

Intra-organizational Knowledge Transfer and Firm Performance: An Empirical Study of Vietnam's Information Technology Companies

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Abstract

The purpose of this paper is to contribute to the limited previous research on intra-organizational knowledge transfer, by examining the impact of particular organizational factors (IT systems, organizational culture, organizational structure and incentive systems) on the process of knowledge transfer within IT companies in Vietnam and the relationship between the knowledge transfer process and its organizational performance. A survey of 36 companies out of 200 software companies in Hanoi and Ho Chi Minh city, targeted at 900 technical staff, middle managers and top managers, was conducted. The study findings, based on a sample response rate of 24 per cent, indicated that a culture of high solidarity, adaptability and collaboration was proved to have the strongest impact on the process of knowledge transfer and company performance. It was also found that a transparent and flexible incentive system motivated individuals to exchange and utilize knowledge in their daily work, that a high level of centralization and formalization hindered the flow of knowledge, and the effect of IT tools on the knowledge transfer process remained weak. Overall, the findings of the study indicated that organizational factors and intra-organizational knowledge transfer processes have positive correlations with organizational performance.

Keywords: Intra-organizational knowledge transfer; organizational performance; IT companies.

1. Introduction

In the process of building a knowledge-based economy, knowledge is increasingly considered as the most critical asset of firms. A critical factor in achieving organizational competitiveness is the ability to effectively transfer knowledge (Rhodes et al., 2008). Despite the growing research on knowledge transfer in recent years (e.g., Al-Alawi et al., 2007; Cabrera et al., 2006; Lai and Lee, 2007; Chen and Huang, 2007, Rhodes et al., 2008, Liyanage et al., 2009; Friesl et. al, 2011; Wang, 2013; Amayah, 2013), four issues in the study of knowledge transfer have not been successfully addressed. Firstly, rarely have all factors influencing knowledge transfer been taken into account. Secondly, while researchers view knowledge transfer as a critical determinant of an organization's capacity to confer sustainable competitive advantage, the effect of knowledge transfer on organizational performance has not been fully examined or attracted adequate empirical testing. Thirdly, while most research on intra-organizational knowledge transfer has been extensively conducted in developed countries, only a limited number of researches have been done in developing countries like Vietnam. Finally, given the importance of knowledge transfer and the significant research in this domain, intra-organizational knowledge transfer remains a big challenge for the leaders and managers of organizations.

This paper aims to propose and test a model linking organizational factors (organizational culture, organizational structure, information technology tools and incentive system attributes) with intra-organizational knowledge transfer process and organizational performance in the context of Vietnam's information technology companies.

2. Literature review and conceptual model

2.1. Knowledge transfer

The simplest approach to knowledge transfer is that of some researchers who considered that knowledge transfer is knowledge sharing among people (Dyer and Nobeoka, 2000). Knowledge sharing implies the giving and taking of information. Since the source and the recipient may be different in their prior knowledge and their identities, they may have different perceptions and interpretations of the same information. The knowledge received by the recipient is not identical with that of the source. Thus, the knowledge sharing implies the generation of knowledge in the recipient.

Some researchers view knowledge transfer as a process through which knowledge moves between a source and a recipient where knowledge is applied and used. Within an organization, knowledge can be transferred among individuals, between different levels in the organizational hierarchy, and between different units and departments. Szulanski (1996) defines knowledge transfer as "dyadic exchanges of knowledge between a source and a recipient in which the identity of the recipient matters". The level of knowledge transfer is defined by the level of knowledge integrated in the operation of an individual and the level of satisfaction with transferred knowledge expressed by the recipient.

Others focus on the resulting changes to the recipient by seeing knowledge transfer as the process through which one unit is affected by the experience of another (Argote et al., 2000). Similarly, Davenport and Prusak (2000) suggested that the knowledge transfer process involves two actions: the transmission of knowledge to a potential recipient and the absorption of the knowledge by that recipient that could eventually lead to changes in behavior or the development of new knowledge.

Given the various definitions of knowledge transfer, key aspects of knowledge transfer are knowledge movement and its application by the recipient that could lead to creation of new knowledge or changes in behaviors. In this research, the author takes both the process view and the outcome view on knowledge transfer by emphasizing three key dimensions of knowledge transfer. Knowledge transfer involves three actions: (i) initiation - the extent to which people know how to access the knowledge they need, (ii) implementation - the volume of knowledge movement via communication among individuals; (iii) integration - the extent to which a recipient applies the received knowledge that results in a change in a recipient's behavior or/and job performance, and the extent to which a recipient is satisfied with the received knowledge.

2.2. Organizational factors and knowledge transfer

Information technology tools and knowledge transfer

Communication-aiding technologies are expected to foster knowledge transfer by efficiently alleviating factors leading to the difficulty of transfer knowledge. This kind of technology helps to overcome barriers of time or space, promotes positive relational communication and coordination between people, thus easing the "arduous relationship" that may prevent effective knowledge dissemination. It can increase knowledge transfer by extending the individual's reach beyond formal communication lines. Computer networks, electronic bulletin boards, and discussion groups create a forum that facilitates contact between the person seeking knowledge and those who may have access to the knowledge (Karlsen and Gottschalk, 2004). Email, intranet and the internet were rated as the most currently used and the most effective tools supporting knowledge

management in 16 organizations in the UK (Edwards and Shaw, 2004), in 340 organizations in Australia (Zhou and Fink, 2003) and in 115 management consulting firms in the USA (Kim and Trimi, 2007).

Decision-aiding technologies usually require standard forms of input, procedures and standard reports that are readily understandable to users. The anonymity associated with general decision-aiding technologies allows users to participate freely in discussion without considering status and personality, thus alleviating common problems such as conformity of thought. The increased diversity of opinion often leads to generation of new knowledge. Moreover, information technologies are found to support the knowledge transfer process via enhancing the interactions between individuals, groups and organizations as well as easing the decision making process in an organization (Alavi and Leidner, 2001).

