The Impact of Information Technology and Networks on Knowledge Transfer and Sharing: The Mediating Role of Trust

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Abstract: The main purpose of this paper is to empirically analyze the interrelations between information technology, networks and knowledge transfer and sharing (KTS) in MSC status organizations. Apart from that, it contributes in assisting businesses understanding by including the mediating role of trust. In this study, the data is collected from MSC status organizations in Malaysia and analyzed through Partial Least Square PLS-SEM technique. The obtained results shows that: information technology and networks have a positive and significant impact on knowledge transfer and sharing. Moreover, trust fully mediates the relationship between networks and knowledge transfer and sharing. It is also discovered that there is no mediation effects on the relationship between information technology and knowledge transfer and sharing.

Key words: Knowledge transfer and sharing · Information technology · Networks · Trust

INTRODUCTION

Due to the competitive environment, organizations plays an important role in the creation and utilization of knowledge to improve their efficiency and effectiveness. Based on this, the constructs of information technology and networks are considered to be the key factors to support MSC status organizations in Malaysia, as it is a catalyst for growth in achieving fully developed status by the year of 2020 [1]. Thus, this paper focuses on information technology and networks as they are the most emerged constructs in the literature [2-6] which enhance and promote knowledge transfer and sharing. Therefore, this paper aims to investigate the interrelation of input factors to examine direct and indirect effects on knowledge transfer and sharing.

Consequently, this paper empirically tests a mediating model considering trust as a boundary condition for input factors associated with knowledge transfer and sharing to enable inter and intra group relationships among MSC status organizations. In fact, MSC status organizations in Malaysia are facing a competitive environment where all MSC organizations require a direct interest in the genesis of knowledge [7]. In this respect, this paper aims to resolve the issues of

competitive advantage and the importance of knowledge transfer and sharing by incorporating information technology, networks and trust which in turn may enhance MSC's competitiveness.

Knowledge Transfer and Sharing: Knowledge sharing usually means the activities of giving or contributing. While, knowledge transfer should involve active communication between two parties in order to learn what they both know. In a simple meaning, people share knowledge while organizations transfer knowledge [8][9]. In fact, to transfer knowledge from one brain of a human to another brain perfectly is not as easy as transferring files from one computer to another. This is because knowledge can be classified as explicit or tacit knowledge [10]. Explicit knowledge is easily transmitted from one individual or organization. In contrast, tacit knowledge is gained through experience and it is difficult to explain because it exists in peoples' heads [11].

The effectiveness of knowledge transfer and sharing processes depends on the influencing factors such as, reward systems and top management support to encourage employees to share intellectual capital which is considered as a social system. Besides that, information technology is considered as a technical system which can

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be effectively used to facilitate organizational knowledge [12, 13]. In fact, [13] defined these factors as an influencing factors that support knowledge through creating and facilitating the sharing of knowledge. Therefore, this research suggests information technology and networks as the main factors that enable knowledge transfer and sharing by including trust as the best tool to promote knowledge transfer and sharing in MSC status organizations. Furthermore, the effectiveness of this organizations is based on knowledge transfer and sharing, which plays a vital role in this regard [14]. Based on the need to understand this, the current paper needs to be conducted in Malaysia to investigate the role of information technology and networks in MSC status organizations.

Information Technology: Information technology context refers to the existing information technology infrastructure and capabilities supporting the knowledge management in an organization [15]. [2] argue that knowledge management begins and ends with building sophisticated information technology systems. This is because information technology system improves and accelerates knowledge transfer [6]. For this, information technology plays a crucial role in transforming organizational culture to ensure knowledge sharing in its activities [16]. On the other hand, knowledge management supports IT practices to enable organizations in gaining their goals easier. Furthermore, IT facilitates, shares and transfers knowledge using suitable, effective and efficient ways in providing speed services to attain competitive advantage [17]. [2] define information technology as the capability of the organization to use and adopt IT in managing information, because the usage of IT is considered to be the main component that enhances knowledge sharing between organizations, by using electronic tools to disseminate knowledge such as, intranets and databases [3].

