Causal Ambiguity and Knowledge Transfer between Public and Private Sectors Organisations in Private Finance Initiatives Projects

Lesly LAM and Canon TONG, Hong Kong SAR, China

SUMMARY

This paper proposes a research study into the causally ambiguous nature of knowledge in the transfer process between the PFI partners. They are from both public and private sector organizations. As there are many perception variations in their use of knowledge, the knowledge transfer between the PFI partners should also be explored. This paper thus illustrated investigating the antecedents of causal ambiguity – (1) Tacitness; (2) Asset Specificity; (3) Experience; (4) Strategic Similarity; (5) Partner Protectiveness; (6) National Distance and (7) Organizational Distance. The moderating effects of collaborative know-how, absorptive capacity and partnership duration were also addressed.

As only private sectors were concentrated in the previous study, the study here provided a new research dimension of knowledge transfer, in which not only private sectors but also public sectors are involved. Due to the emergence of PFI approach, there is a need to have a better understanding of knowledge transfer for the sustainable development of PFI projects.

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1. INTRODUCTION

With different levels of involvement and responsibility, Public Private Partnerships (PPPs) is kind of arrangements in which both the public and private sectors organizations are required to bring their complementary skills to a public project and provide public services, (www.eu.gov.hk). The Private Finance Initiatives (PFI) is a type of PPP arrangement. In PFI, the government issues partnership contract to procure quality services on a long-term basis, with pre-defined deliverable requirements. Normally, the roles of private sector include maintenance or construction of the infrastructure, whereas public sector is responsible for planning, licensing and other statutory procedures, etc. The reason of "private finance initiatives" is that normally the private sector is required to finance an asset and cover the costs through direct charges on the end-users (www.eu.gov.hk).

As such, PFI has its growing importance for the governments around the world. The increasing amount of discussion forums, conferences and events organized by academics, governments and professional bodies indicate that there is a need of continuously improvement for PFI. One of the key issues about PFI improvement is the best practices of the knowledge transfer process (Carrillo et al., 2006).

Causal ambiguity is well-recognised as an obstacle hindering knowledge transfer throughout all phases of the transfer process (Lippman and Rumelt, 1982). Since the extent to which is not well understood, many research studies are being conducted in order to find out its effect to strategic alliances and joint ventures in private sectors. Moreover, the starting point of investigation is usually from the antecedents of causal ambiguity (Simonin, 1999).

Concentrating in the PFI context, this research examines the causally ambiguous nature of knowledge in the knowledge transfer process between the PFI partners, which are from public and private sector organizations. There are many perception variations in the use of knowledge between public and private sectors (McAdam and Reld, 2000). To have an understanding on this aspect, the study empirically analysed the "antecedents" of causal ambiguity including (1) Tacitness; (2) Asset Specificity; (3) Strategic Similarity; (4) Experience; (5) Partner Protectiveness; (6) National Distance; and (7) Organisational Distance (Simonin, 1999).

Due to the emergence of PPP/PFI approach, this study constitutes a new research dimension of knowledge transfer, in which partner from public sector is also included. By which, the central role of "Causal Ambiguity" and its simultaneous effects on "Knowledge Transfer"

between public and private sector organisations in the knowledge transfer process of PFI infrastructure projects is unambiguously recognized.

2. THE CONTEXT OF EXISTING RESEARCH AND PRACTICE

2.1 Knowledge Transfer Process - Private sector / Private sector

Causal ambiguity has been a concept in the strategy management and organization theory literatures (Mosakowski, 1997). Knowledge has emerged as the most strategically-significant resource of the firm (Grant, 1996). To investigate the competitive advantage and knowledge stickiness, many researches have been conducted on how knowledge is managed and acquired from the partners in the joint ventures, international joint ventures and strategy alliances (Simonin, 1999; Inkpen, 1997; Tiemessen et al., 1997; Lyles and Salk, 1996) and how knowledge is transferred across partners (Appleyard, 1996; Choi and Lee, 1997; Dodgson, 1996; Mowery, Oxley, and Silverman, 1996). Argote et al. (2000) illustrates various knowledge transfer mechanisms including (1) personnel movement; (2) training; (3) communication; (4) observation; (5) technology transfer; and (6) alliances, etc. A number of scholars have also proposed frameworks to improve knowledge transfer (Goh, 2002; von Krogh et al., 2001; Szulanski, 2000; Argote et al., 2000). However, the existing research and practice are only concentrating on knowledge transfer between private sectors.

2.2 Knowledge Transfer Process - Public sector / Private sector

In the research study conducted by McAdam and Reld (2000), the socially constructed knowledge management model was chosen for his comparison study of the public and private sector perceptions and use of knowledge management. The study proved that there are many perceptions variation on knowledge capturing, knowledge sharing, knowledge management, knowledge transfer, knowledge resources utilisation, etc. between public and private sectors. However, the use of knowledge management, e.g. the knowledge transfer process, between public and private sectors has still yet to be investigated.

Since there are growing opportunities but still lack of knowledge transfer in PFI, Carrillo et al. (2006) pointed out that there was a need to develop and evaluate a knowledge transfer framework to encourage the transfer of PFI knowledge between projects. As such, it just began to have a touch on the knowledge transfer from preceding projects.

From the above perspectives, the knowledge transfer between public sector and private sector has not yet been explored. Thus, conducting research in it has its significant value to the PFI infrastructure projects and there is a need to have a better understanding of knowledge transfer for the sustainable development of PFI projects.

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2.3 The Antecedents of Causal Ambiguity

Various scholars have defined the antecedents of causal ambiguity, which are usually the starting point when researching into a new area of knowledge transfer (King, 2007). The definitions of these antecedents among different articles are more or less very similar. The simply model as illustrated in Simonin (1999) is adopted in this study. They are (1) Tacitness; (2) Asset Specificity; (3) Experience; (4) Strategic Similarity; (5) Partner Protectiveness; (6) National Distance and (7) Organizational Distance.