Information technologies play a very important role in fostering knowledge transfer. However, this does not guarantee that the investment in information technologies will lead to more effective knowledge transfer, and the real value of technology in supporting knowledge transfer has not yet been fully understood. The effective support of information technologies on knowledge transfer depends on the technology itself and the frequency of use of those technologies for exchange of knowledge inside an organization. Because of that, the supportive role of IT for knowledge transfer is still questionable and need to be more closely examined. Thus, we can hypothesize that:

Hypothesis 1 (H1): The frequency of using IT tools will positively relate to the knowledge transfer

Organizational culture and knowledge transfer

Culture is “the set of values, beliefs and norms, meanings and practices” shared by personnel in an organization (Robbin, 2001), and guiding the action and thinking of people in an organization (Mullins, 2005). Culture serves as a sense-making mechanism that guides and shapes the values, attitudes, and behaviors of employees. Empirical results of several researches indicate that organizational culture is the most important factor for success in knowledge management in both industrial and service corporations (Finke and Vorbeck cited in Mertins et al., 2001; Ruggles, 1998).

In this paper, the author incorporates the three culture models given by Cameron and Quinn (1999), Denison and Young (1999), and Goffee and Jones (1996) to drive several culture dimensions that capture all meanings of organizational culture. The integration enables identification of a specific type of culture and concrete cultural traits associated with knowledge transfer in an organization. The culture traits consist of team orientation, collaboration, adaptability, and solidarity. Solidarity is mainly based on common tasks, mutual interests or shared goals that benefit all involved parties. Solidarity refers to the degree to which members of an organization share goals and tasks (Goffee and Jones, 1996). This makes it easy for them to pursue shared objectives quickly and effectively and generates a strategic focus, swift responses and a strong sense of trust. This trust can translate into commitment and loyalty to the organization’s goals. Adaptability refers to the extent to which individuals express their attitude toward learning, taking risk and creating change (Fey and Denison, 2000).

Although the relationship between organizational culture and knowledge transfer was tested in different contexts by using different methodology, the researchers seem to agree that a culture characterized by mutual trust, open-

ness, collaboration, teamwork orientation and learning orientation has a positive impact on the process of knowledge sharing in an organization (Bollinger and Smith, 2001; Goh, 2002; Lee and Choi, 2003; Karlsen and Gottschalk, 2004; Molina and Llorens-Montes, 2006; Lai and Lee, 2007; Hislop, 2002).

Additionally, Ladd and Ward (2002) and Janz and Prasarnphanich (2003) also found that organizations with cultural traits exhibiting openness to change and innovation, a task-centered orientation and risk-taking, coupled with a level of autonomy over people-related, planning-related and work-related processes, tended to be more conducive to knowledge transfer.

Despite researchers’ attempts in investigating the relationship between culture and knowledge management, in most cases, little attempt has been made to deeply specify the type of culture and the influencing level of different culture traits on knowledge transfer in a concrete and comprehensive manner, especially in the context of IT companies in a transition economy like that of Vietnam. Since organizational culture is often seen as the key inhibitor of effective knowledge sharing in an organization nowadays (McDermott and O’Dell, 2001), there is a need to re-examine the relationship between different culture traits and knowledge transfer, and then to develop a culture that best facilitates the process of knowledge transfer in the setting of IT companies. Hence, the following hypotheses are proposed:

Hypothesis 2a (H2a): Team orientation will positively correlate to knowledge transfer

Hypothesis 2b (H2b): Adaptability will positively relate to knowledge transfer

Hypothesis 2c (H2c): Collaboration will positively relate to knowledge transfer

Hypothesis 2d (H2d): Solidarity will positively relate to knowledge transfer

Organizational structure and knowledge transfer

On the one side, organizational culture creates the context for social interaction - informal communication among individuals in an organization - and thus may influence knowledge transfer. On the other side, organizational structure - the basic lines of reporting and accountability that are typically drawn on an organizational chart - is clearly important for any organization in controlling communications and interactions as well as coordinating different parts and different areas of work in an organization (Mullins, 2005). Organizational structure creates a framework and controls formal communication among individuals across management levels and/or across departments. There are six dimensions that configure the structure of an organization, including work specialization, departmentalization, span of control, chain of command, centralization, and formalization (standardization) (Robbin, 2001). Among them, two primary dimensions of organizational structure, centralization and formalization, have received more attention than any others (Tsai, 2002).

Centralization and knowledge transfer

Within an organization where different units have different goals and strategic priorities, centralization is likely to have a negative impact on knowledge sharing. In an empirical research, Tsai (2002) found that a formal hierarchical structure, in the form of centralization, has a significant negative effect on knowledge sharing among units that compete with each other for market share, but not among those that compete for internal resources. Claver-Cortés et al. (2007) claimed that the companies adopting flexible, increasingly flat organizational forms with fewer hierarchical levels, not only allow but also encourage communication and teamwork among staff members. High

centralization prevents an individual from exercising greater discretion in dealing with the demands of his/her relevant task environment. Moreover, it is possible that centralization reduces initiative so that an individual in a highly centralized organization will not be interested in providing his/her knowledge to others working in different units unless a higher authority requires them to do so. Such an inactive role reduces possible beneficial knowledge flows to others in the same organization. Moreover, a centralized structure hinders interdepartmental communication and frequent sharing of ideas due to time-consuming communication channels (Bennett and Gabriel, 1999). It also causes distortion and discontinuity of ideas (Stonehouse and Pemberton, 1999).