On the other hand, many obstacles inhibit knowledge transfer and sharing such as lack of organizational learning climate [4]. This is because it is challenging for the organizations to create an appropriate environment in sharing and transferring knowledge. In this regard, IT owns the ability to access information to increase efficiency of the system. Based on this, [16] has emphasized these challenges to the managers in terms of creating proper environment to facilitate transfer and sharing knowledge among individuals and teams. This is because managers are the primary determinant of

knowledge sharing in choosing and enforcing suitable technology that offers a close fit between all levels in an organization.

In this context, [2][3] asserted that information and communication technologies ICT are mostly used to transfer and store data by electronic means, which include, e-mail, SMS text messaging, video chat, online social media and all different computing devices for instance, a laptop and smart phones. Furthermore, open communication and information exchange are seen equally the key component of knowledge management [2]. [18] affirmed that ICT improves organizations by accelerating knowledge transfer in terms of communication among organizational members. In this line, [3][19] suggest ICT systems as one of the organizational factors that affect knowledge transfer and sharing.

Therefore, ICT system is recognized in business intelligence areas such as portals, data mining, customer relation management and e-learning, to increase knowledge of the organizations [19][20]. [20] argued that ICT has the ability to accomplish all types of knowledge transfer tasks, for instance tacit knowledge. In addition, [21] asserted that ICT in the short term assists communication with a knowledge source. While in the long term, ICT contributes to the development of trust and commitment. It also increases social networks that can enhance knowledge transfer and sharing. In this respect, [22] conceptualize IT competency in three categories: ICT operations, which refers to skills and processes that manages information, ICT objects which refers to using hardware and software to show and communicate information and eventually ICT knowledge which refers to the context of knowledge based know-how.

However, the existence of IT systems is necessary, but sometimes not sufficient for knowledge transfer and sharing to occur [18]. This is because, organizations need to implement not only proper knowledge management technologies, but these technologies need to meet the expectations of employees and those employees should be properly trained and provided with technical support [3][23]. To this end, [12] argues that ICT systems, help employees in receiving knowledge only, but not in donating the knowledge to others which means that employees are using technology as their source of knowledge. This implies that, MSC status organizations should apply ICT systems properly and build a culture of knowledge transfer and sharing in order to be more effective in facilitating sharing knowledge.

Networks: Another issue that has been debated in the literature is networks. It has been reported that a personal network encompasses the interaction between people who hold different backgrounds, diverse types of knowledge and different ideas which lead to effectiveness and efficiency [23]. [24] stated that an individual's personal network is indeed important for the effectiveness of knowledge transfer. This is because, personal networks and interaction between individuals build knowledge. By this way, tacit knowledge appears in the process of generating ideas among members. Thus, it is important for the organizations to establish appropriate formal and informal networks to enable knowledge creation and sharing.

Further, [25] stated that closer mutual relationships between members is considered as an inter-organizational relationship. This is crucial in giving the organization the ability to increase exchange information and knowledge sharing [25]. The social networks provides opportunities such as, face to face communication and produce strong ties between members and organizations which leads them to trust each other [26].

Moreover, electronic networks is also the key to transfer knowledge between organizations. But there are some difficulties in using an electronic networks. For instance, transferring tacit knowledge is difficult, because of its nature as it exists in the heads of members. In this context, electronic networks has the ability to transfer explicit knowledge rapidly and reduce communication cost [26][27]. [27] added that networks can increase the organizations' ability to obtain knowledge for business purposes. MSC status organizations is identified as heavy users of multimedia and information and communications technology, which means they believe in electronic social networks usage in enhancing knowledge transfer.

However, [26] revealed that both social networks and electronic networks are considered by organizations to be an important source for them to get the needed knowledge. In this regard, social networks plays a key role in enhancing organizational capabilities. To do so, [28] examined how the characteristics of CEOs' social networks influence organizational performance. This is because CEOs' social networks empowers the abilities of the organization's members and exploits the knowledge. In other words, the CEO's support is critical in an organization, whether internally or externally. Externally, the CEOs are linking the organization through social networks to its environment to gain acceptance and support. Internally, the CEO focuses on the context of relationships that can build development to implement changes. Based on this, [29] noted that the effectiveness of knowledge transfer and sharing depends on the role of managers. This is because of their contributions as a decision makers as well as their knowledge in managing diverse barriers that are faced by organizations. To do so, managers encourage and motivate members to transfer and share their knowledge openly.

