the organisation's knowledge and creating an action plan for transferring knowledge. On the other hand, Liyanage et al.'s framework - consists of five processes: Knowledge awareness, Knowledge acquisition, Knowledge transformation, Knowledge association and, Knowledge application which affected or influenced a successful knowledge transfer.

Both frameworks can enable organisations and individuals to be more proactive in managing and improving knowledge transfer on PFI projects. However, due to the challenges faced in PFI projects, it is only prudent for clients and service providers to identify, assess, evaluate and rank the barriers and enablers that influence knowledge transfer processes, in order to improve existing knowledge transfer processes.

### **Barriers and enablers of knowledge transfer processes**

There is still considerable debate on the barriers or factors that negatively affect knowledge transfer processes in general. Szulanski's (1996) identified the lack of time to receive and/or apply new knowledge as a characteristic barrier to knowledge transfer. Certainly, the times available to participants to transfer their knowledge in ways meaningful to recipients are timely and situated in the recipients' real world context (Bresnen et al. 2003, Fernie et al. 2003).

Among other factors and issues, confidentiality, reliability, copyright, and the fear of losing one's unique value (Carrillo et al. 2006); the absence of trust among the participants (Renzi 2008) have been identified. Certainly a climate of trust and willingness is necessary to achieve knowledge sharing within the organisation or project. However, trust and willingness are built on good communication between the relevant parties. Gann et al. (1998) identified policies, procedures, rules and regulations attached to projects, especially when these are treated as static sets of technical requirements. Other issues such as lack of management support (Renzi 2008, Goh 2002) and commitment and motivation of staff to share knowledge (Carrillo et al. 2006) have been emphasized as barriers to knowledge transfer. While these issues and factors have been identified, their relative importance to each other in PFI projects has received minimum attention.

In terms of factors or issues that can positively influence a successful knowledge transfer, organisational culture, incentive structure, interpersonal trust in general, trust in management, supportive leadership and supportive structures such as clearly articulated goals and strategies were identified by Renzi (2008) and Goh (2002). Among other factors, the reliability of the source of information is important to the knowledge transfer process was identified by Ko et al (2005); policies, procedures, rules and regulations when used as part of a portfolio aimed at improving performance by Gann et al. (1998); the presence of management support by Renzi (2008) and Goh (2002); commitment and motivation of staff to share knowledge through incentive or reward structure and the willingness to learn from others by Carrillo et al. (2006); organisational and individual capabilities and competencies by Szulanski (1996).

Clearly due to the complexity of PFI projects, some of these factors must be important than others. Therefore it is prudent to attempt to rank them from the perspective of PFI participants, in terms of the consideration that should be given to them in the knowledge transfer process.

## **Research method**

A questionnaire survey was deemed the most suitable way of obtaining the views of a large number of clients and construction practitioners on specific PFI issues. The questionnaire content was informed by literature reviews, and interviews which identified success factors for knowledge transfer from other sectors and industries. A total of thirteen factors relating to knowledge transfer barriers and twenty-three factors relating to knowledge transfer enablers were identified.

Between April and July 2009, over 250 questionnaires were posted to potential respondents using a database of education sector, transport and NHS PFI projects. The respondents included PFI directors, bid managers, partners, associates, and procurement managers. The survey process followed Dillman's (2000) Total Design Method. The sample survey consisted of a self-reported questionnaire which was completed by a senior manager of a construction related company or firm. A total of 53 usable responses were obtained. This represents a response rate of about 20%. This rate is higher than rates achieved by comparable survey study reported in the construction and project management journals (Akintoye et al. 2000). All respondents were either senior managers or partners with responsibility for PFI projects in their respective organisations.

## Findings

The main findings are presented below.

### *Barriers that negatively affect knowledge transfer processes*

Table 1 below shows respondents' view of the most important as well as the least important barriers to the knowledge transfer process.

**Table 1: Barriers that negatively affect a knowledge transfer**

<b>Barriers</b>	<b>Respondents</b>	<b>%</b>	<b>Ranking</b>
Time constraints	33	65	1
Lack of trust between parties (i.e. individuals and companies)	25	49	2
Budget limitations	24	47	3
Fear of losing the competitive edge	23	45	4
Policies, procedures, rules and regulations attached to the project	23	45	4
Not-invented here syndrome (This usually occurs as an unwillingness to adapt an idea or product because it originates from another company/culture)	22	43	6
Companies' lack of willingness to share knowledge	21	41	7
Reluctance to change the industry routines	17	33	8
External influences (political and social)	17	33	8
Reluctance to embrace new ideas	16	31	10
Organisational context and structure (i.e. complex structure and barren Organisational context)	15	29	11
Unnecessary influence made by other parties in the PFI project	15	29	11
Lack of motivation of staff to share knowledge	13	25	13

The five barriers that negatively affect knowledge transfer in order of importance are: Time constraints (65%), Lack of trust between parties (i.e. individuals and companies) (49%), Budget limitations (47%), Fear of losing the competitive edge (45%) and Policies, procedures, rules and regulations attached to the project (45%). Similarly, the five less important barriers that negatively affect knowledge transfer are: lack of motivation of staff to share knowledge (25%); unnecessary influence made by other parties in the PFI project

(29%); organisational context and structure (i.e. complex structure and organisational context) (29%); reluctance to embrace new ideas (31%), and external influences (political and social) (33%).