On the other hand, breaking down hierarchies in the organization enables knowledge transfer (Nonaka and Toyama, 2002). A flexible organizational structure (i.e., teamwork, decentralized structure) provides a good environment for discussion and interaction among employees about task-related issues (Chen and Huang, 2007). Multi-faceted dialogue, individual autonomy, and high care are factors of team working that favor knowledge transfer (Goh, 2002; Nonaka and Takeuchi, 1995). Moreover, lateral relations and interactions among individuals are very important as they coordinate activities across different units and substantially improve the design of a formal organization. These relations and interactions blur the boundaries among members of different units and between different management levels, and stimulate the formation of common interests, that in turn, support the building of new exchanges or cooperative relationships (Tsai, 2002). A low level of centralization provides more channels for information exchange among members in an organization as well as making communication among individuals across organizational

units and management levels easier. This may provide more space for knowledge exchange. However, if organizational structure is highly dynamic like virtual structure, it can inhibit the establishment of knowledge-oriented infrastructure that supports knowledge sharing (Kahler et al. cited in Barnes, 2002). Hence, there is a hypothesis that:

Hypothesis 3a (H3a): Centralization will negatively relate to knowledge transfer

Formalization and knowledge transfer

Knowledge transfer requires flexibility, frequent interaction and less stress on work rules (Lubit, 2001). The range of new ideas seems to be rarely created and shared when strict formal rules dominate an organization. There may not be much tacit knowledge shared when all work processes strictly follow the rules. Less formalized organizational structure enables social interaction, which is needed for transferring knowledge within an organization (Chen and Huang, 2007). The communication and interactions necessary for sharing knowledge may be hindered in an organization having a high level of formalization. Hence, it is hypothesized that:

Hypothesis 3b (H3b): Formalization will negatively relate to knowledge transfer

Incentive system and knowledge transfer

Several empirical studies found that monetary incentives are absolutely necessary for fostering knowledge transfer. Bartol and Srivastava (2002) proposed a relationship between different types of knowledge sharing and monetary reward systems. They identify four mechanisms of knowledge sharing - individual contribution to databases, formal interactions within and between teams, knowledge sharing across work units, and knowledge sharing through informal interactions. They suggested that monetary rewards could be instituted to encourage knowledge sharing through the first

three mechanisms, whereas informal knowledge sharing would be rewarded by intangible incentives such as enhancing the expertise and recognition of individuals. Disterer (2003) also recommended that knowledge sharing issues need to be incorporated into a compensation plan and promotion policies.

Despite empirical studies on the relationship between different types of incentives and knowledge transfer showed different results, incentive systems are proved to be important in fostering knowledge sharing. However, there is no evidence showing the relationship between the availability of incentive systems and knowledge transfer in the context of Vietnam. Thus, it is hypothesized that:

Hypothesis 4a (H4a): The availability of incentive systems will positively associate with knowledge transfer

Not only the influence of incentive types on knowledge sharing matters, but the impact of incentive system attributes on this process also get a lot of attention from researchers. Locke (2004) argues that, it is critical to do a lot of thinking about which actions and outcomes are important before creating a goal and reward system. Disterer (2003) added that, in order to encourage people to share their knowledge, a clear incentive system has to be provided and there must be a balance of give and take between employees who share knowledge. Similarly, Hansen et al. (1999) argue that if there is an inappropriate and no clear incentive system for knowledge management, knowledge management policies and objectives will be inadequate. Through an empirical research of 118 potential respondents in an IT planning context, Sahraoui (2002) suggested that 3 attributes of a formal rewards system: fairness, group reward, and openness are positively related to the extent of harnessing collective knowledge of knowledge workers.

Given the important role of incentives and incentive systems attributes in fostering knowledge transfer, the relationship between them has not yet been thoroughly examined. Thus, we can hypothesize that:

Hypothesis 4b (H4b): An incentive system characterized by fairness, transparency, flexibility and that is group-based, will positively relate to intra-organizational knowledge transfer.

2.3. Knowledge transfer and organizational performance

Knowledge transfer not only improves the competency of the actors/ individuals that are involved in the process but it also benefits the organizations by speeding up the deployment of knowledge (Sveiby, 2001; Davenport and Prus-

sak, 1998). Possible consequences of effective knowledge transfer include: improved financial performance (Teece, 1998, Rhodes et al., 2008), innovation (Darroch, 2005; Lin, 2007; Rhodes et al., 2008; Chen et al., 2010), enhanced organizational learning (Buckley and Carter, 2004; Yang, 2007), and organizational effectiveness (Yang, 2007). In the empirical study, Gold et al. (2001) suggest that knowledge management capabilities are positively related to organizational effectiveness. Supporting that, Lee and Choi (2003), Rhodes et al. (2008) also found the relationship of the knowledge creation and knowledge transfer process and subjective indicators of organizational performance, via the mediating effect of organizational creativity and innovative capabilities. Darroch (2005), in the study of 433 companies in New Zealand,