Therefore, socialization is one of the main processes of knowledge creation, as mentioned by [10] who identified the importance of organizational members' social interaction. It also emphasizes that active communication is important for knowledge creation and transfer [30]. The process of knowledge transfer is often studied in the context of a social network [5][31], because knowledge transfer and sharing means more interactions and networking between individuals and groups internally or externally of the organization. Socialization indeed helps all members in getting more knowledge by sharing and learning new practices. Finally, it depends on mutual trust among team relationships'. In doing so, the current paper incorporates trust as a mediator in explaining information technology, networks and knowledge transfer and sharing links.

Trust: The study by [32] shows the importance of interpersonal trust which incorporates both the willingness and positive expectation elements of trust. [32] conceptualized two dimensions of interpersonal trust: cognition based trust which is among competence, responsibility, reliability and dependability to judge the trustworthiness of another party. On the other hand, affect based trust involves the emotional links between individuals which expresses care and concern about others. From this, [6] affirmed that interpersonal trust plays a vital role in transferring and sharing knowledge among individuals. This is because, trust in an organization builds better relationships in order to achieve more cooperation, innovation and exchange information and knowledge. Moreover, [33] see the atmosphere of trust as a source of sharing knowledge, which contributes effectiveness in organizations. Furthermore, trust promotes knowledge creation by encouraging the climate of work to reduce the fear of risk. Hence, high level of trust among members leads to high level of exchanging knowledge [13].

Therefore, when trust occurs among individuals and teams, they are further prepared to exchange knowledge effectively [34]. This is in line with the findings by [6],

who reported that trust can be improved through open communication and networks between all levels in an organization, including top management because the top management is considered as a source of trust among members. In this regard, managers have to encourage their employees in terms of transferring and sharing knowledge to enhance their efficiency [35]. This is because, the efficiency of employees emphasizes organizational knowledge processes to be essential in achieving and sustaining competitive advantage [36][37][38].

Top management plays a vital role in establishing knowledge transfer as they have a critical effort to support conditions needed for knowledge sharing and through sharing information and seeking it from others in the organization. This can be valuable to solve organizational problems and improve the attitude that can create an environment of trust [39]. In other words, when the level of trust is decreased, the employees will devalue the incentives which can be a reason for them to terminate their membership in the organizations [40][41][42]. In fact, the willingness to engage in knowledge exchange depends on mutual trust among team relationships [40]. Therefore, the open channels of communication within organizational interests is crucial between superiors and subordinates in terms of increasing trust [43]. The readiness to transfer and share knowledge can be enhanced when the mutual trust among individuals is developed.

Hypothesis Development: This research hypothesized that information technology may influence knowledge transfer and sharing as it is the key factor that enhances organization's activities. Furthermore, several studies noted that information technology relates to knowledge transfer and sharing [2][6][44] this is because information technology plays a crucial role in transferring and sharing knowledge. It supports collaboration and communication among organizational members by using different computing devices to enhance knowledge transfer and sharing. Based on this, it is predicted that:

H1: Information technology will have a positive effect on knowledge transfer and sharing.

[5] argued that networks is basically linked to knowledge transfer and sharing. This is because networks allows the interactions between individuals and groups inside or outside the organizations. Accordingly, the social networks and interaction provide opportunities such as, face to face communication. The success of

knowledge exchange depends on the overall relationships between the source and the recipient unit. Therefore, it is predicted that:

H2: Networks will have a positive effect on knowledge transfer and sharing.

In fact, the purpose of knowledge transfer is to create and use new knowledge through information technology. Thus, trust is crucial once knowledge transfer and sharing adapts and utilizes IT to manage information within an organization [3]. The study [45] revealed that knowledge sharing is considered as one of the most practical solutions for technological enterprises because these organizations are facing rapid changes and competitive environment by using new forms such as, Facebook, Twitter and YouTube. It is a fact that trust is an important issue in adopting new technology to promote and share knowledge. Based on this, it is predicted that:

H3: Trust mediates the relationship between information technology and knowledge transfer and sharing.