3. LITERATURE REVIEW

3.1 The Private Finance Initiative

As early as 1992, the UK government had already started the first PFI project to provide public facilities and services. The aims are as follows:-

1. to improve the level of public services;
2. to alleviate budgetary pressure;
3. to minimize public expenses;
4. to gain efficiency arising from innovation, management and marketing skills offered by the private sectors; and
5. to be freed from the complicated public-expenditure constraints while the strategic controls can still be retained.

PFI approach is different from the traditional privatization, corporatisation, licensing, contracting-out, out-sourcing methods, etc. Instead, PFI is a kind of PPP arrangement, with which the functions of government are not totally delegated away from the government and ministerial departments to private sectors. The United Nations perceived PFI as effective means of establishing cooperation between public and private actors and to bundle financial resources, know-how and expertise to address needs. PFI offer alternatives (a midway stage) to full privatization, aiming at involving the private sector in the delivery of public services in various ways. Organisations from public and private sectors work as partners in planning, financing, designing, constructing, operating and managing public facilities and services. Many countries in the world, including Australia, UK, Canada, Japan, US, have firmly adopted this approach as a key direction of public sector reform. HK has just started her major step to use PFI a few years ago.

PFI are so based on a partnership approach, where the responsibility for the delivery of services is shared between the public and private sectors, both of which bring their complementary skills to the enterprise (after Efficiency Unit, 2003, p. 1). Both Public Sector and Private Sector are thus expected to share their totally different expertise and experience and serve the following fundamental roles.

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3.2 Knowledge Transfer

Around the world, one of the main areas employing PFI approach is infrastructure project. PFI infrastructure projects do require knowledge transfer since it is a relatively new procurement approach (Carrillo et al., 2006). Those involved parties may be new or still lack of knowledge to the process. The partners in PFI, i.e. both from the public and private sectors, are still in their learning path. Knowledge transfer between public and private sections is thus of utmost importance for continuous evolution of a better PFI process. Construction organizations from public or private sectors are the main players in PFI infrastructure projects. Not surprisingly, there is also a growing interest in how organizations, especially for private sector learn from their partners and develop competencies through PPP/PFI.

The organisations could be beneficial significantly from knowledge transfer. Studies even shows that the significant benefits arising from knowledge transfer include (1) reducing duplicate works; (2) avoiding reinventing the wheel; (3) improved utilization of tacit knowledge; and (4) best practices to facilitate continuous improvement and innovation (Robinson et al., 2001). Moreover, knowledge transfer could also be an effective mechanism for mitigating risks, which is a key issue in an increasingly complex PFI environment (Carrillo et al., 2006).

Argote (2000) asked the question of how characteristics of social network affect knowledge transfer. Evidences show that knowledge transfers more readily across organizations with special relationship, such as franchise, chain, or alliance, than across independent organizations (Baum & Ingram, 1998; Darr, Argote, & Epple, 1995; Greve, 1999; Ingram & Simons, 1999; Powell, Koput, & Smith-Doerr, 1996).

3.3 Causal Ambiguity

For knowledge transfer strategy to be viable in any of the joint ventures or alliances including PPP/PFI, organisations must overcome the causal ambiguity associated with their partners' skills (Crossan and Inkpen, 1995). It is about the nature of the causal connections between actions and results, which are hard or even impossible to relate outcomes of its phenomenon (Lippman and Rumelt, 1982). A good example in strategy is that whether the success of a firm is directly related to strategic management approach or stochastic process.

Einhorn and Hogarth's (1986) defined causal ambiguity as "an intermediate state between ignorance (no distributions are ruled out) and risk (all but one are ruled out). Thus, causal ambiguity results from the uncertainty associated with specifying which of a set of distributions is appropriate in a given situation."

Causal ambiguity is often related to the knowledge in social network. Various studies have found that the characteristics of the social network affect the extent of knowledge transfer. McEvily and Zaheer (1999) found that "consistent with structural hole theory (Burt, 1992),

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non-redundancy in organisations' social networks demonstrated their ability to acquire knowledge and capabilities." That is to say, organisations with non-redundancy social ties to other organisations can access to more information and acquire more new knowledge.

Moreover, Lippman and Rumelt (1982) find that causal ambiguity actually acts as a powerful block on both knowledge imitation and factor mobility. Multiple factors and characteristics determine the level of causal ambiguity. What are the knowledge characteristics, attributes and factors affecting knowledge transfer? As with causal ambiguity, there is a lack of understanding of the logical linkages between actions and outcomes, inputs and outputs, and causes and effects (Szulanski, 2000).

3.4 Knowledge Management and Knowledge Transfer Process

In knowledge management topic, knowledge is required to be created, interpreted, disseminated, transferred, used, retained and refined (De Jarnett, 1996). It is the process of managing knowledge to meet current requirements, to identify and exploit current and new knowledge assets and to develop new opportunities (Quintas et al., 1997). However, knowledge faces barriers, is relatively immobile and is not as mobile as it has often been assumed (Attewell, 1992; Tiemessen et al., 1997). Kogut and Zander (1992) even pointed out the "inertness of knowledge". As such, knowledge transfer depends on how easily that knowledge can be transported, interpreted, and absorbed (Hamel et al. 1989).

In the knowledge transfer process, the subtle aspects of knowledge, including its ambiguity, its resistance to clear communication, its embeddedness in context, and its idiosyncrasy, are required to be considered (Hedlund and Zander, 1993). Crossan and Inkpen (1995) acknowledge that "for joint-venture learning strategies to be viable, firms must overcome the causal ambiguity associated with their partner's skills."

The above review of research theories actually indicates that the significant construct, "Causal Ambiguity" which leads to the knowledge immobility, requires explicitly recognized and integrated in the knowledge transfer theory.

3.5 Perception Variations between Public and Private Sectors

McAdam and Reld (2000) concluded that both the public and private sector organizations have much to gain from effective knowledge management systems. However, it is a lack of public-private sector knowledge management comparisons. As such, the perceptions of both public and private sector organizations in regard to knowledge management need to be studied in order to improve overall understanding and develop sector specific learning.