Figure 1: Conceptual model

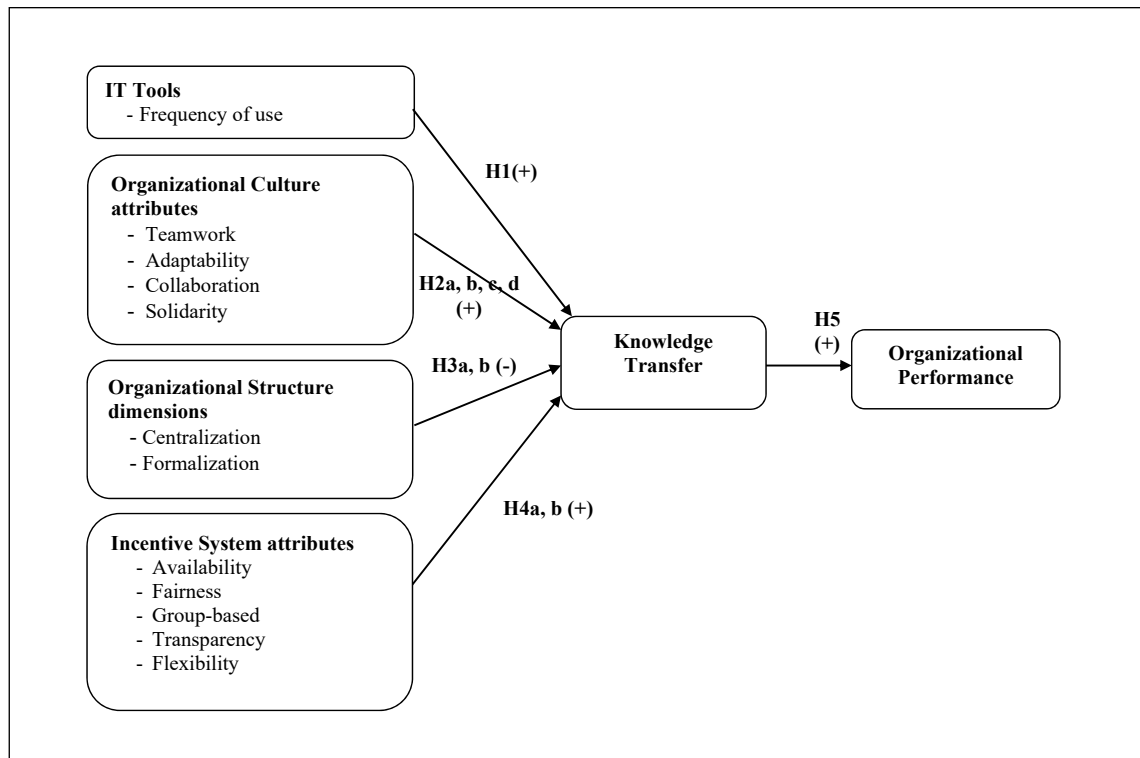


Table 1: Demographic profile of respondents

Demographic variables	Frequency	Percentage
<i>Gender</i>		
Male	188	86.2
Female	30	13.8
<i>Work seniority</i>		
Less than 6 months	26	11.9
6 months to 2 years	68	31.2
2 years - 5 years	96	44.0
More than 5 years	28	12.8
<i>Work positions</i>		
Technical staff	128	58.7
Middle managers	88	40.4
Senior managers	2	0.9

found that knowledge dissemination positively predicts innovation, but the positive relationship of knowledge dissemination with organizational performance was not confirmed.

Therefore, there is a hypothesis that needs to be tested:

Hypothesis 5 (H5): The knowledge transfer process will positively relate to organizational

performance.

The control variables - company age, company size, seniority and working position of respondents - were included in the model.

3. Research methodology

3.1. Sample and data collection

The sample for this study was drawn from

Table 2: Profile of the surveyed companies

Company characteristics	Frequency	Percentage
<i>Business Area</i>		
Software production	32	88.9
Hardware production and IT services	4	11.1
<i>Year of Operation</i>		
< = 7 years	18	50.0
> 7 years	18	50.0
<i>Company's Ownership</i>		
Joint-stock	17	47.2
Liability Ltd.	13	36.1
State-owned	6	16.7
<i>Company Size (Number of full-time employees)</i>		
< = 50	5	13.9
51 - 99	12	33.3
100 - 249	6	16.7
> = 250	13	36.1

the list of 200 companies which are members of the Vietnam Software Association located in Hanoi and Hochiminh City, since those companies are big enough (having a number of employees greater than 50) for the study on knowledge transfer. The target respondents of the survey are 900 technical staff, heads and deputy heads of functional departments and senior managers working in surveyed companies. As a result, 218 individuals (response rate is 24%) from 36 software companies actually participated in the research. 3 to 8 respondents per company were surveyed. Table 1 and Table 2 provide a description of the sample in the study.

3.2. Measurements of constructs and questionnaire design

The questionnaire was developed using self-developed and prior measurements corresponding to each variable in the literature and taking the context of the Vietnamese IT firms into account. A 5-point Likert scale (ranging from 1: strongly disagree to 5: strongly agree) was employed for all questionnaire items. Multiple-item scales for all constructs in the conceptual model were either newly developed or grounded from previous researches to ensure the reliability and validity of the measurement system.

Organizational performance was measured by changes in the company's performance over the last three years in different perspectives: financial, customer, internal process and innovativeness. The measurements of the construct was grounded in the work of Kaplan and Norton (1996), Edvinsson and Malone (1997), Lee and Choi (2003), Bell (2005) and William (2003).

The development of the intra-organizational knowledge transfer measure was grounded in the work of Argote et al. (2000), Szulanski

(1996, 2000) and Ko et al. (2005).

The measurement for the construct "frequency of IT tool use" was adapted from Staples and Jarvenpaa (2000) and Taylor (2004).

Organizational culture was operationalized through four main constructs: teamwork, collaboration, adaptability, and solidarity. The measurement for each construct was adopted from the work of Fey and Denison (2000), Goffee and Jones (1996), and Lee and Choi (2003).

Organizational structure comprises two dimensions: centralization and formalization. Centralization is measured by identifying the level at which strategic and operational decisions are made in organizations (Palmer and Dunford, 2002). Formalization refers to the degree to which the work processes are explicitly represented and documented in the form of written policies and rules (Baum and Wally, 2003; Lee and Choi, 2003). Based on the studies of Lee and Choi (2003), Baum and Wally (2003), Tata and Prasad (2004), the items measuring the two constructs are defined.

As discussed in the literature, transparency, flexibility, fairness and group orientation are four attributes measuring incentive systems that facilitate knowledge transfer in an organization. 16 items measuring the four constructs were generated based on the previous literature, especially on the work of Sahraoui (2002) and Locke (2004).