This study also theorized that trust mediates the relationship between networks and knowledge transfer and sharing. This is due to the fact that, social networks influenced by trust which is in turn impact knowledge transfer and sharing processes (Fernandez-Pérez et al., 2012; Guechtouli et al., 2013; Argote & Ingram, 2000) [5][28][46]. This means that social networks exists once knowledge transfer and sharing occurs and transferred by moving knowledge from one unit to another which is related to trust. In this context, knowledge transfer and sharing occurs when top management pays attention to the social interactions between members in an organization [23]. This is because the CEO's social networks support enable knowledge transfer and sharing among individuals [28]. On this basis, the appropriate environment of trust is affected by networks and skills learned during the interaction and communication [25]. Based on this, it is predicted that:

H4: Trust mediates the relationship between networks and knowledge transfer and sharing.

MATERIALS AND METHODS

The unit of analysis in this study is the organization. The respondents were Middle Managers of MSC status organizations. The selection of Middle Managers is

because they are more knowledgeable and they are the decision makers; capable in understanding the overall organization's characteristics. Data is collected through a questionnaire. All the different antecedents measured using a 5-point Likert scale with 1= strongly disagree and 5= strongly agree. 331 questionnaires were distributed out of which 132 were put to task. The data were analyzed using the Partial Least Squares (PLS-SEM).
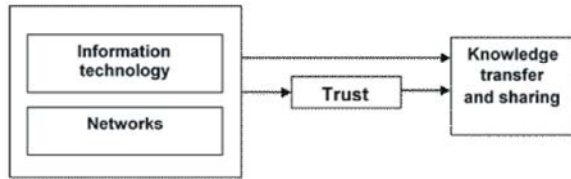

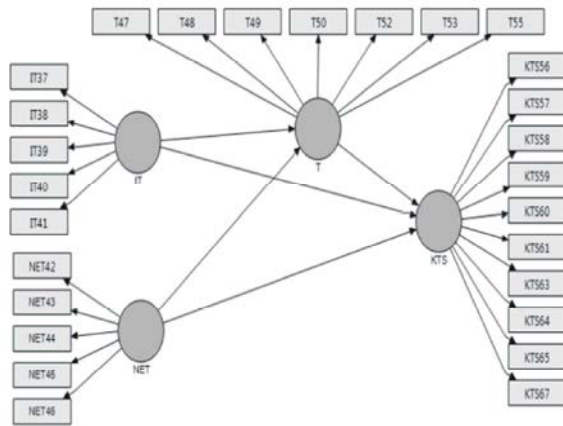Diagram 1: Theoretical Framework

Diagram 2: Research Model

Diagram 1 and Diagram 2 above showed the hypothesized relationships between information technology, networks, trust and knowledge transfer and sharing.

RESULTS

The PLS analysis involves separate assessments of the measurement model and the structural model. This study employed a two-step process in analyzing the data. In the first step, the PLS analysis examined the measurement model which shows how the constructs are measured [47]. Then, the structural model specified how the constructs are related to each other in the model. The following sections describe these analyses [47][48].

The Measurement Model: The first step in the PLS analysis before testing the hypotheses of the study, is to

assess the measurement model or the outer model. To do so, the two main criteria to assess the measurement model were convergent validity and discriminant validity [47] (Hair *et al*., 2014; Khozaei *et al.*, 2012). The assessment of convergent validity used the outer loadings, composite reliability (CR) and the average variance extracted (AVE), as suggested by (Hair *et al*., 2014). Table 1 provides results of loadings which has exceeded the recommended value of 0.7 [47] [49] [50]. Composite reliability (CR) values also was assessed to depict the extent to which the indicators reflect the latent construct, all values exceeded the recommended value of 0.7 [47]. The value of average variances extracted (AVE) is greater than the recommended value of 0.5. Cronbach's alpha also is greater than the recommended value of 0.7 [47].