Due to the growing importance of PFI, Carrillo et al. (2006) recognized that there was tremendous scope for improvement in the execution of PFI infrastructure projects by construction organizations. PFI performance can be significantly improved by transferring knowledge to other PFI teams.

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3.6 Gaps in Current Knowledge and Theory

With the growing significance of PFI, there is recognition of the need to investigate the knowledge transfer process in it. Conducting study into the causal ambiguity of public and private sector organizations is the starting point for knowledge transfer.

In construction organizations, the implementation of a knowledge strategy is still underdeveloped. A key challenge is to address the best practices of knowledge transfer process. Causal Ambiguity has been a concept in the strategic management and organization theory literatures (Mosakowski, 1997) that many research studies are being conducted. However, the full implications of this concept have largely been undeveloped in the PFI infrastructure projects.

Moreover, mechanisms or frameworks of knowledge transfer have not been systematically exploited in the construction and infrastructure development sectors (Carrillo et al., 2006). One of the reasons may be that these frameworks are still at a conceptual level (Argote et al., 2000). Factors, like leadership, problem-solving/seeking behaviours, support structures, absorptive and retentive capacity and types of knowledge (Goh, 2002), are just highlighted for consideration, rather than providing practical solutions.

From the above perspectives, the above literature reviews justify the need of knowledge transfer in PFI infrastructure projects on a causal ambiguous investigation approach.

4. RESEARCH DESIGN AND METHODOLOGY

Quantitative methodology is adopted in this research. This research approach can be regarded as a constructivist one that realities exist under the shape of multiple specific constructions is addressed. That is to say, the identified factors and variables are interpreted, compared and correlated so as to generate constructions.

4.1 Research Questions
With reference to the above literature review, the following research questions are so derived:

1. Does causal ambiguity affect the process of knowledge transfer between partners in PFI projects?
2. How much is the strength of causal ambiguity affecting the process of knowledge transfer between partners?
3. What are the perception differences between government and private sectors organisation?

The dependent variable is Knowledge Transfer. There are 7 antecedents of causal ambiguity including (1) Tacitness; (2) Partner Protectiveness; (3) Asset Specificity; (4) Organisational Distance, (5) Strategic Similarity; (6) Experience; and (7) National Distance in the process of

knowledge transfer (Simonin, 1999). The main independent variables directly related to Knowledge Transfer are 4 antecedents, (1) Tacitness; (2) Partner Protectiveness, (3) Asset Specificity and (7) National Distance. The (1) Tacitness, (2) Partnership Protectiveness and (3) Asset Specificity are also tested against the other 3 independent variables, (4) Organisational Distance, (5) Strategic Similarity and (6) Experience respectively in order to see their relationship. The moderating variables are (1) Collaborative Know-how; (2) Absorptive Capacity; and (3) Partnership Duration. The hypotheses are so derived as follows: -

4.2 Hypotheses

H_1.   Tacitness is negatively related to Knowledge Transfer.

Tacitness – Reed and DeFillippi (1990) define tacitness as the implicit and non-codified accumulation of skills that results from learning by doing. Tacit knowledge is knowledge that people carry in their minds, which cannot be easily shared, communicated and is difficult to access (Nonaka, 1994). Tacit knowledge is valuable because it provides context for people, places, ideas, and experiences (Nonaka, 1994). Effective transfer of tacit knowledge, which is in an individual's involvement, requires extensive personal contact and trust. It involves a learning path that cannot be easily devised. Tacit knowledge, which is embedded in each organization, is hard to identify, address, locate, quantify, value, map, etc.

H_2.   Partner Protectiveness is negatively related to Knowledge Transfer.

Partner Protectiveness – In alliances and partnerships, some partners may be less transparent or open than others (Hamel, 1991). For knowledge transfer and acquisition between partners, it depends on not only the firm's internal absorptive capabilities but also the knowledge sharing willingness.

H_3.   Asset Specificity is negatively related to Knowledge Transfer.

Asset Specificity – Asset specificity is the extent to which the investments contributed to support a particular transaction, rather than redeployed for the other purposes (McGuinness, 1994). Obviously, such transaction should be of higher value and the units are willing to "tie in" in a two-way or multiple-way relationship.

H_4.   National Distance is negatively related to Knowledge Transfer.

National Distance – National Distance usually refers to Cultural Distance. The possibly damaging effects due to the various facets of collaboration including communication barriers, work routines, managerial approaches, and cultural differences have been well documented (see Simonin, 1999).

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H_5.   Tacitness is positively related to Organisation Distance.

Organizational Distance – It represents the degree of dissimilarity between the partners' practices, institutional heritage and organizational culture (Simonin, 1999). As such,

H6.   Strategic Similarity is positively related to Partner Protectiveness.

Strategic Similarity – The similarity of partners affects knowledge transfer. Partner similarity aids the search through a universe of potential knowledge sources (Darr & Kurtzberg, 2000). The bigger the number of similar elements across the tasks, the greater the likelihood of successful transfer (Thorndike, 1906).

H_7.   Asset Specificity is positively related to Experience.

Experience – Richer in experience can facilitate knowledge transfer.

H_8.   The relationship between Causal ambiguity and Knowledge transfer is moderated by Absorptive Capacity.

Absorptive Capacity – Partners may vary in their absorptive capacity, which are their ability to exploit outside sources of knowledge.

H_9.   The relationship between Causal ambiguity and Knowledge transfer is moderated by Collaborative Know-how.

Collaborative Know-how – Lack of collaborative experience may lead to alliance problems and failures (Lei and Slocum, 1992). Collaborative know-how thus helps to adopt proper procedures for information gathering, interpretation and diffusion (Simonin, 1999).

H_{10}.   The relationship between Causal ambiguity and Knowledge transfer is moderated by Partnership Duration.

Partnership Duration – As the partnership sustains itself over the years, trust intensifies and attachment between partners developed (Inkpen and Beamish, 1997). It thus expected to moderate the relationship hypothesized in the model.