3.3. Measurement assessment

Firstly, Cronbach's alpha was used as a measure of reliability because it provides a lower bound for the reliability of a scale and is the most widely used measure. The results of testing validity and reliability of measurement of constructs indicated that all Cronbach's coefficient alpha of constructs were greater than 0.7. According to Kline (1998), a set of items with a coefficient alpha greater than or equal to 0.7

Table 3: Correlations

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Frequency of IT use	1																
Teamwork	.307**	1															
Adaptability	.294**	.427**	1														
Collaboration	.291**	.340**	.546**	1													
Solidarity	.411**	.348**	.571**	.708**	1												
Formalization	0	.191**	.456**	.604**	.573**	1											
Centralization	.346**	.313**	.318**	.419**	.557**	.364**	1										
Monetary Incentives	.224**	.311**	.389**	.548**	.641**	.555**	.495**	1									
Nonmonetary Incentives	0	.147**	.246**	.446**	.593**	.481**	.384**	.684**	1								
Fairness	.242**	.261**	.496**	.522**	.651**	.572**	.523**	.579**	.539**	1							
Transparency	.285**	.303**	.446**	.468**	.687**	.521**	.617**	.547**	.528**	.672**	1						
Flexibility	0	.145**	.411**	.326**	.398**	.310**	.271**	.372**	.345**	.374**	.428**	1					
Group-based	.158*	.243**	.392**	.554**	.586**	.504**	.450**	.611**	.497**	.546**	.595**	.372**	1				
Initiation	.174*	.384**	.541**	.284**	.449**	.222*	0	.237**	.148**	.233**	.348**	.257**	.334**	1			
Implementation	.143*	0	.400**	.320**	.514**	.260**	0	.261**	.321**	.266**	.190**	.358**	.268**	.568**	1		
Integration	.285**	.367**	.444**	.386**	.564**	.157**	.296**	.436**	.384**	.370**	.500**	.304**	.381**	.527**	.545**	1	
Overall KTransfer	.235**	.352**	.557**	.389**	.603**	.257**	.165**	.363**	.328**	.339**	.409**	.363**	.390**	.860**	.839**	.804**	1
Overall Firm Performance	.314**	.207**	.445**	.477**	.638**	.345**	.434**	.515**	.549**	.458**	.536**	.523**	.521**	.310**	.400**	.492**	.470**

Note: **. Correlation is significant at the 0.01 level (2-tailed); *. Correlation is significant at the 0.05 level (2-tailed)

is considered internally consistent.

Secondly, confirmatory factors' analysis was employed in order to reduce the number of variables to more manageable sets and to seek out the underlying constructs from the data (Hair et al, 1995). All factors with eigen values greater than 1 were extracted. Factor loadings were evaluated on 2 criteria: the significance of the loadings and the simplicity of the factor structure. Items with loadings less than 0.5 were deleted from the analysis. The confirmatory factor analysis was also examined to ensure an acceptable level of multi-collinearity among latent factors.

Thirdly, regression analysis was conducted to test all hypotheses of this research. Hypothesis testing included examination of different multiple regression models for predicting knowledge transfer and firm performance. The computed factor scores of each latent factor were used as predictor variables in regression analysis with the dependent factor. For each of the independent variables in the regression models, the variable inflation factor (VIF) was calculated. The VIF of independent variables in all regression models ranged from 1.046 to 1.5. According to Chatterjee et al. (2000); Hair et al. (1995), a value of VIF less than 10 is acceptable. Thus, our data may not be subject to a problem of multi-collinearity.

4. Main results

4.1. Correlation analysis

Table 3 presents the correlation matrix assessing the means, standard deviations, and relationship among variables in the study. None of these correlations was considered high (above 0.7) and some were moderately correlated (between 0.4 and 0.7).

As expected, the four attributes of organizational culture (adaptability, teamwork, collaboration and solidarity) positively correlated with

the three stages of the transfer process: initiation, implementation and integration. Frequency of using IT tools correlated with all three stages at low level.

Some independent variables were correlated in a way opposite to that hypothesized. Centralization and formalization positively correlated with all three stages.

4.2. Hypothesis testing

Knowledge transfer models

Table 4 and 5 represented 6 models showing the relationship among different independent factors and knowledge transfer.

Model 1 examining the predictability of the frequency of using IT tools was significant (Adj. $R^2=0.052$, $F=3.35$, $p<0.001$). The frequency of using IT tools contributes to 5.2% of the variance in knowledge transfer. This effect

remains weak. None of the control variables is significant in this model. The statistical result in Table 4 indicates support for the hypothesis H1. The impact of the frequency of use of IT tools on integration stage remains the biggest ($\beta=0.18$, $p<0.001$). The higher the frequency of using IT tools, the higher the possibility that knowledge will be integrated into daily work and individuals' performance in the company. This finding suggests that information technology has a potential for facilitating knowledge transfer. However, the IT tools by themselves are not sufficient. There needs to be a mechanism and an enabling environment to encourage people to use the tools for exchanging knowledge.

Model 2 examining the predictability of organizational culture attributes was significant

Table 4: Regression results of knowledge transfer

Variables	Model 1			Model 2			Model 3		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
	Beta	Beta	Beta	Beta	Beta	Beta	Beta	Beta	Beta
Control Variables									
Company Age	-0.12	-0.02	0.01	-0.17*	-0.08	0	-0.22	-0.11	-0.04
Company Size	-0.11	0.14	0.08	-0.17*	0.05	0.03	-0.11	0.14	0.1
Seniority	0.09	0.07	0.05	0.05	0.05	0.01	0.07	0.06	0.06
Working Position	-0.03	-0.13	0.03	0	-0.09	0.08	0.02	-0.09	0.05
Independent Variables									
Frequency of Using IT tools	0.15**	0.11*	0.18***						
Organizational Culture									
Teamwork				0.13+	-0.11	0.16*			
Adaptability				0.52***	0.23**	0.13*			
Collaboration				-0.22*	-0.13	-0.09			
Solidarity				0.34***	0.46***	0.40***			
Organizational Structure Dimensions									
Centralization							0.02	-0.05	-0.22***
Formalization							0.22***	0.204***	0.03
Availability of Incentive Systems									
Monetary Incentives									
Non-monetary Incentives									
Incentive Systems' Attributes									
Fairness									
Transparency									
Flexibility									
Group Orientation									
Adjusted R ²	0.03	0.03	0.07	0.38	0.28	0.35	0.070	0.070	0.096
F Statistic	2.6**	2.5*	4.6***	17.5***	14.0***	15.7***	3.7**	4.0**	4.83***

Note: + $p<0.1$, * $p<0.05$, ** $p<0.01$, *** $p<0.001$; (1) Initiation stage; (2) Implementation stage; (3) Integration stage

