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THE EFFECT OF SUBSIDIARY CHARACTERISTICS ON EFFICIENCY IN KNOWLEDGE TRANSFER BETWEEN MULTINATIONAL COMPANIES

Junshuai Cheng [1], Shankar Chelliah [1], Ai Ping Teoh [2]
[1] *School of Management, Universiti Sains Malaysia, 11800 Penang, Malaysia*
[2] *Graduate School of Business, Universiti Sains Malaysia, 11800 Penang, Malaysia*
E-mail: apteoh@usm.my
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Abstract
This paper aims to establish a comprehensive framework for relationships between parent and subsidiary (subsidiary autonomy, subsidiary position, organizational trust) on knowledge transfer efficiency. Then shed light on how the long-ignored characteristics of the subsidiary (characteristics of the knowledge transfer participant) play a role in the knowledge transfer of MNCs. The study highlights and tests the influence of two parts by subjecting a dataset of 212 Chinese MNCs to a Partial Least Squares Structural Equation Modeling (PLS-SEM) to analysis: one is the impact of relationships between parent-subsidiary (subsidiary autonomy, subsidiary position, organizational trust) on the knowledge transfer efficiency. The other is the subsidiary characteristics (subsidiary age, subsidiary size) moderates the relationship between them. The robust results indicate that subsidiary autonomy, subsidiary position, organizational trust have a significant positive influence on the knowledge transfer efficiency of Chinese MNCs. As well as one of the subsidiary characteristics (subsidiary age) only moderates the relationship between subsidiary autonomy, organizational trust and knowledge transfer efficiency. While the other characteristic (subsidiary size) has no moderation. The findings indicate that the ignored subsidiary characteristics (subsidiary age, subsidiary size) have some moderations in the knowledge transfer efficiency, and it is useful to help MNCs improve knowledge transfer efficiency by copying and creating the implicit meaning of characteristic.

Research paper

Keywords: Knowledge transfer efficiency; MNCs; Subsidiary characteristics; Subsidiary autonomy; Subsidiary position; Organizational trust

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Introduction

As a new economic form, the knowledge economy has quietly emerged and has become an important trend in the development of the world economy, and knowledge and technology-oriented multinational corporations (MNCs) have become the most dynamic form of economic organization. Then the role of knowledge transfer within MNCs has attracted increased research interest in recent years (Blomkvist, 2012; Mudambi et al., 2014; Qin et al., 2017; Gaur et al., 2018; Jiménez-Jiménez et al., 2019).

According to the knowledge-based view, MNCs are the main drivers of expanding the impact of the knowledge economy on a global scale (Fourné et al., 2014), and knowledge management (KM) capabilities have become a key competitive advantage for MNCs (Ghoshal & Bartlett, 1990; Dana et al., 2021). In line with this development, MNCs choose to acquire knowledge and occupy a wider market by setting up subsidiaries overseas (Phene & Almeida, 2008) and wish to take advantage of knowledge transfer throughout its geographically dispersed network of foreign subsidiaries (Yamin et al., 1999).

Previous research has shown that successful knowledge transfer involves several challenges, especially in terms of efficiency and effectiveness (Pérez-Nordtvedt et al., 2008; Guerrero et al., 2014, 2015; Su et al., 2019). The modern MNC is a more fragmented entity, and the inter-organizations are no more passive recipients of knowledge from the parent company but active participants in knowledge creation and transfer (Scalera et al., 2014).

For the research of the relationship between parent and subsidiaries, researchers indicate that different management models and control mechanisms in the organizational design of MNCs have different effects on knowledge transfer, what is more, they regard the organizational structure of parent and subsidiary company as a knowledge regulation structure with specific conditions (Rabbiosi & Santangelo, 2013). However, it mainly indicates a single side factor of the relationship between parent and subsidiaries, which makes it hard to comprehensively understand and treat the issues (Gupta & Govindarajan, 2000).

Accordingly, this paper aims to create a comprehensive framework for relationships between parent-subsidiary (subsidiary autonomy, subsidiary position, organizational trust) on knowledge transfer efficiency. Moreover, the subsidiary characteristics (subsidiary age and subsidiary size) always were excluded by researchers from the study of knowledge transfer in MNCs, but as an important knowledge transfer participant, its characteristics should be mentioned. Thus, the current paper will test how the characteristics of subsidiary play a role in the knowledge transfer of MNCs. In other words, firstly, it integrates the research conclusions of parent and subsidiary companies about knowledge transfer and establishes a complete research framework. Besides, it uses subsidiary characteristics (subsidiary age, subsidiary size), which has been ignored for a long time, as a moderator. Thus, it ensures the comprehensiveness of this study at the firm level.

Literature Review

Knowledge transfer efficiency in MNCs

The rapid development of modern information determines the vital role of knowledge in companies (Tajpour et al., 2020), especially MNCs. The transfer of knowledge has also become a key capability for MNCs to compete with their peers, and it poses new challenges to the business management model (Jiménez et al., 2014). The previous management model, experience and organizational structure had to be adjusted to adapt to the market competition of knowledge, information and globalization. Corporations need to fully grasp the needful information to ensure the effective and rapid transfer of knowledge transfer (Walczak, 2005; Ulijn, J., & Salamzadeh, 2021). However, few empirical studies exist on knowledge transfer efficiency and complete framework at the firm level.

First of all, the increasing of MNCs adopt global strategies to obtain the knowledge they need from worldwide. The importance of knowledge transfer is needless to say, while many researchers confuse the research of knowledge transfer and knowledge transfer efficiency. Most of them think that they are the same and no need to explain separately. However, they are different, and knowledge transfer efficiency refers to evaluate the effect of knowledge transfer, that is, the evaluation of the status and results of knowledge transfer between participants (Radovic Markovic et al., 2019; Su et al., 2019).