4.3 Conceptual Framework

The relationships among different variables and hypotheses are shown in the following conceptual framework.
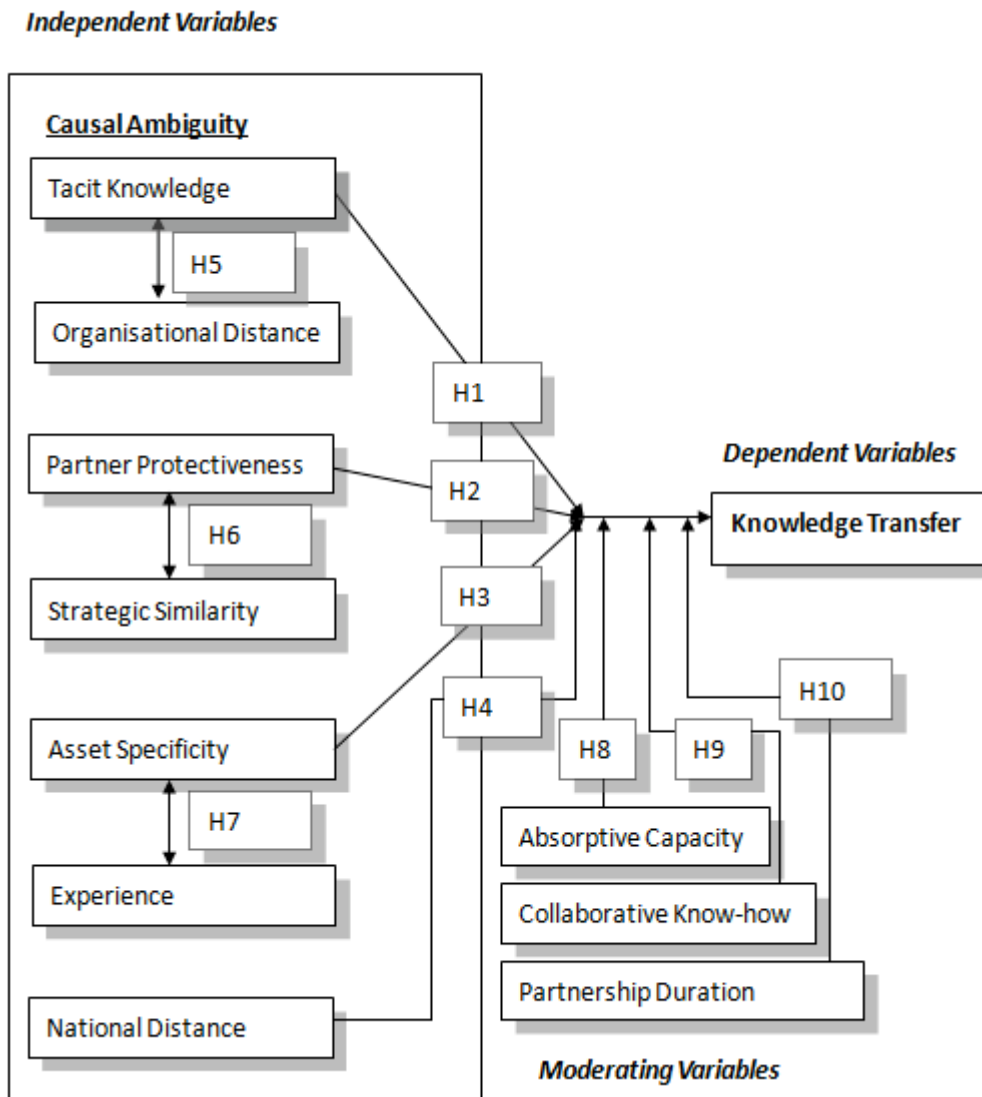
Figure (i) Conceptual Framework

The strength of the relationships among the above variables, antecedents of causal ambiguity and knowledge transfer in the PFI context are examined in this research study.

4.4 Questionnaire Survey

The anonymous questionnaire, utilizing a five-point Likert scale, is the main research tool. The design of questionnaire and the conduct of survey will follow the Total Design Method (Dillman, 1978). The format and the questions in it are developed from a thorough and comprehensive literature review.

4.5 Target Population

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The target population consists of the practitioners in PPP/PFI from both public and private sectors. The most relevant construction organisations and practitioners are from the registered professional bodies. They are the Hong Kong Institute of Architects (HKIA) & Architects Registration Board, the Hong Kong Institute of Planners (HKIP) & Planners Registration Board, the Hong Kong Institute of Surveyors (HKIS) & Surveyors Registration Board, the Hong Kong Institution of Engineers (HKIE) & Engineers Registration Board, the Hong Kong Institute of Landscape Architects (HKILA) & Landscape Architects Registration Board and Institution of Civil Engineering Surveyors (ICES). The members of these professional institutes are thus the main players in the "Community of Practices" of the PFI infrastructure projects in HK.

As such, the questionnaires were sent to these professional members. They are well-distributed in both public and private sectors which are the most representative group in the working and management levels of the construction industry.

More than 750 questionnaires were collected, in which 602 questionnaires were valid and usable yielding a response rate not atypical for this research. The criteria to justify each valid and usable questionnaire include: -

- All questions are answered;
- Requirement of minimum 1 year working experience in PPP/PFI project is fulfilled; and
- Questions are answered in a proper manner. Those giving the same rating for many or all questions are rejected.

4.6 Data Analysis Tools

SPSS was employed as data analysis tools to deduce respondents' perceptions of specified requirements, risks, and hidden costs. SPSS allows researchers to identify individuals who share common opinions. It can (1) identify important internal and external constituencies; (2) define participant viewpoints and perceptions; (3) provide sharper insight into preferred management directions; (4) identify criteria that are important to clusters of individuals; (5) examine areas of friction, consensus, and conflict; and (6) isolate gaps in shared understanding. It involves using factor analytic techniques in order to find out the correlation between variables, by forming variance-covariance matrix (or named as Cofactor Matrix) for answering the hypotheses. Based on a five-point scale in the questionnaire, it can conduct rank-ordering of a set of questions from strongly agree to strongly disagree.