Next, examine the construct validity of the measurement model, discriminant validity is another type in which the square root of the AVE and cross-loading exceed the inter-correlations of the construct with the other constructs to demonstrate discriminant validity (Amin *et al*., 2014). This means squared AVE were found to be higher than the inter-construct correlations. As shown in Table 2 the correlations for each construct is less than the square root of the AVE. From this, the measurement model demonstrated adequate convergent validity and discriminant validity.

The Structural Model: After assessing the validity of the measurement model, the next step is to examine the hypothesized relationship by running the PLS algorithm and Bootstrapping procedures in SmartPLS 2.0. As shown in Table 3, two variables hypothesized to influence knowledge transfer and sharing. The mediation of trust on the relationship between (IT) and (KTS) statistically failed at 0.01 levels of significance (β = 0.030, t= 1.07, p= 0.14). Whereas (H4), the mediation of trust on the relationship between (NET) and (KTS) was supported.

Mediating Effect: The mediation results, indicate that there is an indirect effect of networks through trust on knowledge transfer and sharing. The size of the indirect effect was examined by the variance accounted for value (VAF) to determine the ratio of the indirect effect to the total effect of networks on knowledge transfer and sharing which explained by the trust. Based on this, the study used the formula of variance accounted for value (VAF) as follows:

$$VAF = a*b / a*b+c$$

Table 1: Result of measurement model

Constructs	IT	KTS	NET	T
IT	0.868			
KTS	0.646	0.781		
NET	0.671	0.683	0.773	
T	0.602	0.676	0.748	0.786

Notes: IT, Information Technology; NET, Networks; KTS, Knowledge Transfer and Sharing; T, Trust.

Table 2: Discriminant validity of constructs

Con-structs	Items	Loadings	CR	AVE	Cronbach's alpha
IT	IT37	0.899	0.938	0.753	0.917
	IT38	0.916			
	IT39	0.893			
	IT40	0.813			
	IT41	0.810			
NET	NET42	0.772	0.881	0.598	0.832
	NET43	0.783			
	NET44	0.746			
	NET45	0.762			
	NET46	0.799			
KTS	KTS56	0.776	0.940	0.611	0.928
	KTS57	0.801			
	KTS58	0.821			
	KTS59	0.859			
	KTS60	0.766			
	KTS61	0.793			
	KTS63	0.708			
	KTS64	0.799			
	KTS65	0.731			
	KTS67	0.747			
T	T47	0.739	0.9186	0.617	0.896
	T48	0.757			
	T49	0.843			
	T50	0.820			
	T52	0.796			
	T53	0.798			
	T55	0.741			

Table 3: Path coefficients and hypothesis testing

Hypo-thesis	Relation-ships	Std. Beta	Std. Error	t-value	P-value	Deci-sion
H1	IT -> KTS	0.29	0.09	3.24	0.00**	Supp-orted
H2	NET -> KTS	0.26	0.11	2.37	0.01*	Supp-orted
H3	IT -> T->KTS	0.03	0.03	1.07	0.14	Not Supp-orted
H4	NET -> T->KTS	0.12	0.06	2.08	0.02*	Supp-orted

From this, the resulted values in Table 3, have provided a significant value of 0.02. Which, in turn, needs to be estimated by employing the formula of (VAF).

VAF = (0.119/119+0.018) =>VAF =0.87

The result of (VAF) is 0.87 meaning that 87% percent of the total effect of networks on knowledge transfer and sharing is explained by indirect effects of trust. Indicating that trust has a full mediation and power relationship between networks and knowledge transfer and sharing. To this end, the (VAF) has very large outcomes of above 80%, which can be described as a full mediation as determined by [47].

The R^2 for endogenous construct represents the predictive power of the model. In addition, it assesses the effect of the combined exogenous variables in the endogenous variable. As suggested by [51] the obtained R^2 values of 0.35 and 0.36 are considered substantial values. Which indicate that 578% of the variance in trust and 572% in knowledge transfer and sharing, suggesting that 57 percent of the variance can be explained by information technology and networks.

Table 4: Prediction relevance of the model

Variable	R Square	Cross-Validated Redundancy
Knowledge transfer and sharing	0.572	0.356
Trust	0.578	0.345

Similarly, as indicated by [47][52] the cross-validated redundancy (CV-red) value higher than zero shows that there is predictive relevance. While, a value less than zero indicates a lack of predictive relevance. For this study, the cross-validated redundancy for trust and knowledge transfer and sharing were 0.356 and 0.345. Indicating that the model has predictive relevance. The following Table 4, shows the prediction relevance of the model.