Table 5: Regression results of knowledge transfer (con't)

Variables	Model 4			Model 5			Model 6		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
	<i>Beta</i>	<i>Beta</i>	<i>Beta</i>	<i>Beta</i>	<i>Beta</i>	<i>Beta</i>	<i>Beta</i>	<i>Beta</i>	<i>Beta</i>
Control Variables									
Company Age	-0.17+	-0.06	-0.06	-0.19	-0.09	-0.07	-0.13	-0.03	0.04
Company Size	-0.17+	0.08	0	-0.14	0.1	0.06	-0.18*	0	-0.02
Seniority	0.07	0.07	0.03	0.07	0.06	0.04	0	0.01	-0.01
Working Position	0.03	-0.1	0.09	0.03	-0.09	0.08	0.08	-0.04	0.11*
Independent Variables									
<i>Frequency of Using IT Tools</i>							-0.05	-0.01	-0.01
<i>Organizational Culture</i>									
Teamwork							0.17*	-0.02	0.12*
Adaptability							0.49***	0.19*	0.17**
Collaboration							0.19*	-0.14	0.03
Solidarity							0.47***	0.69***	0.31***
<i>Organizational Structure Dimensions</i>									
Centralization							-0.30***	-0.23***	-0.14*
Formalization							-0.04	0	-0.26***
<i>Availability of Incentive Systems</i>									
Monetary Incentives							0.213**	0.03	0.198***
Non-monetary Incentives							0	0.202**	0.109+
<i>Incentive Systems' Attributes</i>									
Fairness				-0.02	0.15*	0.02	-0.15	0.004	-0.06
Transparency				0.21*	0.11	0.28***	0.16*	0.24***	0.23***
Flexibility				0.12+	0.22***	0.07	0.03	0.16***	0.02
Group Orientation				0.17*	0.11+	0.07	0.15*	0.06	0.01
Adjusted R ²	0.070	0.100	0.202	0.17	0.155	0.267	0.43	0.409	0.452
F Statistic	3.9***	5.11***	10.17***	6.55***	5.95***	10.86***	10.9***	9.8***	11.53***

Note: + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; (1) Initiation stage; (2) Implementation stage; (3) Integration stage

(Adj. $R^2=0.44$, $p < 0.001$). The adjusted R^2 value of all regression models reveals that organizational culture has a large effect on different stages of knowledge transfer. The statistical results of the regression analysis in Table 5 indicate support ($p < 0.001$) for the hypotheses H2a, H2b and H2d (Adj. $R^2=0.38$, 0.28 , 0.35 , $p < 0.001$). The beta weights suggest that high adaptability and high solidarity contribute most to predicting the knowledge transfer process ($\beta=0.29$ and 0.4 respectively, $p < 0.001$). Solidarity, adaptability and teamwork are three culture values that were significantly associated with the three stages of the intra-organizational knowledge transfer process, while collaboration was not. Teamwork orientation has more impact on the integration stage ($\beta=0.16$, $p < 0.001$). In contrast to that hypothesized (H2c), collaboration was negatively related to the initiation stage ($\beta=-$

0.22 , $p < 0.001$). Two control variables - company age and company size - were negatively correlated with the initiation stage ($\beta=0.17$, $p < 0.05$).

Model 3 examining the predictability of organizational structure attributes was significant (Adj. $R^2=0.07$, $p < 0.001$). However, the effect of organizational structure on the knowledge transfer process is much lower than that of organizational culture. Formalization contributes most to facilitating knowledge transfer. None of the control variables is significant in this model. The results, presented in the Table 4, suggest that formalization was positively associated with the initiation stage ($\beta=0.22$, $p < 0.01$) and the implementation stage ($\beta=0.204$, $p < 0.001$). The hypothesis H3b was supported in the opposite direction to that hypothesized. Applying ISO standards to managing company opera-

tions and providing regulations and instructions in the organization may help people in keeping track of their work and knowing exactly what they need to do. High formalization can also reduce chaos and control employees' behavior in a way that facilitates knowledge transfer.

Centralization was negatively associated with the integration stage ($\beta = -0.22$, $p < 0.001$). High centralization prevents individual creativity and flexibility in dealing with changes in the work environment. It also hinders communication and frequency of sharing ideas due to time-consuming communication channels. There is no statistically significant relationship between centralization and the initiation and implementation stages.

The statistical results presented in the model 4 (Table 5), suggest that both monetary and non-monetary incentives are needed to facilitate the knowledge transfer process (Adj. $R^2 = 0.142$, $p < 0.001$). The effect of incentive availability on the implementation stage is the biggest. The monetary incentive system was positively associated with initiation and integration stages ($\beta = 0.213$, $p < 0.01$ and $\beta = 0.198$, $p < 0.001$, respectively), while the non-monetary incentive system was significantly associated with the implementation stage ($\beta = 0.202$, $p < 0.01$).

Model 5 examined the relationship between the incentive system's attributes and the knowledge transfer process. The statistical results, presented in Table 5, indicate support for the hypothesis H4b (Adj. $R^2 = 0.23$, $p < 0.001$). For facilitating the initiation stage, group orientation and transparency are more important than fairness and flexibility. The volume of knowledge transfer increases if the incentive system is flexible and fair. To facilitate the integration stage, there is a need to have a clear incentive system ($\beta = 0.28$, $p < 0.001$). Overall, an incentive system which is flexible, transparent and group-oriented, can have a significantly posi-

tive effect on the knowledge transfer process.

Model 6 tested the joint impact of all proposed independent variables on the knowledge transfer process. As observed, there is a significant improvement in the predictive power of this model in comparison with previous models with the explained percentages of total variance being 43% for the initiation stage, 40.9% for the implementation stage and 45.2% for the integration stage. Company size is negatively correlated with the initiation stage ($\beta = -0.18$, $p < 0.05$), while working position is positively correlated with the integration stage ($\beta = 0.11$, $p < 0.05$). The results suggest that individuals with high positions in the company's hierarchy tend to have more opportunities to apply the acquired knowledge in their work that results in their better performance. In addition, the larger the company is, the weaker the individuals' interaction for exchanging knowledge. In order to facilitate the knowledge transfer process, a culture of adaptability and solidarity in the company could be developed and facilitated.