4.7 Data Validity and Reliability

Data Validity and Reliability testing included the examination of internal consistency, convergent validity, discriminant validity, normal distribution and linearity tests.

Internal consistency of the constructs was evaluated by Cronbach's Alpha. 0.60 is considered acceptable for exploratory purposes, 0.70 is considered adequate for confirmatory purposes, and 0.80 is considered good for confirmatory purposes. If the construct satisfies the above

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assumption, then the construct will contribute in predicting the relationship for dependent variables. With respect to the full sample of this research, the variables display satisfactory levels of reliability as indicated by Cronbach's Alpha ranging from 0.74 to 0.86 as follows.

-   Independent Variables – 7 Antecedents of Causal Ambiguity
        Questions: X1, X2, X3, X4, X5, X6, X7, X8, X9, X10, X11, X12, X13, Y1 and Y2
        Cronbach's Alpha: 0.849

-   Independent Variables and Moderating Variables – Causal Ambiguity, Absorptive Capacity, Collaborative Know-how
        Questions: X1, X2, X3, X4, X5, X6, X7, X8, X9, X10, X11, X12, X13, Y1, Y2, A,B & a to s
        Cronbach's Alpha: 0.820

-   Dependent Variables – Knowledge Transfer
        Questions: Y3, Y4 and Y5
        Cronbach's Alpha: 0.741

Convergent validity is the extent to which multiple items measuring a same concept agree. Convergent validity is adequate when constructs have an Average Variance Extracted (AVE) of at least 0.5 (Fornell and Larcker, 1981). Convergent validity is also demonstrated when items load highly (loading > 0.5) on their associated factors (Nunnally, 1978).

For the collected data of this research, most factor loadings and AVEs were 0.5 or higher except for a few questions. The AVE of the independent variables, dependent variables and moderating variables are both higher than 0.5. Convergent validity is satisfactory for the constructs in the measurement model.
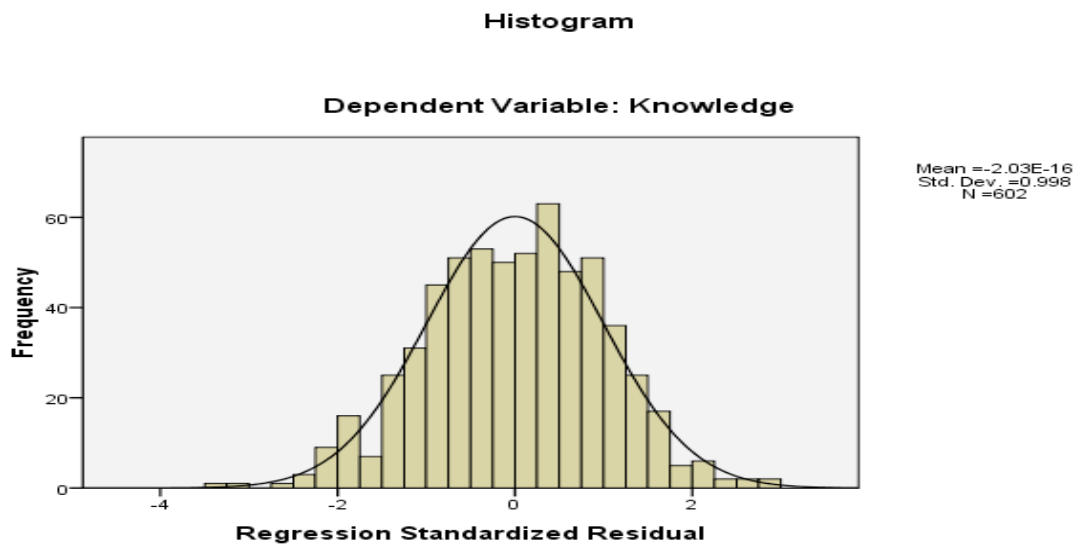
Figure (ii) Histogram of Knowledge Transfer Residuals

Moreover, the histogram in Figure (ii) shows that the Knowledge Transfer residuals are normally distributed.
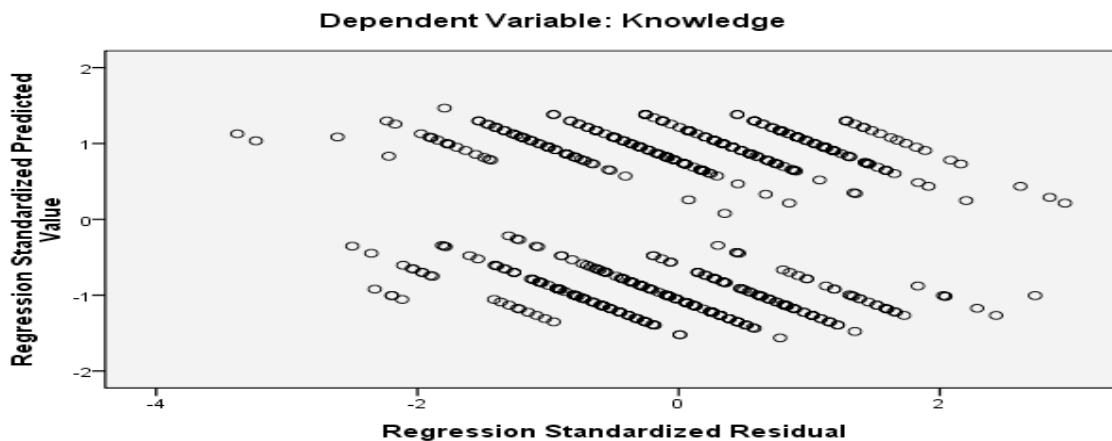
Normal P-P Plot of Regression Standardized Residual
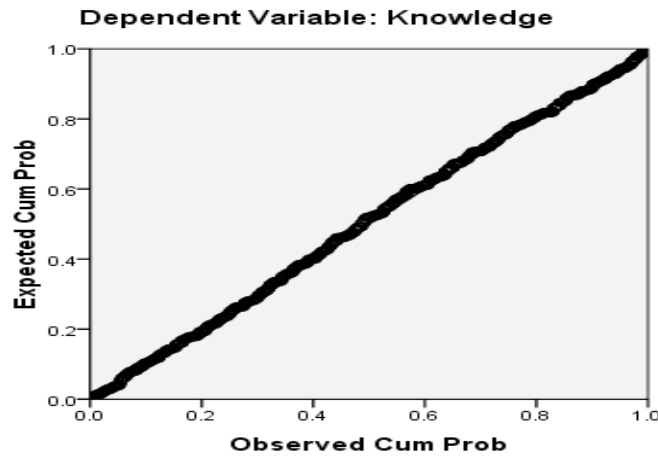
Figure (iii) Normal PP Plot of Regression Standardized Residual

The probability plot (P-P plot) in Figure (iii) shows almost perfect relationship of residuals around the linear line at 45°. Therefore normality of residuals and linearity of relationships exist.