The existing literature about the knowledge transfer efficiency includes the following conclusions: 1) based on cost, Teece (1977) analyzes many international projects and argues that the efficiency of knowledge transfer is reflected in all the costs related to knowledge flow during the knowledge transfer process, which includes communication costs, engineering costs, salary costs and commissioning costs. Then Casimir et al. (2012) add to the tacit cost that in the cost calculation of knowledge sharing, they pay more attention to hidden costs, such as time, energy and expert skills. 2) based on economic indicators and technical indicators (Bresman et al., 1999). It takes international acquisition as the background and maintains that economic indicators refer to the growth rate, transfer costs, market share, etc.; technical indicators refer to the improvement of technical capabilities and innovation capabilities, etc. 3) based on knowledge acceptance (Szulanski, 1996), it concludes that if the knowledge recipient is more satisfied with the method, degree, and cost of knowledge transfer, the better the efficiency of knowledge transfer, as well as the same applies to the opposite situation. Hence, in this study, it summarily explains knowledge transfer efficiency from the perspectives of communication, usefulness, speed and economy.

Secondly, the knowledge transfer efficiency of MNCs is related to the influence and status of the organization in corporation (Blomkvist, 2012). With the passage of time, the subsidiaries continue to develop in terms of technological advancement and management. Some subsidiaries are authorized, while others are reduced or even disappeared in the knowledge transfer (Birkinshaw & Hood, 1998). Nevertheless, instead of focusing on such issues,

researchers mainly studied participants' sending and absorbing capabilities or studied one side of the relationship between parent and subsidiaries (Chang et al., 2012; Su et al., 2013). Therefore, to improve the efficiency of knowledge transfer, the relationship between participants is a point that must be mentioned.

Finally, subsidiaries characteristics are composed of AGE and SIZE (Raziq et al., 2013). With the expansion of age and size, the subsidiaries have more resources and more right to speak (Jakobsen & Rusten, 2003). Therefore, as the right to speak increases, subsidiaries with different characteristics will have different performances when dealing with various relationships.

Conceptual framework and hypotheses

Foreign subsidiaries are a source of innovation for MNCs (Pearce & Papanastassiou, 1999). These innovations can be transferred to the parent company, thereby helping to create the company's competitive advantage (Ambos et al., 2006), which benefits from using the knowledge of foreign subsidiaries (Eden, 2009). For example, they use subsidiary knowledge to better coordinate global strategies and improve the development of new products, technologies, or services (Ambos et al., 2006). What is more, it establishes a bond between parent and subsidiary companies, guide knowledge to the appropriate MNC units, and coordinate the knowledge transfer process to operate effectively in the network (Phene & Almeida, 2008). However, the knowledge-based view is ignored that knowledge transfer of MNCs is not

always smooth, and it includes potential power struggles connected to organizations and conflict of interest between parent-subsidiaries (Björkman et al., 2004; Andersson et al., 2015; Lind et al., 2020).

The relationships between parent and subsidiaries

With the continuous development of the operating environment and the increasingly fierce market competition, the traditional hierarchical structure between parent and subsidiary companies is severely challenged. In addition, the competition between modern companies is more reflected in the competition of information, knowledge and other resources. In order to gain a lasting competitive advantage, the parent company must re-examine the status of the parent-subsidiary company and their relationship with each other (Wang et al., 2004). Only by paying attention to the links between the various companies in the corporation group and strengthening the integration of resources within the parent-subsidiary company can the overall advantages of the corporation group be better played.

Subsidiary autonomy. Numerous researchers have proved that the autonomy of subsidiaries has advantages in the creation and increase of own knowledge (Gupta & Govindarajan, 1991; Schulz, 2001; Noorderhaven & Harzing, 2009). Ghoshal and Nohria (1989) propose that centralization is negatively correlated with local resource levels, and autonomy is positively correlated with local resource levels. Noorderhaven and Harzing (2009) argue that different degrees of subsidiary autonomy are closely related to subsidiary

roles. The coordination of the knowledge transfer of the parent company depends on the status of the subsidiary (Ambos & Schlegelmilch, 2007). Therefore, the influence of subsidiary autonomy on knowledge transfer is self-evident.

Subsidiary position. Social resource theory maintains that resources such as power and status are obtained through individual social relationships (Wernergelt, 1995). Positioning is the node of an individual's relationship in the social network, which is related to the activity scope and activity capacity of the individual (Kilduff & Brass, 2010). Ghoshal and Bartlett (1990) argue that the role of subsidiaries needs to be judged by the general context. In the context of knowledge transfer, the positioning of a subsidiary is mainly determined by two aspects: one is its own knowledge, and the other is the dependence of the parent company on it. At the same time, the two are inseparable (Chenhall, 2003): the parent company is highly dependent on the subsidiary in knowledge, which reflects the strategic importance of the knowledge of the subsidiary to the parent company. In the process of knowledge transfer, the parent company will correspondingly give more convenient conditions and support.