***Enablers that positively affect knowledge transfer processes***

Similarly, Table 2 below shows respondents' view of the most important as well as the least important enablers to the knowledge transfer process.

**Table 2: Enablers that positively affect knowledge transfer**

<b>Enablers</b>	<b>Respondents</b>	<b>%</b>	<b>Ranking</b>
Supportive leadership	48	96	1
Participation/commitment from the relevant parties	43	86	2
Good communication between the relevant parties	39	78	3
Organisational Culture (awareness, willingness to embrace new ideas and technology, etc.)	38	76	4
Willingness to learn from others	34	68	5
Individual capabilities and competencies	31	62	6
Feedback mechanisms	27	54	7
Reciprocity	26	52	8
Clearly articulated goals and strategies	23	46	9
Performance Measurement	23	46	9
Direct relationships or networking	22	44	11
Capacity to learn	22	44	11
Organisational capabilities	21	42	13
Training and development	21	42	13
Organisational structure (i.e. well-balanced structure)	20	40	15
The support from the other companies/partners	20	40	15
Common language and understanding	16	32	17
Reward mechanisms	15	30	18
Environmental Influences (Political, Economical, Social, etc.)	14	28	19
User-friendly technology	14	28	19
Understanding, interpretation and use of Information technology (IT)	13	26	21
Ensure reliability of the source	10	20	22
Policies relating to knowledge transfer	10	20	22

Table 2 indicate that the top five enablers that positively affect knowledge transfer are: supportive leadership (96%), participation/commitment from the relevant parties (86%), good communication between the relevant parties (78%), organisational culture (awareness, willingness to embrace new ideas and technology) (76%), and the willingness to learn from others (68%).

The five enablers that least positively affect knowledge transfer are: environmental influences (Political, Economical, Social, etc.) (28%); User-friendly technology (28%); Understanding, interpretation and use of Information technology (IT) (26%), Ensuring reliability of the source (20%).and policies relating to knowledge transfer (20%).

## **Discussion**

### ***Barriers that most negatively affect knowledge transfer***

Time constraints are perceived as the most significant barrier that negatively affects the knowledge transfer process (Table 1, 65% of respondents). A reason may be that as exchanging and internalizing information is time consuming (Szulanski 1996), there is a possibility that individuals with numerous other demands on their time will focus solely on work demands for which they have primary accountability. Also the lengthy negotiation periods associated with PFI procurement and its subsequent influence on bidding and transaction costs (Carrillo et al. 2008) may limit the time required to implement the knowledge transfer process. This finding suggests that PFI firms need to provide enough time for employees and relevant parties to learn and share information.

The second most significant barrier that affects the knowledge transfer process is the lack of trust (Table 1, 49% of respondents). This suggests that some participants in PFI projects are still experiencing a lack of trust between the project stakeholders. A reason may be that the trust between parties has to be developed over a shorter period rather than over the concession period considering the time allocated for the design and construction of the facility. This suggests that project stakeholders in PFI projects should pay attention to encouraging and developing trust between stakeholders for a successful knowledge transfer.

In terms of the least important barriers to knowledge transfer process, the lack of motivation of staff to share knowledge (Table 1, 25% of respondents) is perceived as the least important barrier to knowledge transfer in PFI projects. Even though motivational factors act as barriers to knowledge transfer process (Salmi and Torkkeli 2009, Szulanski 1996), it seems the lack of motivation to share knowledge is not a growing concern. Li et al. (2005) found out that staffs are willing to share knowledge in PFI projects. Another reason may be that project stakeholders seek external skills and experience from competent advisers to complement their knowledge and skills in the bidding stage of the project. However, the cost of such advice makes PFI bidding cost and transaction costs very expensive. This suggests that staffs in most of the organisations are motivated to share knowledge but other issues are significantly influencing the knowledge transfer process. Thus stakeholders should pay more attention to the significant barriers identified.