Scatterplot

Figure (iv) Scatterplot of Regression Standardized Residual

The scatter plot in Figure (iv) shows randomness and non linearity of residuals. Therefore this data is suitable to form linear regression models.

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As such, the tests of data reliability & validity and these 3 graphs show the suitability of the data for this research and further analysis.

5. RESULTS, ANALYSIS AND DISCUSSIONS

In testing H_1, H_2, H_3, and H_4, i.e. Tacit knowledge, Partner Protectiveness, Asset Specificity and National Distance (independent variables) with Knowledge Transfer (dependent variables). As these variables were measured using a 5-point scale likert scale, Multiple Linear Regression (MLR) was used to determine the direction and their relationship with Knowledge Transfer. However, in order to enable the use of MLR, the data need to satisfy 3 assumptions as follows: -

1. Assumption of normality of residuals which signifies the generalisability of findings
2. Assumption of linearity of model, this is essential for linear regression
3. Assumption of randomness of residuals which confirms the consistency in the residuals in the independent variables or the homoscedasticity of residuals.

Assumption 1 is determined using histogram and probability plot (P-P plot) in the Figure (ii) and (iii), Assumption 2 and 3 are verified using a scatterplot of residuals in Figure (iv). As regression analysis is robust it can survive the violation of these assumptions when sample size is large. (Hair, J. F., Anderson, R. E., Tatham, R. L. and Black, W. C., 2006)

5.1 Multiple Linear Regression (MLR) Test for H_1, H_2, H_3, and H_4

The MLR model can be illustrated as follows: -
Knowledge Transfer = a + b_1 (Tacit Knowledge) + b_2 (Partner Protectiveness) + b_3 (Asset Specificity) + b_4 (National Distance) + error

First of all, the following 4 main hypotheses are tested.

H_1: Tacit Knowledge is negatively related to Knowledge Transfer.
H_2: Partner Protectiveness is negatively related to Knowledge Transfer.
H_3: Asset Specificity is negatively related to Knowledge Transfer.
H_4: National Distance is negatively related to Knowledge Transfer.

It is essential in this study as the nature of the relationship is equally tested as to understand if the independent variables influences the dependent variable positively. Checking on the sign of each coefficient show the positivity or negativity of the relationship.

To test the significance, the following 3 criteria should be set.

- **H₀: model does not fit the data ; H₁: model fits the data**

  H_0 is rejected based on the rule of the thumb p-value < 0.05 or at 5% level of significance. This p-value refers to the ANOVA output and F value of regression analysis.

- **H₀: β = 0 ; H₁: β > 0 (positively related)**

  H_0 is rejected base on the rule of the thumb p-value < 0.05 or at 5% level of significance. This p-value refers to the coefficient output and t value. However, since this is a one tailed test, (p-value)/2 should be 0.05 to reject H_0.

- **H₀: β = 0 ; H₁: β ≠ 0 (2 tailed test)**

  H_0 is rejected base on the rule of the thumb p-value < 0.05 or at 5% level of significance. This p-value refers to the coefficient output and t value.

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1 (Constant)	4.133	.699		5.914	.000		
TKnowledge	.487	.037	.591	13.097	.000	.241	4.142
PProtect	.189	.048	.113	3.909	.000	.590	1.696
ASpecificity	.271	.061	.195	4.481	.000	.259	3.867
NDistance	-.137	.088	-.035	-1.559	.119	.994	1.006

a. Dependent Variable: Knowledge Transfer

Table (i): Coefficient of MLR Model

With reference to the Table (i), the MLR model is: -

Knowledge Transfer = 4.13 + 0.49 (Tacit Knowledge) + 0.19 (Partner Protectiveness) + 0.27 (Asset Specificity) – 0.14 (National Distance)

This model is tested using the results in the ANOVA table 1 below as follows: -

Testing the significance of the model: -

H_0 = model does not fit the data where $H_0 : \beta_0 = 0$

H_1 = model fits the data where $H_1 : \beta_1 < 0$ (one tailed test)

b_0, ➔ t = 13.10, p-value = (0.0001)/2, H_0 is rejected as p-value < 0.05, hence Tacit Knowledge is a significant variable. However, b-value is greater than 0.

b_1, ➔ t = 3.91, p-value = (0.0001)/2, H_0 is rejected as p-value < 0.05, hence Partner Protectiveness is a significant variable. However, b-value is greater than 0.

b_2, ➔ t = 4.48, p-value = (0.0001)/2, H_0 is rejected as p-value < 0.05, hence Asset Specificity is a significant variable. However, b-value is greater than 0.

b_3, ➔ t = - 1.56, p-value = (0.119)/2 = 0.06, H_0 is not rejected as p-value > 0.05.

However, when raising the significance level to 0.1 (10%), H_0 is rejected as hence Tacit Knowledge is a significant variable at 10% level of significance and b-value is less than 0.