Organizational trust. Trust plays an important role in knowledge transfer between organizations. Organizational trust can be used as an influencing factor to affect knowledge transfer, and sometimes as an intermediary variable of other influencing factors to affect knowledge transfer (Mayer et al., 1995; Maurer, 2010; Sankowska, 2013; Doshmanli et al., 2018; Batrancea et al., 2019). As discussed above (Hansen et al., 1999), due to the full trust of

knowledge source to knowledge receptor, knowledge source will reduce the perception of expected risk. The positive mental state makes the knowledge source more willing to transfer valuable knowledge to the knowledge receiver. As well as it will also reduce the control and prevention of knowledge receptors. As a result, knowledge receivers can re-create knowledge at the level of existing knowledge to enhance the company's technical and innovation capabilities. Therefore, it proposes the following hypotheses:

H1: *There is a significant relationship between subsidiary autonomy and knowledge transfer efficiency in Chinese MNCs. Subsidiary autonomy positively influences the knowledge transfer efficiency in Chinese MNCs.*

H2: *There is a significant relationship between subsidiary position and knowledge transfer efficiency in Chinese MNCs. Subsidiary position positively influences the knowledge transfer efficiency in Chinese MNCs.*

H3: *There is a significant relationship between organizational trust and knowledge transfer efficiency in Chinese MNCs. Organizational trust positively influences the knowledge transfer efficiency in Chinese MNCs.*

The effect of subsidiary characteristics (subsidiary age, subsidiary size)

Although few research on subsidiary characteristics (subsidiary age, subsidiary size), no one can ignore their importance (Williamson, 1967; Dunning, 1998; Raziq et al., 2013).

Subsidiary age. Subsidiary age was the number of years since the subsidiary foundation (Foss & Pedersen, 2002), and it has always been a very important variable. In the field of knowledge transfer, it is applied to various

types of research, such as organizational learning, development of subsidiary and expatriates (Frost & Zhou, 2005; Bruning et al., 2011; Delios & Beamish, 2018). The main reason why subsidiary age has always attracted attention is that researchers believe that the age of the subsidiary represents the accumulation of the subsidiary resources (Tallman & Li, 1996). The larger the age, the greater the amount of resource storage, which naturally plays a positive role in promoting the knowledge transfer process. Then as time goes by, subsidiaries have become more localized in terms of staffing (Schuler et al., 1993) and other human resource management practices (Rosenzweig & Nohria, 1994).

Subsidiary size. The research on subsidiary size is common thirty years ago (Gates & Egelhoff, 1986), and in organizational research, it has become a common practice to classify it as a control variable. But as resources, knowledge, capabilities, and innovation continue to upgrade, subsidiary size may deserve closer attention. The size of the subsidiary is an important variable, and its significance is not only reflected in the strength of the company. With other conditions unchanged, the increase in the size of subsidiaries may be related to the increase in useful resources (Dierickx & Cool, 1989; Grover & Davenport, 2001) and hence with increasing value to the overall MNC. Generally speaking, the larger subsidiary has more discretion and freedom than the smaller ones because larger subsidiaries have more resources (Roth & Morrison, 1992). Therefore, Under the resource-based view, subsidiary size measures the size of knowledge resources, which also

plays a corresponding role in knowledge transfer. Therefore, it proposes the following hypotheses:

H4a: *Subsidiary age moderates the relationship between subsidiary autonomy and knowledge transfer efficiency in Chinese MNCs, where the relationship is stronger when subsidiary age is longer.*

H4b: *Subsidiary age moderates the relationship between subsidiary position and knowledge transfer efficiency in Chinese MNCs, where the relationship is stronger when subsidiary age is longer.*

H4c: *Subsidiary age moderates the relationship between organizational trust and knowledge transfer efficiency in Chinese MNCs, where the relationship is stronger when subsidiary age is longer.*

H5a: *Subsidiary size moderates the relationship between subsidiary autonomy and knowledge transfer efficiency in Chinese MNCs, where the relationship is stronger when subsidiary age is larger.*

H5b: *Subsidiary size moderates the relationship between subsidiary position and knowledge transfer efficiency in Chinese MNCs, where the relationship is stronger when subsidiary age is larger.*

H5c: *Subsidiary size moderates the relationship between organizational trust and knowledge transfer efficiency in Chinese MNCs, where the relationship is stronger when subsidiary age is larger.*

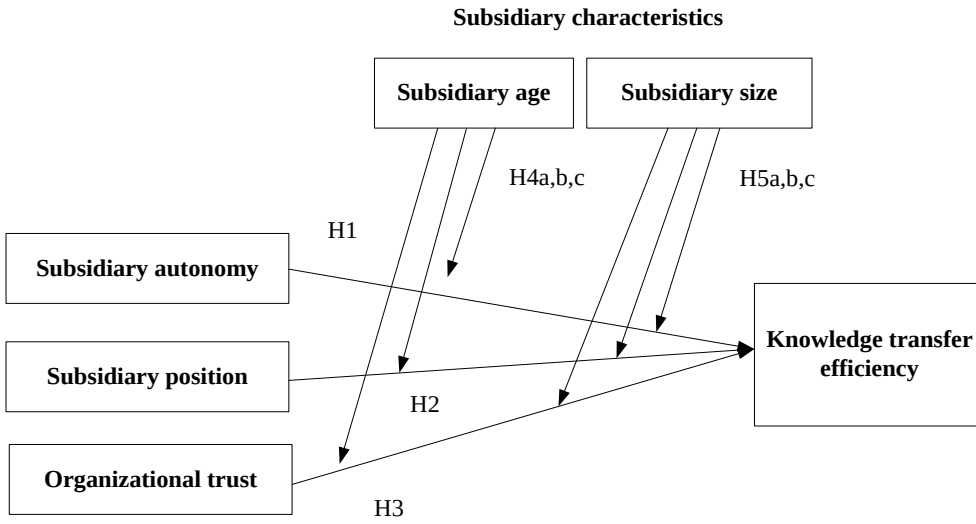

Figure 1. Research Framework

Methodology

This study uses quantitative research methods, which expresses problems and phenomena in quantity. It focuses on theory testing to elucidate how a phenomenon occurs, which is consistent with deductive reasoning, where the researcher concentrates on theory confirmation. It gains meaning by analyzing, testing and explaining the data (Mcchesney & Aldridge, 2019). Concomitant with the quantitative method is using survey methods to collect data, which is one of the most widely used data collection techniques (Radovic Markovic & Salamzadeh, 2012, 2018; Leeuw, 2005). It provides an efficient way of collecting responses from a large sample by asking each respondent to answer the same set of questions.