DISCUSSION

This study provides several noteworthy findings, first, theoretical and practical contribution to enhance the businesses understanding by determining the importance of knowledge transfer and sharing. Interestingly, the current findings made the strongest contribution to the knowledge transfer and sharing in MSC status organizations as it is knowledge intensive entities. The results generate that knowledge transfer and sharing as depicted in this study has a good model fit with an R^2-value of 0.572 suggesting that 57.2 percent of the variance in knowledge transfer and sharing can be explained by information technology and networks.

The result indicates that the respondents of the study agreed that information technology had the greatest impact on knowledge transfer and sharing. These findings are consistent with results provided by [6] [12] [53]. The results also confirmed the importance of IT in MSC status organization in achieving a knowledge based society vision. Furthermore, the empirical results demonstrate that networks have a positive effect on knowledge transfer and sharing. This indicates that the respondents of the study support inter-organizational relationships which in turn affect knowledge transfer and sharing. The result is consistent with the previous studies by [5] [24] [54]. This is justified that managers in MSC status organization in their process of creating, transferring and sharing knowledge were using informal procedures, as MSC status organizations heavy users of multimedia and information and communications technology, which makes them believe in electronic social networks use, to enhance knowledge transfer and sharing.

Unexpectedly, the indirect influence of information technology (IT) on (KTS) through trust failed to gain support, this is because the respondents of the study and based on their position. Perhaps they were very careful in using information technology in terms of the accuracy of

knowledge before posting in the system. Furthermore, the security and privacy of the organization also may take into account as they are dealing with the competitive environment. The findings have also demonstrated that MSC status organization is part of the marketplace where (IT) is utilized and shared with the other organization. From this, the relationship between buyers and sellers is based on information technology investments and at the same time mutual trust is based on these investments.

Actual gain was found to have a significant impact of networks on knowledge transfer and sharing through trust. The present mediation result is supported by the respondents of study because they are surrounded by a dense network to share knowledge which increase a strong tie between individuals and affect knowledge transfer and sharing. Trust was seen by the respondents as a crucial matter for collaboration to exchange knowledge particularly in tacit knowledge. This result was in tandem with previous researchers where trust contributes more in collaboration [23, 55]. However, the respondents of this study found that networks within a trusted environment is an important component to transfer and share knowledge.

In this study, the interpersonal trust is an important predictor of knowledge transfer and sharing. Therefore, the respondents of the study might have a strong belief of trust towards the other party in doing their job, which, in turn, assists the members of an organization to be more willing to engage in the process of knowledge transfer and sharing. The result also indicates that respondents might be more likely to be trusted to create a good team member with a trusted work environment. This could be done by having team members who closely provide awareness on why share, what to share, when to share and how to share and whom to share with.

Limitations and Suggestions for Future Research: The purpose of this study is to produce a better understanding into the key factors that affect knowledge transfer and sharing in MSC status organizations. The study suggests the input factors to be considered in the process of knowledge transfer and sharing in MSC status organizations. The results would be more valuable if there were multiple respondents and relationships. At the same time, the information gathered might be limited. This is because, respondents not willing to share certain information based on the confidentiality or may be biased to give a positive image on their respective organizations. This is probably because of the actual position in an organization as they are holding high level position in MSC status organizations.

However, future research also could use the mixed methodology in terms of qualitative and quantitative approach with bigger size of sample to provide a deeper understanding on knowledge transfer and sharing in MSC status organizations.

CONCLUSION

In conclusion, MSC status organizations could use the findings of this study in order to optimize the opportunities for better knowledge transfer and sharing. This can provide a crucial insights to address knowledge transfer and sharing in the previous studies of knowledge management in MSC status organizations. Given the importance of knowledge transfer and sharing, this study was conducted in relation to the Tenth Malaysia Plan, where knowledge will be the key factor to drive growth, create new value and provide the basis to remain competitive in order to achieve fully developed status by the year of 2020.

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