The ANOVA table below shows the model is significant as F = 359.9, degrees of freedom (df) = 4, 597 and p-value = 0.0001 which is < 0.05. Therefore, H_o is rejected, showing that the model fits the data.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2901.458	4	725.365	359.946	.000[a]
	Residual	1203.075	597	2.015		
	Total	4104.533	601			

a. Predictors: (Constant), NDistance, ASpecificity, PProtect, TKnowledge

b. Dependent Variable: Knowledge Transfer

Table (ii) ANOVA Table

Strength of relationship can be tested using the adjusted R^2 value. The strength is confirmed using Cohen's (1992) recommendations: -

R^2 around 0.01 – small ; R^2 around 0.09 – medium ; R^2 around 0.25 – strong (Cohen, J., 1992)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.841[a]	.707	.705	1.41958	.707	359.946	4	597	.000

a. Predictors: (Constant), NDistance, ASpecificity, PProtect, TKnowledge

b. Dependent Variable: Knowledge Transfer

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Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.841[a]	.707	.705	1.41958	.707	359.946	4	597	.000

Table (iii) Model Summary

Table 3 shows R^2 is 0.705, showing 70.5 % of change in Knowledge Transfer is due to the changes in Tacit knowledge, Partner protectiveness, Asset Specificity and National distance

Based on the above analysis, H_1, H_2, and H_3 are not accepted or not supported as Tacit knowledge, Partner protectiveness and Asset Specificity are positively related to Knowledge Transfer. However, H_4 is supported as National Distance is significantly and negatively related to Knowledge Transfer.

5.2 Multicollinearity Test for H_1, H_2, H_3, and H_4

Multicollinearity can be tested using Variance Inflation Factor (VIF) and based on recommendation Hair et al. (2006) and Kutner et al. (2004). Multicollinearity is essential to test if there exists relationship between the independent variables in the model. The existence of multicollinearity may explain the existence of an independent variable due to another, thus the relationship is not because of the influence of that particular independent variable on the dependent variable.

The VIF values for the independent variables shown in Table (i) show VIF < 5. This shows that the independent variables are independent from each other. In other words, there is no multicollinearity (Hair et al., 2006; Kutner et al., 2004) in the multiple linear regression. VIF < 5 rules out the existence of multicollinearity between the independent variables. (Kutner, M. H., Nachtsheim, C. J. and Neter, J., 2004)

5.3 Correlation Analysis for H_5, H_6 and H_7

Simple Pearson's correlation analysis is used to test the strength and direction of relationship between two variables. Correlation is used when the variables are both measured using continuous measures. The H_5, H_6 and H_7 are testing for type of relationships between variables. Coefficient of determination (R^2) allows the measure of variability in one variable which is explained by the other variable involved in the analysis.

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The relationship between Tacit Knowledge and Organisational Behaviour was tested using simple correlation test. According to the table (iv), Tacit knowledge is significantly related to Organisational Distance at r = 0.56, p = 0.0001(p < 0.05)

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		TKnowledge	ODistance
TKnowledge	Pearson Correlation	1	.556**
	Sig. (1-tailed)		.000
	N	602	602
ODistance	Pearson Correlation	.556**	1
	Sig. (1-tailed)	.000	
	N	602	602

**. Correlation is significant at the 0.01 level (1-tailed).

Table (iv) Correlations between Tacit Knowledge and Organisational Distance

H_5: Tacit knowledge is positively related to organisation Distance as there seems to be a positive significant correlation.

Hence, R^2 = 30.9% of variations in Tacit Knowledge can be explained by the variations in organisational distance.

The relationship between Strategic Similarity and Partner Protection was tested using simple correlation test. According to Table (v), Strategic Similarity is significantly related to Partner Protectiveness at r = 0.52, p = 0.0001(p < 0.05)

		StSimilarity	PProtect
StSimilarity	Pearson Correlation	1	.523**
	Sig. (1-tailed)		.000
	N	602	602
PProtect	Pearson Correlation	.523**	1
	Sig. (1-tailed)	.000	
	N	602	602

**. Correlation is significant at the 0.01 level (1-tailed).

Table (v) Correlations between Strategic Similarity and Partner Protection

H_5: Strategic similarity is positively related to partner protectiveness as there seems to be a positive significant correlation.

Similarly to H_3, R^2 = 27.4% of variations in partnership Protection is explained by the strategic similarities.

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The relationship between Asset Specificity and Experience was tested using simple correlation test. According to Table (vi), Asset Specificity is significantly related to Experience at r = 0.50, p = 0.0001(p < 0.05)

		ASpecificity	Experience
ASpecificity	Pearson Correlation	1	.499[**]
	Sig. (1-tailed)		.000
	N	602	602
Experience	Pearson Correlation	.499[**]	1
	Sig. (1-tailed)	.000	
	N	602	602

**. Correlation is significant at the 0.01 level (1-tailed).

Table (vi) Correlations between Asset Specificity and Experience

H_6: Asset specificity is positively related to experience as there seems to be a positive significant correlation. R^2= 24.9% of variations in asset specificity is explained by experience.

5.4 Cross Tabulations and Chi Square Tests for the Differences between Government and Private Sectors Organisation

Cross tabulations and chi square tests are used to determine the association between the independent constructs and nature of organisation (i.e. Government organisations vs. Private sectors organisations).

			Type		Total
			Government	Private	
TKnowledge	2	Count	101	0	101
		% within G or P	34.1%	.0%	16.8%
	3	Count	93	0	93
		% within G or P	31.4%	.0%	15.4%
	4	Count	69	0	69
		% within G or P	23.3%	.0%	11.5%
	5	Count	29	0	29
		% within G or P	9.8%	.0%	4.8%
	6	Count	4	4	8
		% within G or P	1.4%	1.3%	1.3%
	7	Count	0	7	7
		% within G or P	.0%	2.3%	1.2%
	8	Count	0	48	48
		% within G or P	.0%	15.7%	8.0%
	9	Count	0	122	122
		% within G or P	.0%	39.9%	20.3%
	10	Count	0	125	125
		% within G or P	.0%	40.8%	20.8%
Total		Count	296	306	602
		% within G or P	100.0%	100.0%	100.0%

Table (vii) Tacit Knowledge - G or P Cross-tabulation

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.940E2[a]	8	.000
Likelihood Ratio	823.293	8	.000
N of Valid Cases	602		

a. 4 cells (22.2%) have expected count less than 5. The minimum expected count is 3.44.