A questionnaire can be used for descriptive and explanatory research (Stone, 1993). The specific method is the non-probability method to collect data through a purposive sample (Krosnick & Presser, 2010). Since the main research object of this research is the knowledge transfer efficiency of MNCs, respondents must have working experience abroad, which ensures that they are sufficiently familiar with the environment of the parent company and subsidiaries so as to represent the subsidiaries. Therefore, the data source of this study must be a specific object.

The research involves both descriptive and explanatory analysis, it will adopt the questionnaire as the major instrument for collecting data. In order to reach more respondents, this study will deliver the questionnaires primarily through emails and social software. First, in order to save time and cost, an electronic questionnaire is formed through online questionnaire software. At the same time, electronic questionnaires are also more convenient for respondents. Secondly, through the registration information of the Administration for Industry and Commerce of the Chinese Government, the corresponding Chinese MNCs were found. Send the email to the human resources department of the organization for help finding suitable respondents. Since the respondents of the questionnaire are Chinese, the questionnaire will be translated into Chinese. This study adopted a bilingual translation method (Harpaz, 2003), in which two Chinese and English bilinguals independently translated the questionnaire. Then compare the two translations with each other until the two bilinguals reach an agreement. Finally, according to the information collected by the electronic questionnaire, the data is cleaned and

analyzed. What is more, to encourage response to the questionnaire, a cover letter is attached on top of the questionnaire illustrating the purpose of the study.

The validity and reliability of data and the response rate depend on the design of the questions, the structure of the questionnaire and the rigor of pilot testing (Hulland et al., 2018). When designing the questions, it will adapt language used in the questionnaires to incorporate the Chinese political, cultural and economic context. For the language of the questionnaire, since the respondents in this study are expatriates from Chinese MNCs, the questionnaire will be translated into English (the universal language) and Chinese (for the convenience of the respondents). In addition, in order to achieve the validity of the questionnaire, the terms used in the questionnaire should be familiar and understood by the respondent. The main content of the research is based on country, firm and individual level to examine the influence of various factors on knowledge transfer efficiency in Chinese MNCs.

The population definition and sampling process are significant for the majority of managerial research (Taherdoost, 2016). The data used in this study is part of the subsidiaries from Chinese MNCs, and the respondents are worked in the overseas subsidiaries. As a first step in collecting the data, a formal letter was sent to the companies asking them to participate in the study and guarantee the confidentiality of their information. Then approached the managers or human resource officers to ask for their help that find suitable employees to answer the questionnaire. The second step was focused on the

target respondents. In fact, the population is ill-defined, and no comprehensive publicly available listing exists for the current study; hence data collection in this study is carried out by random sampling.

The survey questionnaire was sent to the respondents by email and WeChat link during the first week of September 2020. The measures for all the questionnaires in the survey were adapted from previously published work. Due to the online nature of the data collection, there were no missing values in the responses because the respondents could not proceed to the next question if they had not answered any particular question. The only questions which were not compulsory were the suggestions answers. As the survey requires the cooperation of the human resources department of the organizations, it takes longer to collect the questionnaire. Until the end of December 2020, a total of 239 questionnaires were collected in this study, among them, the answers to the questionnaire and the answering time of 27 respondents did not conform to common sense and were judged to be blindly answering questions. Thus out of these, 212 could be used for the survey. Therefore, the total number of responses that could be used for data analysis was 212 (shown in Table 1).

Table 1. Summary of response rate

Number of responses received	Number of non-adopters	Number of usable responses
239	27	212
100%	11.29%	88.70%

The profile of 212 valid questionnaires are shown in Table 2. Almost half, i.e. 50.47% of the MNCs had established more than 10 years. The others account for almost half of the remaining, 22.17% had 5 to 10 years, and 27.36% had less than 5 years. Similarly, almost half, i.e. 40.57% had less than 300 employees, 33.49% had around for between 300 to 1000, and 25.94% more than 1000. As for the industry, this study mainly divided into two categories, i.e. manufacturing and service, they account for 33.49% and 47.17%, respectively. Except for them, the others account for 19.34%. This research divides transferable knowledge into seven categories, which include Cultural knowledge (22.64%), Sales and marketing knowledge (16.98%), Management knowledge (15.09%), Product/service knowledge (13.68%), Technical knowledge (12.74%), Accounting/finance knowledge (7.08%), Human Resource knowledge (1.42%). In order to prevent content that does not fall into these categories, the "others" option is set and accounts for 10.38%. The number of the data includes various subsidiary characteristics, different industries and the rich experience in transferring kinds of knowledge, which indicates a well-distributed sample.

Table 2. Profile of Organizations (N=212)

Variables	Description	Frequency	Percentage
Number of years in company establishment	Less than 5 years	58	27.36%
	5 to 10 years	47	22.17%
	More than 10 years	107	50.47%
		212	100.00%
Number of employees	Less than 300	86	40.57%
	300-1000	71	33.49%
	More than 1000	55	25.94%

		212	100.00%
Industries of the company	Manufacturing	71	33.49%
	Service	100	47.17%
	Others	41	19.34%
		212	100.00%
Types of knowledge transferred	Management knowledge	32	15.09%
	Cultural knowledge	48	22.64%
	Technical and production knowledge	27	12.74%
	Sales and marketing knowledge	36	16.98%
	Product/service knowledge	29	13.68%
	Human Resource knowledge	3	1.42%
	Accounting/finance knowledge	15	7.08%
	Others	22	10.38%
		212	100.00%