The statistical results in Table 5 suggest that solidarity and adaptability are two culture values that strongly influence all three stages of the knowledge transfer process. Solidarity has a large effect and the strongest association with the implementation stage ($\beta = 0.69$, $p < 0.001$), and the integration stage ($\beta = 0.31$, $p < 0.001$). It is also significantly related to the initiation stage ($\beta = 0.47$, $p < 0.001$). Adaptability has the strongest association with the initiation stage ($\beta = 0.49$, $p < 0.001$), and is significantly associated with the implementation stage ($\beta = 0.19$, $p < 0.05$) and the integration stage ($\beta = 0.17$, $p < 0.01$). Teamwork is significantly associated with the initiation stage ($\beta = 0.17$, $p < 0.05$) and the integration stage ($\beta = 0.12$, $p < 0.05$). Collaboration is only significantly associated with the integration stage ($\beta = 0.19$, $p < 0.01$). Overall, all four culture values were significantly associ-

ated with the integration stage. Adaptability, teamwork orientation and solidarity are important for facilitating the initiation stage. Solidarity and adaptability appear important for facilitating the implementation stage.

After examining the effect of organizational culture, the two dimensions of organizational structure are now analyzed. The statistical results suggest that the higher the level of formalization and centralization, the more the transfer process is hindered. Centralization is negatively associated with all three stages. Formalization negatively influences the integration stage ($\beta=-0.26$, $p<0.001$). Overall, the effect of centralization on the knowledge transfer process is larger than that of formalization.

A flexible and transparent incentive system is also important for facilitating the knowledge transfer process. The more flexible the incentive system, the more knowledge is exchanged and utilized among individuals ($\beta=0.16$, $p<0.001$). Transparent incentive systems encourage people to utilize knowledge and make behavioral change ($\beta=0.23$, $p<0.01$).

Unexpectedly, in this model, frequency of IT tools use was not significantly related to the knowledge transfer process ($p>0.5$). Since people did not frequently use IT tools for knowledge transfer (the average frequency is “sometimes”, e.g. once per month to once per week), the support of IT tools in the knowledge transfer process could not be adequately revealed. The low frequency of individual use of IT tools in surveyed companies results from a low level of IT usefulness perceived by people in those companies. Another explanation is that IT tools may not directly support the three stages of the transfer process. Although email, intranet, and company websites can help collaboration, this communication-aided technology cannot replace face-to-face contact in fostering tacit-to-tacit knowledge transfer.

In summary, the impact of independent variables on the knowledge transfer process was varied. Among independent variables, the results suggest that organizational culture has the strongest impact on the knowledge transfer process. The next most important was the impact of organizational structure dimensions followed by the impact of incentive systems. The frequency of using IT tools was not significantly associated with the three stages of the knowledge transfer process.

To facilitate each stage of the process, some independent variables appear to be more important than others. Facilitation is enhanced in the initiation stage by building a culture of adaptability, teamwork, collaboration and solidarity, by using group-oriented and transparent incentive systems, and by avoiding centralization. Building a culture of high adaptability and high solidarity, as well as flexible and clear incentive systems coupled with a high involvement of individuals in the decision-making process may facilitate the implementation stage. Knowledge integration is improved by a transparent incentive system, low formalization and centralization and a culture of high adaptability, teamwork and solidarity.

Intra-organizational knowledge transfer and organizational performance

The statistical result, presented in Table 6, suggests that the knowledge transfer process is positively related to overall organizational performance (Adj. $R^2=0.272$, $p<0.001$). The hypothesis H5 was supported. Among the three stages of knowledge transfer, integration contributes most to predicting organizational performance ($\beta=0.338$, $p<0.001$). It has the biggest effect on both financial and non-financial performances. Together with knowledge integration, company size also positively influences organizational performance ($\beta=0.139$, $p<0.05$).

Table 6: Multiple regression results for organizational performance

Variables	Financial performance	Non-financial performance	Overall performance
	Beta	Beta	Beta
<i>Control Variables</i>			
Company Age	-0.080	0.022	-0.021
Company Size	0.205**	0.140*	0.139*
<i>Knowledge Transfer Process</i>			
Initiation	0.083	0.034	0.023
Implementation	-0.040	0.115	0.133*
Integration	0.475***	0.305***	0.338***
Adjusted R ²	0.274	0.205	0.272
F Statistic	17.390***	12.173***	17.170***

Note: + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

5. Discussion of the main results

This study proposed and tested a model linking organizational culture, incentive system attributes, organizational structure dimensions, frequency of using IT tools, with knowledge transfer and organizational performance in the setting of Vietnam's IT companies. It was found that the most important factor influencing the knowledge transfer process was the organizational culture attribute. The next factors in importance were incentive system attributes and organizational structure dimensions. Frequency of using IT tools was a minor factor influencing the knowledge transfer process. The relationship between the knowledge transfer process and organizational performance was also examined. It was found that the three stages of the knowledge transfer process were significantly associated with organizational performance.

The results of the study confirm the important role of organizational culture in intra-organizational learning, stated by McDermott and O'Dell (2001). In contrast to previous research

undertaken in developed countries (Lee and Choi, 2003; Karlsen and Gottschalk, 2004; Molina and Llorens-Montes, 2006), this study found that in the context of a transition economy, high solidarity and adaptability attributes are more important than collaboration and teamwork orientation. This finding is in line with the findings of Taylor and Wright (2004).