### ***Enablers that positively affect knowledge transfer***

Supportive leadership is perceived as the most significant enabler that positively affects knowledge transfer processes (Table 2). 96% of the respondents believed that this was the most important factor that positively enables a successful knowledge transfer processes. This finding concurs with previous findings by Yang (2007) and Eppler and Sukowski (2000) that supportive leadership functions do foster and enhance effective knowledge transfer processes. This suggests that for a successful knowledge transfer, support and good leadership from key stakeholders and senior managers is vital. Relying solely on frameworks may not be sufficient. Effective and supporting leaders will be able to support favourable knowledge transfer framework through clearly articulated goals and strategies (Renzl 2008). Thus PFI stakeholders should pay more attention to encouraging senior managers to partake in the knowledge transfer processes.

Participation/commitment from the relevant parties is ranked as the second most significant enabler to knowledge transfer in PFI projects (Table 2, 86%). Bresnen et al. (2003) noted that the process of knowledge capture, transfer and learning in project settings rely upon social patterns, practices and processes which emphasizes the value and importance of trust, commitment and collaboration. This suggests that for a successful knowledge transfer to occur in PFI projects, stakeholders should secure commitment and participation from relevant stakeholders where appropriate. This suggests that in order to achieve a successful knowledge transfer, all relevant stakeholders should commit their best resources to the knowledge transfer process. As such commitment and participation must be encouraged throughout all levels of management.

In general the finding that 96% and 86% of respondents perceived supportive leadership and participation/commitment from the relevant parties respectively, as the most significant enablers, suggests that firms need to develop leadership qualities as well as seek participation and commitment within all levels of management to enhance successful knowledge transfer processes.

The enabler that least positively affects knowledge transfer processes as perceived by practitioners is Policies relating to knowledge transfer (Table 2, 20%). A reason may be that most organisations do not have specific knowledge transfer policies because it is taken for granted that knowledge is embedded within the organizational structures, processes, procedures, and routines. Generally, knowledge transfer processes are affected by individual



absorptive capacities irrespective of the organisational structure and culture (Cranefield and Yoong 2007, Bresnen et al. 2005).

## **Conclusions**

Although there has been significant increase in the use of PFI to procure public facilities and services in the UK over the years, there are concerns over the level of knowledge transfer, information sharing, innovation and continuous improvement in several aspects of PFI projects. Different knowledge transfer frameworks have been proposed as solutions, but many factors and issues enable or hinder knowledge transfer processes in PFI projects. While, it is possible to identify and rank the relative significance of these factors or issue, there is a lack of knowledge about the relative importance of the barriers and enablers that hinder or enhance the knowledge transfer processes in PFI environments.

This paper has investigated and identified the most significant barriers and enablers to a successful knowledge transfer process in UK PFI projects. Data from questionnaire survey has been used to identify and rank the most significant factors or issues that enable or hinder a successful knowledge transfer process in UK PFI projects. The five barriers that emerged as negatively affecting the knowledge transfer process, in order of descending significance are: time constraints, lack of trust between parties, budget limitations, fear of losing the competitive edge and policies, procedures, rules and regulations attached to the project. Similarly the five most significant enablers that positively affected knowledge transfer processes are identified, in order of descending significance as supportive leadership, participation/commitment from the relevant parties, good communication between the relevant parties, organisational culture, and the willingness to learn from others. Most importantly, the findings of supportive leadership and participation/commitment, as the most significant enablers, suggests that PFI firms need to develop leadership qualities as well as seek participation and commitment within all levels of management to enhance successful knowledge transfer processes. Practitioners and managers can overcome the barriers encountered while enhancing the enablers to improve bespoke knowledge transfer processes.

This paper proposes that PFI participants engaged in knowledge transfer process should pay more attention to the identified barriers and enablers in order to achieve successful transfer process. To improve knowledge transfer processes, senior managers tasked with enhancing or developing knowledge transfer frameworks and boosting innovation can use the identified barriers and enablers to efficiently achieve their knowledge transfer goals.

## Reference

- Abjanbekov, A and Padilla, A E A (2004) *From knowledge transfer to knowledge translation: Case study of a telecom consultancy*, Linköping, Sweden: Linköping University.
- Akintoye, A, McIntosh, G and Fitzgerald, E (2000) A survey of supply chain collaboration and management in the UK construction industry. *European Journal of Purchasing and Supply Management*, **3-4**(6), 159-68.
- Akintoye, A, Hardcastle, C, Beck, B, Chinyio, E and Asenova, D (2003) Achieving best value in private finance initiative project procurement. *Construction Management and Economics*, **21**(5), 461–70.
- Bresnen, M, Edelman, L, Newell, S, Scarbrough, H and Swan, J (2003) Social practices and the management of knowledge in project environments. *International Journal of Project Management* 21 (2003), **21**(1), 157–66.
- Bresnen, M, Edelman, L, Newell, S, Scarbrough, H and Swan, J (2005) Exploring social capital in the construction firm. *Building Research and Information*, **33**(3), 235-44.
- CABE (2008) *Artists and places*, London: The Commission for Architecture and the Built Environment
- Carlile, P R and Rebentisch, E S (2003) Into the black box: The knowledge transformation cycle. *Management Science*, **49**(9), 1180-95.
- Carrillo, P, Robinson, H, Al-Ghassani, A and Anumba, C (2004) Knowledge management in construction: Drivers, resources and barriers. *Project Management Journal*, **35**(1), 46-56.
- Carrillo, P, Robinson, H, Foale, P, Anumba, C and Bouchlaghem, D (2008) Participation, barriers, and opportunities in pfi: The united kingdom experience. *Journal of Management in Engineering*, **24**(3), 138-45.