Measurement of variables

Knowledge transfer efficiency

Knowledge transfer refers to the process of disseminating knowledge among various participants in the social system through certain channels over a period of time (Wang & Zhang, 2010). From an operational perspective, knowledge transfer is a trade-off between effectiveness and efficiency (Pérez-Nordtvedt et al., 2008). Researchers have made many valuable achievements in the evaluation and measurement of knowledge transfer efficiency. Szulanski (1996) argues that knowledge transfer is the degree of knowledge possession, the degree of use of knowledge transferred, the degree of satisfaction, and the smoothness of the transfer process. Mohr et al. (1996) divide the efficiency of knowledge transfer into four dimensions to measure: the effectiveness of organizational information exchange (frequency of communica-

tion), feedback during communication, the degree of impact on the organization through communication, and the completeness of formal communication channels. As the same time, in order to make the results more credible, Sangaiah et al (2015) propose an evaluation framework including knowledge, team, technology and organizational factors to measure the effectiveness of knowledge transfer. In addition, there are ways to use knowledge transfer influencing factors to evaluate the effectiveness of knowledge transfer (Yu et al., 2017) and the speed and cost of activities in the process of knowledge transfer (Wang & Zhang, 2010). Hence this study synthesizes previous research conclusions (e.g. Teece, 1977; Bresman et al., 1999; Casimir et al, 2012), and defines the knowledge transfer efficiency as improving the process from communication (the extent of knowledge understood), usefulness (the usefulness of knowledge transfer), speed (the speed of knowledge transfer) and economy (the cost of knowledge transfer).

Subsidiary autonomy

In MNCs, the centralized control implemented by the parent company will weaken the learning motivation of the subsidiary, as well as thus limit the subsidiary's knowledge accumulation and innovation ability (Frost, 2001). Therefore, a high degree of autonomy provides subsidiaries with the possibility to operate their own businesses and carry out activities. As for the measurement of subsidiary autonomy, different researchers choose different indicators according to the research direction they focus on.

Luo and Peng (1999) evaluate the degree of autonomy of the subsidiary based on indicators such as the number of product types and market share. Ghoshal Korine and Szulanski (1994) claim that the autonomy of subsidiaries can be measured by the degree of non-intervention in the following six management areas: (1) development and launch of new products; (2) pricing decisions and marketing activities; (3) expand and reduce production facilities; (4) human resources management policies; (5) borrowing funds to raise funds; (6) setting annual business goals. Miao et al., (2011) measure the autonomy of the subsidiary company by the position of the expatriate staff, the number and proportion of the expatriate staff. As the same time, they add the two indicators of the frequency of communication between the parent- subsidiary company and the performance of the subsidiary as supplements. Finally, a complete measurement project for the autonomy of subsidiaries is formed. Combining the research of the above researchers and taking into account the relevant factors of knowledge transfer, the research has four dimensions: (1) the frequency of communication between the subsidiary and the parent company; (2) the proportion of the expatriate personnel of the parent company within the subsidiary; (3) Subsidiary decision-making degree on its own affairs; (4) Subsidiary performance.

Subsidiary position

For the positioning of subsidiaries (or the role of subsidiaries), different researchers have divided them according to different criteria. For example, based on the number of resources possessed by the subsidiary (Bartlett &

Ghoshal, 1989), based on the operation content and length of operation of the subsidiary (Hogenbirk & Kranenburg, 2006), and based on the role of the subsidiary in knowledge flow (Qin et al., 2011) etc. Subsidiary roles are also categorized according to different criteria. At present, there is no uniform standard in the academic circle.

In empirical research, both sides of the parent-subsidiary company are involved in the analysis. From the perspective of the subsidiary, the role of the subsidiary is mainly judged by its own value. For example, the importance of the environment in which the subsidiary is located, the amount and value of its own knowledge, and the contribution made by the subsidiary to the parent company (Salamzadeh et al., 2011; Najafi-Tavani, Giroud & Sinkovics, 2012; Nair, Demirbag & Mellahi, 2016; Salamzadeh, 2020). From the perspective of the parent company, it focuses on the motivation of the parent company to establish the subsidiary and the authorization of the parent company to the subsidiary (Wang, Liu & Li, 2009). As a result, in view of the key research areas, this study judges the position of the subsidiary through the following three aspects: (1) subsidiary knowledge reserve; (2) subsidiary knowledge reserve value; (3) parent company motivation when establishing the subsidiary.

Organizational trust

Trust can arise between individuals, individuals and organizations, as well as organizations (Schoorman et al., 1996). Since the object of the research is MNCs, trust refers specifically to organizational trust between the

parent company and its subsidiaries. Suppose the parent company trusts the subsidiary company. In that case, it will do its best to provide necessary assistance and help for the knowledge transfer of the subsidiary company- For example, by sending professionals, providing employee training and improving the quality of knowledge transfer. At the same time, if the subsidiaries trust the parent company, it will also cooperate with the transfer of knowledge (Dana & Salamzadeh, 2021). For example, fully understand the knowledge transferred by the parent company, and apply the knowledge to production, technology improvement (Costigan et al., 1998).

As for organizational trust, according to the environmental background, researchers in different periods gave different measurement standards. Based on cost and ethical standards, Lewicki and Bunker (1995) divide the organizational trust into three dimensions: calculation-based trust, knowledge-based trust, and identification-based trust. In the perspective of the generation of trust mechanism, Adler (2001) argues that organizational trust is made up of calculation-based trust, familiarity-based trust and norm-based trust. What is more, there are some more controversial arguments, such as Rousseau et al. (2009) divide the organizational trust into deterrence-based trust, calculation-based trust, relational trust and institution-based trust. All in all, it shows previous researchers divide the organizational trust dimension into two aspects, one is based on material, and the other is based on emotion. Since the parent-subsidiary company is a community of common interests, the study will learn from the division of McAllister (1995) and divide the

organizational trust into cognitive trust and emotional trust, as well as measure the trust of the organization by it (Li, 2005).