The link between the incentive system and the knowledge transfer process is confirmed by the study. Further to the conclusion drawn by McDermott and O'Dell (2001), Bartol and Srivastava (2002), Burgess (2005), Al-Alawi et al. (2007), neither monetary incentives nor non-monetary incentives alone are enough to facilitate the process of intra-organizational knowledge transfer. The finding of this study further supports the study of Lucas (2006) that, in order to make people engage in the process of knowledge transfer, incentives must be offered through all three stages. If incentives only exist at a particular stage, then people may refuse to participate in subsequent knowledge transfer efforts.

Besides, all four attributes, including transparency, fairness, flexibility and group orientation, must be taken into account when designing an incentive system since each attribute appears more important for a certain transfer stage than the others. Group-oriented incentives, on the one hand, would be an effective instrument in creating a feeling of cooperation, ownership and commitment among employees. On the other hand, group-oriented incentives can enhance knowledge sharing within teams and across work units. A fair incentive system is an important factor in the development of trust, which facilitates knowledge sharing through informal interactions. A flexible and transparent incentive system motivates employees to improve their job performance, and their competencies. As a result, a company can benefit from the wide pool of employee's knowledge and their subsequent improved performance. The result of the study is in line with the findings of Bartol and Srivastava (2002), Disterer (2003) and Locke (2004), but it goes further by concluding that (i) a transparent incentive system has to be in place in order to encourage people to apply new knowledge in their work, and (ii) a transparent incentive system allows individuals to anticipate rewards - knowing how the system functions, they then try to meet the company requirements to achieve rewards.

The impact of organizational structure dimensions (centralization and formalization) on the knowledge transfer process is also revealed in the study. Similar to the findings of Tsai (2002), Goh (2002), Lee and Choi (2003), Lucas (2006), Chen and Huang (2007), Al-Alawi et al. (2007), centralization was found to negatively influence the flow of knowledge among individuals. High centralization prevents interaction and frequency of communication among individuals in different units. It also hinders the creativity and the need for sharing ideas be-

tween individuals since they are not required to do so by higher authorities. The more control the managers exercised on their subordinates, the less the subordinates were willing to share knowledge with others. Therefore, participation and active involvement in the decision-making process are essential for successful knowledge transfer. When employees are involved in the decision-making process, they develop a sense of ownership. This sense of ownership leads employees to look beyond the scope of their stated responsibilities and do what is necessary to ensure that knowledge transfer is successful. The sense of ownership that employees develop stimulates them to engage in repeated signaling as a means of encouraging specific actions by employees and discouraging those actions that do not reinforce the cultural values important to success.

Centralization can become an ineffective way to coordinate individuals in a company since centralization may impose certain costs on an organization. These costs include: (i) a tendency for managers to intervene inappropriately in individuals' task performance, (ii) increased time and effort devoted to influencing activities with a corresponding reduction in individual and organizational productivity; and (iii) poor decision-making resulting from the distortion of information associated with activities to influence.

In contrast to the findings of Lee and Choi (2003), Lubit (2001), formalization was found to have a positive relationship with the knowledge transfer process in this study. There are several possible explanations for this difference. The first is that the learning requirement in the Vietnamese companies' settings may not be as dynamic as originally assumed. Therefore, the need for more flexible learning structures may not be as great as originally hypothesized. The second is that formalization may enhance

the communication flow through an extensive monitoring and reporting requirement. This, in turn, can facilitate the conversion of tacit knowledge into explicit knowledge within the company. Another important, possible explanation for the failure to confirm the hypothesis related to formalization is that, as McDermott and O'Dell (2001) suggested, culture plays a significant moderating role in the knowledge transfer process. Formal studies of Vietnamese culture do not appear to have been conducted, but if uncertainty avoidance is a silent cultural trait in Vietnam as with many other Asian cultures, then it is possible that Vietnamese people may learn more efficiently when formal mechanisms are used to transfer knowledge.

The knowledge transfer process was found to predict organizational performance. The fact that the knowledge transfer process accounted for 27% of the total variance in financial performance and 20.5% of the total variance in non-financial performance, clearly suggests that an intra-organizational knowledge transfer process should be considered as one of the factors contributing to company performance. The explaining power of knowledge transfer to the variance of organizational performance was at a slightly moderate level. These results also support Brachos et al. (2007), who found that knowledge sharing connected with organizational learning ultimately predicts organizational effectiveness. The effective organizational learning and knowledge sharing enable an organization to improve organizational behaviors by the creation of advanced knowledge and the development of better understanding, and hence to become innovative and competitive. Furthermore, the overall contribution to bottom-line profits would be attained. Eventually, this results enhance overall organizational effectiveness. Several studies considered intra-organizational knowledge transfer as an

indicator of organizational capability and used it to predict various performance outcomes. For example, Tsai and Ghoshal (1998) showed that intra-organizational knowledge sharing affected business unit product innovation. Darroch (2005) showed that a company with a knowledge management capability uses resources more efficiently and so is more innovative and performs better.

The statistically non-significant findings in this study also have some implications. In the multiple regressions (model 6) presented in Table 5, the frequency of using IT tools was no longer significantly related to the knowledge transfer process when other independent variables were added to the analysis. The statistically non-significant relationship suggests that either IT tools have no direct impact on the knowledge transfer process or their effects remain weak. IT tools will have more impact if people use them more frequently in their work. Thus, IT companies should invest more in training to improve the IT skills of their employees in order to encourage them to use such tools.

Overall, managers in IT companies can improve the company's performance by facilitating knowledge transfer processes. In order to facilitate the knowledge transfer process, building a communal culture, decentralizing organizational structure and developing flexible and transparent incentive systems are the main concern.

6. Conclusion

The study builds on and extends the findings of the previous researches on the link between organizational factors, the knowledge transfer process and organizational performance with data from Vietnam IT companies.

Although making certain contributions to the growing body of literature on knowledge

transfer, the study has several limitations. Since data were collected from individuals in 36 IT companies, the findings may not be generalized at large, and/or in other setting. Additionally, there is a potential risk for common method

bias due to the use of self-administered questionnaires with mainly perceptual measures.

Future study could attempt to incorporate personal factors in the existing model to create a more comprehensive model.

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