Table (viii) Chi-Square Tests

The above chi square table shows that there is significant difference in Tacit knowledge between government and private sector. Hence variations in Tacit Knowledge is associated with type of organisations. It is apparent from table (vii) that private sectors organisations are more likely to agree on the importance of Tacit Knowledge compared to Government organisations.

			G or P		Total
			Government	Private	
PProtect	6	Count	2	0	2
		% within G or P	.7%	.0%	.3%
	7	Count	13	0	13
		% within G or P	4.4%	.0%	2.2%
	8	Count	34	3	37
		% within G or P	11.5%	1.0%	6.1%
	9	Count	96	9	105
		% within G or P	32.4%	2.9%	17.4%
	10	Count	107	39	146
		% within G or P	36.1%	12.7%	24.3%
	11	Count	37	84	121
		% within G or P	12.5%	27.5%	20.1%
	12	Count	5	111	116
		% within G or P	1.7%	36.3%	19.3%
	13	Count	1	51	52
		% within G or P	.3%	16.7%	8.6%
	14	Count	1	6	7
		% within G or P	.3%	2.0%	1.2%
	15	Count	0	3	3
		% within G or P	.0%	1.0%	.5%
Total		Count	296	306	602
		% within G or P	100.0%	100.0%	100.0%

Table (ix) Partner Protectiveness - G or P Cross-tabulation

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.144E2[a]	9	.000
Likelihood Ratio	376.819	9	.000
N of Valid Cases	602		

a. 6 cells (30.0%) have expected count less than 5. The minimum expected count is .98.

Table (x) Chi-Square Tests

The above chi square table shows that there is significant difference in Partnership Protectiveness between government and private sector. Table (x) indicates that private sectors organisations are more agreeable to the importance of partner protectiveness than government organisations

There exists variations in Tacit knowledge and Partner Protectiveness are associated with type of organisations.

			G or P		Total
			Government	Private	
ASpecificity	4	Count	28	0	28
		% within G or P	9.5%	.0%	4.7%
	5	Count	100	0	100
		% within G or P	33.8%	.0%	16.6%
	6	Count	124	2	126
		% within G or P	41.9%	.7%	20.9%
	7	Count	38	9	47
		% within G or P	12.8%	2.9%	7.8%
	8	Count	6	65	71
		% within G or P	2.0%	21.2%	11.8%
	9	Count	0	145	145
		% within G or P	.0%	47.4%	24.1%
	10	Count	0	85	85
		% within G or P	.0%	27.8%	14.1%
Total		Count	296	306	602
		% within G or P	100.0%	100.0%	100.0%

Table (xi) Asset Specificity - G or P Cross-tabulation

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.430E2[a]	6	.000
Likelihood Ratio	726.806	6	.000
N of Valid Cases	602		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 13.77.

Table (xii) Chi-Square Tests

The above chi square table shows that there is significant difference in Asset Specificity between government and private sector. Hence, variations in Asset Specificity is associated with type of organisations.

6. CONCLUSIONS

This research lets us have a further understanding of the process of knowledge transfer in not only between private sectors, but also across the public and private sectors organization. Through the study in PPP/PFI projects, this study provides a new research dimension of knowledge transfer in knowledge management aspect.

Causal ambiguity affects the process of knowledge transfer between partners in PFI projects. Tacit Knowledge, Partner Protectiveness, Asset Specificity and National Distance are all significant constructs affecting the process of knowledge transfer between Government and Private Sectors organisation. Tacit Knowledge, Partner Protectiveness and Asset Specificity are positively related to Knowledge Transfer. However, National Distance is negatively related to Knowledge Transfer.

Moroever, Tacit knowledge is significantly and positively related to Organisational Distance. Strategic Similarity is significantly and psotively related to Partner Protectiveness. Strategic similarity is positively related to partner protectiveness as there seem to be a positive significant correlation. Asset Specificity is significantly and positively related to Experience.

Using the cross tabulation and chi square test, there is significant difference in process of knowledge transfer between government and private sectors organisation.

This paper is the intermediate part of the author's work toward a doctoral degree at the University of South Australia. At the moment of writing this paper, the author is undergoing the analysis to the moderating variables. The results will be announced in the final thesis.

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BIOGRAPHICAL NOTES

<u>**Lesly Lam**</u>
Professional Qualifications:
Fellow of Hong Kong Institute of Surveyors (FHKIS)
Member of Royal Institution of Chartered Surveyors (MRICS)
Member of Chartered Institution of Civil Engineering Surveyors (MInstCES)
FIG/IHO Cat. A Hydrographic Surveyor

Academic Qualifications:
Graduate Management Research in Business and Management, University of South Australia
MSc Degree in Hydrographic Surveying, University College London (UCL), UK
BSc(Hons) Degree in Surveying and Geo-Informatics, Hong Kong Polytechnic University (HKPU), HK
Advanced Certificate in Human Resource Management in the Public Sector, The Hong Kong Institute of Human Resource Management (HKIHRM)

Current Position:
Land Surveyor, Lands Department, Hong Kong SAR Government

Activities in home and International relations:
Honorary Treasurer, The Hong Kong Institute of Surveyors, 2009-2010
Honorary Treasurer, The Hong Kong Institute of Surveyors, 2008-2009
Honorary Secretary, The Hong Kong Institute of Surveyors, 2006-2007
Chairman, Young Surveyors Group, The Hong Kong Institute of Surveyors, 2004-2005

CONTACTS

Mr Lesly LAM
The Hong Kong Institute of Surveyors
Suite 810, Jardine House, 1 Connaught Place, Central,
HONG KONG SPECIAL ADMINISTRATION REGION, CHINA
Tel: + (852) 2526 3679
Fax: + (852) 2868 4612
Email: leslylam@hkis.org.hk
Web site: http://www.hkis.org.hk

Dr Canon Tong
International Graduate School of Business
University of South Australia
Adelaide SA 5001, Australia
Email: canon.tong@unisa.edu.au
Web site: http://www. unisa.edu.au