Data analysis

The PLS-SEM technique is a second-generation structural equation modelling that performs effectively with structural equation models containing latent variables and a series of cause-and-effect relations. It has grown out as an essential data analysis tool to test theories and concepts. About the model fit in PLS-SEM, the proposed criteria are in their early stage of research, are not fully understood (e.g., the critical threshold values), and are often not useful for PLS-SEM (Hair et al. 2017). Therefore, this study reports the model results directly.

For reflectivity measurement, it refers to the direction of the arrow pointing from the latent variable to the indicator. When the indicator is used as a representative of the structure, reflection measurement occurs (Hair et al., 2014). Therefore, all reflective indicators are interchangeable and highly correlated. The deletion of any one of them will not change the meaning of the construct (Sarstedt et al., 2014). To measure the reflective model, the following indicators need to be tested: reliability analysis, convergent validity, discriminant validity.

Internal Consistency. Cronbach's alpha (α) is often used to measure the internal consistency of the structure (Cronbach, 1971). Cronbach's alpha evaluates reliability based on the correlation between indicators (Maroco,

2006). When usingit, an alpha value of 0.7 or higher is considered acceptable to confirm the consistency of a structure. In recent years, to enhance the reliability of this standard, composite reliability (CR) has also been used as an indicator to measure internal consistency (Gefen et al., 2000). When α value and CR value are 0.70 or higher, it can be regarded as acceptable.

Convergent Validity. It uses outer loadings and average variance extracted (AVE) to assess the convergent validity. A high value of outer loading shows that the indicators belong to a particular construct (Hair et al., 2017). The outer loadings should reach 0.708 and above to show that the structure can explain at least 50% of indicator's variance, and value less than 0.4 should be discarded (Bagozzi et al., 1991). However, the items with outer loadings more than 0.4 can be accepted if the construct has achieved 0.5 and above for the AVE score (Hulland, 1999). In addition, the convergent validity can be established at the construct level via the AVE. The value of AVE is not less than 0.5 and gives support for convergent validity, where the reflective construct able to explain more than half of its indicators (Bagozzi & Yi, 1988).

Table 3 depicts the assessment of construct reliability and convergent validity for the variables of this study. The value of all items is around 0.85, which demonstrates that these constructs have high levels of internal consistency. Then all the constructs are more than the minimum threshold value of 0.5 for average variance extracted (AVE), which indicates that they explain more than 50% of the construct's variances (Hair et al., 2014).

Table 3. Summary of Convergent Validity and Reliability

Construct	Item	Loadings	Internal Consistency Reliability			Convergent Validity, AVE
			Cronbach's Alpha	rho_A	Composite Reliability	
Knowledge Transfer Efficiency (KTE)	KTE1	0.799	0.868	0.881	0.896	0.522
	KTE2	0.772				
	KTE3	0.814				
	KTE4	0.804				
	KTE5	0.610				
	KTE6	0.645				
	KTE7	0.665				
	KTE8	0.637				
Subsidiary Autonomy (SA)	SA1	Deleted	0.895	0.896	0.950	0.905
	SA2	0.950				
	SA3	0.953				
Subsidiary Position (SP)	SP1	0.894	0.855	0.862	0.912	0.775
	SP2	0.914				
	SP3	0.832				
Organizational Trust (OT)	OT1	Deleted	0.849	0.854	0.930	0.869
	OT2	0.938				
	OT3	0.926				
Subsidiary characteristics (subsidiary age, subsidiary size)	AGE	1.000	1.000	1.000	1.000	1.000
	SIZE	1.000	1.000	1.000	1.000	1.000

This study used two ways to evaluate the discriminative validity: Fornell and Larcker criteria (shown in Table 4), Henseler's HTMT(shown in Table 5). Fornell and Larcker criteria indicates that the square root on the diagonal of AVE has a higher correlation than the off-diagonal. When the indicator loads are almost similar, this measurement method performs poorly (Voorhees et al., 2016). In this study, the square root on the diagonal is more

correlated than the off-diagonal, and the results perform well. The HTMT criterion proposes two different cut-off values of 0.85 and 0.90 to establish discriminant validity (Henseler et al., 2015). All the results of the HTMT.$_{85}$ are lower than the critical value of 0.85, and the discriminant validity of the model is established.

Table 4. Discriminant Validity Analysis (Fornell-Larcker Criterion)

	KTE	**OT**	**SA**	**SP**
KTE	**0.723**			
OT	0.598	**0.932**		
SA	0.601	0.453	**0.951**	
SP	0.611	0.726	0.504	**0.880**

Table 5. Discriminant Validity Analysis (HTMT$_{.85}$ Criterion)

	KTE	**OT**	**SA**	**SP**
KTE				
OT	0.682			
SA	0.669	0.519		
SP	0.706	0.849	0.576	

The collinearity issue is the first problem to be solved in the measurement structure model to ensure that the structures in the structural model are independent of each other, because the high degree of collinearity between the structures may lead to bias in the regression results (Hair et al., 2014). The VIF value is 5.0 or more, indicating that there may be a collinearity problem in the exogenous structure, and the VIF value is 3.3 or less, indicating that the collinearity problem does not threaten the result of the structural model (Hair

et al., 2019). As shown in Table 6, all the VIF values were below the threshold of 5.0, and there is no multicollinearity issue.