- Carrillo, P M, Robinson, H S, Anumba, C J and Bouchlaghem, N M (2006) A knowledge transfer framework: The pfi context. *Construction Management and Economics*, **24**(10), 1045—56.
- Cranefield, J and Yoong, P (2007) Interorganisational knowledge transfer: The role of the gatekeeper. *International Journal of Knowledge and Learning*, **3**(1), 121-38.
- Dillman, D A (2000) *Mail and internet surveys: The tailored design method*. Second ed. New York: John Wiley & Sons.
- Eppler, M J and Sukowski, O (2000) Managing team knowledge: Core processes, tools and enabling factors. *European Management Journal*, **18**(3), 334-41.
- Fernie, S, Green, S D, Weller, S J and Newcombe, R (2003) Knowledge sharing: Context, confusion and controversy. *International Journal of Project Management*, **21**(3), 177-87.
- Gann, D M, Wang, Y and Hawkins, R (1998) Do regulations encourage innovation? The case of energy efficiency in housing. *Building Research and Information*, **26**(5), 280-96.
- Goh, S C (2002) Managing effective knowledge transfer: An integrative framework and some practical implications. *Journal of Knowledge Management*, **6**(1), 23–30.
- H M Treasury (2008) Infrastructure procurement: Delivering long-term value. In: H M Treasury, Ed., London: The Stationery Office.
- Harada, T (2003) Three steps in knowledge communication: The emergence of knowledge transformers. *Research Policy*, **32**(10), 1737-51.
- Hellowell, M, Price, D and Pollock, A M (2008) *The use of private finance initiative (pfi) public private partnerships (ppps) in northern ireland*, Belfast: Northern Ireland Public Service Alliance,
- Ko, D-G, Kirsch, L J and King, W R (2005) Antecedents of knowledge transfer from consultants to clients in enterprise system implementations. *MIS Quarterly*, **29**(1), 59–85.

- Li, B, Akintoye, A, Edwards, P J and Hardcastle, C (2005) Critical success factors for ppp/pfi projects in the uk construction industry. *Construction Management and Economics*, **23**(5), 459-71.
- Liyanage, C, Elhag, T, Ballal, T and Li, Q (2008) The process of knowledge transfer and its significance in integrated environments. In, *AACE International's 52nd Annual Meeting & ICEC's 6th World Congress on Cost Engineering, Project Management and Quantity Surveying TCM - Cost Engineering for the Global Community* 29 June - 2 July 2008, Toronto, Ontario, Canada.
- Liyanage, C, Elhag, T, Ballal, T and Li, Q (2009) Knowledge communication and translation – a knowledge transfer model. *Journal of Knowledge Management*, **13**(3), 118-31.
- National Audit Office (2009) *Performance of pfi construction: A review by the private finance practice*, London: National Audit Office.
- Nonaka, I (1994) A dynamic theory of organizational knowledge creation. *Organization Science.*, **5**(1), 14-24.
- Oliver, M L (2009) The transfer process: Implications for evaluation. *New Directions for Evaluation*, **2009**(124), 61-73.
- Renzl, B (2008) Trust in management and knowledge sharing: The mediating effects of fear and knowledge documentation. *Omega*, **36**(2), 206-20.
- Robinson, H S, Carrillo, P M, Anumba, C J and Bouchlaghem, N M (2004) *Investigating current practices, participation and opportunities in the private finance initiative*, Loughborough: Loughborough University.
- Salmi, P and Torkkeli, M (2009) Success factors of interorganisational knowledge transfer: A case of a collaborative public–private r&d project *International Journal of Business Innovation and Research*, **3**(2), 109-25
- Szulanski, G (1996) Exploring internal stickiness: Impediments to the transfer of best practice within the firm. *Strategic Management Journal*, **17**(10), 27–43.
- Yang, J-T (2007) Knowledge sharing: Investigating appropriate leadership roles and collaborative culture. *Tourism Management*, **28**(2), 530-43.