Table 6. Lateral Collinearity Assessment

Variables	VIF
SA	1.407
SP	2.703
OT	2.538
AGE	1.215
SIZE	1.200

Table 7 illustrates the results of path co-efficient assessment using bootstrapping procedure for each of the hypothesized relationships in the model. The evaluation of the path coefficient is mainly to test the significance of the hypothetical relationship (Hair et al., 2017). Bootstrapping uses 500 sub-samples to calculate the empirical t value of path coefficient significance. The data analysis results show that subsidiary autonomy, subsidiary position and organizational trust all have significant positive influence on knowledge transfer efficiency atβ= 0.358, p <0.001 (one-tailed), β= 0.210, p <0.05 (one-tailed) and β= 0.300, p <0.001 (one-tailed) respectively. Therefore, it found that H1 to H3 are supported in this study.

Table 7. Assessment of Structural Model

Hypotheses	Path	Path Co-efficient	SD	t-value	Interval Esti-mate		Decision
					LL	UL	
H1	SA > KTE	0.358	0.067	5.363**	0.145	0.447	Supported
H2	SP > KTE	0.210	0.090	2.330*	0.245	0.473	Supported
H3	OT > KTE	0.300	0.091	3.298**	0.052	0.361	Supported

**p< 0.01, *p<0.05 (one-tailed); Note: LL indicates Lower Limit and UL indicates Upper Limit at 95% and 99% confidence interval.

What is more, this study also presents the assessment of co-efficient of determination (R^2), the effect size (f^2) as well as the predictive relevance (Q^2) of exogenous variables on endogenous variable (shown in the Table 8). The value for coefficient of determination (R^2) is 0.579. This suggests that the exogenous variables in this study, namely subsidiary autonomy, subsidiary position and organizational trust explain 57.9% of variances in knowledge transfer efficiency. All in all, the Q^2 value of 0.282 for knowledge transfer efficiency, which is larger than 0 (Hair et al., 2014) suggesting that all exogenous variables possess predictive ability over the endogenous variable. Moreover, each of exogenous variables (SA, $f^2 = 0.217$; SP, $f^2 = 0.039$; SN, $f^2 = 0.084$) has small to medium effect size on the endogenous variable.

Table 8. Determination of Co-efficient (R^2), Effect size (f^2) and Predictive Relevance (Q^2)

	Co-efficient of Determination	**Predictive Relevance**	**Effect Size f ^{2}**	
	R^2	Q^2	KTE	Effect Size
KTE	0.579	0.282		
SA			0.217	Medium
SP			0.039	Small
OT			0.084	Small

Table 9 elucidates the moderating effect of subsidiary characteristics (subsidiary age and subsidiary size) on the relationship between i) subsidiary autonomy (ß = 0.133, t = 1.848; ß = -0.092, n.s.), ii) subsidiary position (ß = 0.033, n.s.; ß = 0.054, n.s.), and iii) organizational trust (ß = -0.208, t = 2.475; ß = 0.129, n.s.) and knowledge transfer efficiency.

Table 9. Results of Moderating Effect of Subsidiary Age and Subsidiary Size

Hypotheses	Relationship	Standard Beta	SD	t-value	Decisions
H4a	AGE>SA-KTE	0.133	0.072	1.848*	Supported
H4b	AGE>SP-KTE	0.033	0.092	0.355 (ns)	Not supported
H4c	AGE>OT-KTE	-0.208	0.084	2.475*	Supported
H5a	SIZE>SA-KTE	-0.092	0.073	1.256 (ns)	Not supported
H5b	SIZE>SP-KTE	0.054	0.087	0.623 (ns)	Not supported
H5c	SIZE>OT-KTE	0.129	0.086	1.508 (ns)	Not supported

**p< 0.01, *p<0.05, n.s. = not supported (one-tailed)

It is found that subsidiary age moderates the relationship between subsidiary autonomy, organizational trust and knowledge transfer efficiency. As shown in Figure 2 illustrates that the postulated relationship is stronger when the subsidiary age is high as well as in Figure 3 illustrates that the postulated relationship is stronger when the subsidiary is low. In summary, H4a and H4c is supported, while the others are rejected.

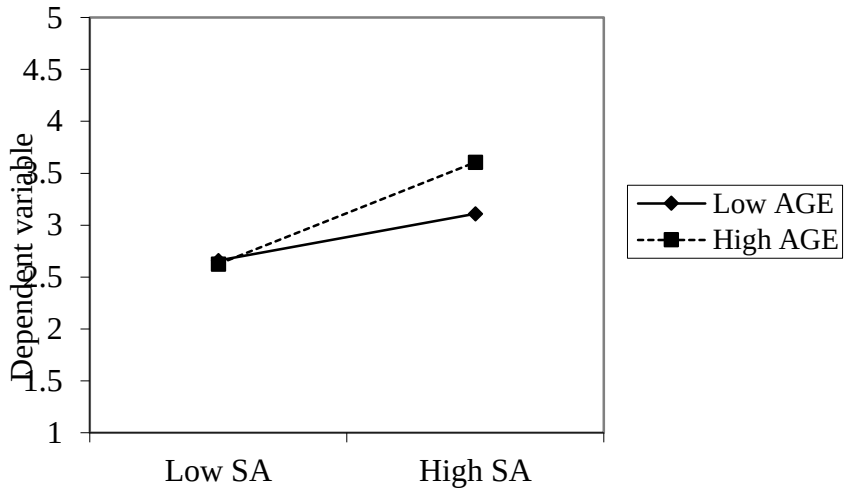

Figure 2. Moderation Effect of Subsidiary Age (SA>KTE)

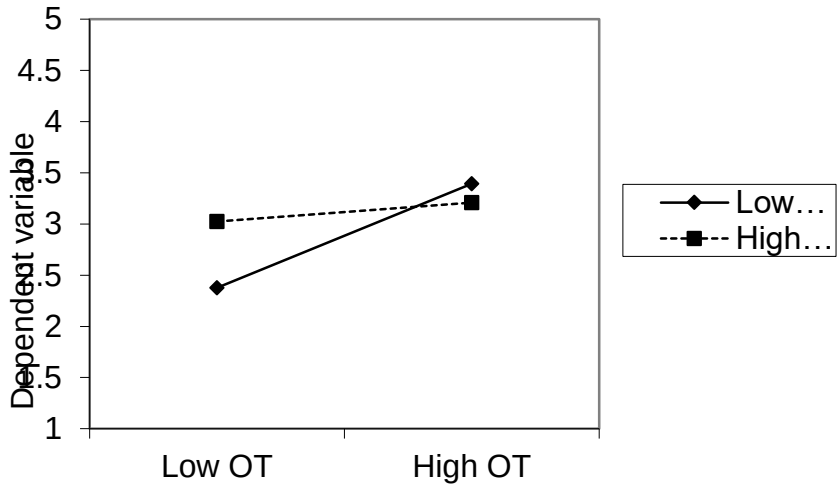

Figure 3. Moderation Effect of Subsidiary Age (OT>KTE)

Discussion

The ability of modern MNCs to develop, cultivate, and maintain competitive advantages mainly depends on the ability to create, transfer, and use knowledge within the companies (Gaur et al., 2018). It is of great significance to MNCs that find out the influencing factors of knowledge transfer and how to use them, which helps MNCs effectively control and guide knowledge, MNCs acquire and create more innovative knowledge to obtain a lasting competitive advantage (Susanty et al., 2012).

Knowledge transfer activities require participants, one is the sender, and the other is the receiver (Sabokro et al., 2018). In traditional knowledge transfer research, the most common concern are the motivation of the sender

(e.g. Kalling, 2003; Salamzadeh et al., 2014; Burmeister, Lazarova & Deller, 2016) the absorptive capacity of the recipient (e.g. Chen, 2004; Chang, Gong & Peng, 2012). Few scholars put together the 'power relationship' between parent and subsidiary companies, which is the reason why this study includes subsidiary autonomy (the degree of the parent company delegated power), subsidiary position (the degree of subsidiary importance), and organizational trust (the degree of connection in organizations). Finally, the results indicate that all factors have positive significant on knowledge transfer efficiency.

This study draws on social network theory and creates a new perspective model, including the completed relationships between parent and subsidiaries, as well as the ignored factors (subsidiary age and subsidiary size). The findings indicate that knowledge transfer efficiency can be fostered and enhanced by the factors based on the relationships of parent and subsidiaries (subsidiary autonomy, subsidiary position, and organizational trust). Importantly, the results also contribute by revealing that subsidiary age has moderation between subsidiary autonomy as well as organizational trust and knowledge transfer efficiency.

Subsidiary autonomy. The previous research on the relationships between knowledge transfer and subsidiary autonomy is divided into two parts, the direct and indirect effects. The first conclusion is to prove that subsidiary autonomy has a direct effect on the knowledge transfer efficiency. Taking Rabbiosi (2008) as an example, his conclusion confirms that subsidiary autonomy has a direct impact on the efficiency of knowledge transfer. However, there are certain limitations to satisfying this conclusion that knowledge is

mainly elementary, and the flow is from the subsidiary to the parent company. The second part proves that subsidiary autonomy has an effect on the efficiency of knowledge transfer, but the effect is indirect. It is represented by Søberg and Wæhrens (2020). Their conclusion is that the enhancement of the subsidiary autonomy allows the subsidiary to get more equipment support and to control the technical resources more freely, and the transfer knowledge more freely too. This conclusion of this study also directly confirm the latter results, moreover test subsidiary autonomy ($\beta = 0.065$, $p<0.001$) has a positive significant on knowledge transfer efficiency.

Subsidiary position. Subsidiaries distributed around the world provide different resources for multinational companies, and the role of the subsidiaries will also change with their different positioning (Rabbiosi, 2011). Subsidiaries in different roles bear different responsibilities. As mentioned in the previous parts of the present research, scholars have classified different roles of subsidiaries in different ways. Therefore, the research on the role or position of subsidiaries is mostly based on their role characteristics (e.g. Qin et al., 2011; Schotter & Bontis, 2009). In the current research, it only emphasizes the importance of subsidiaries. Thus, in its view, the main point about the subsidiary role and knowledge transfer efficiency can be interpreted that whether the importance the parent company attaches to its subsidiary has an impact on knowledge transfer efficiency. Therefore, this study tests by measuring the attention of the parent company. The result is that the subsidiary position ($\beta = 0.210$, $p <0.05$) has a positive impact on the efficiency of knowledge transfer in Chinese MNCs, just like the hypothetical prediction.

Organizational trust. The relationship between organizational trust and knowledge transfer has been tested and recognized by many researchers (e.g. Maurer, 2010; Sankowska, 2013), but most of the research are isolated, and they rarely combine organizational trust with other knowledge management elements to study together. Exploring these connections in isolation is unlikely to make people understand the role of trust, so this study puts organizational trust into the analysis of the multiple factors of inter-company relationships. With the improvement of technological equipment, it seems that the abstract context like organizational trust is not important. However, it overlooks that organizational trust is the original driver for the activity of knowledge transfer in companies. Trust promotes the frequency and quality of communication between organizations, especially when information flow and knowledge exchange are of strategic interest (McEvily et al., 2003). All in all, the foundation for accepting and transferring knowledge is trust (Renzl, 2008). Trust at the individual level has been confirmed by Ismail and Yusof (2010), while the present research has also obtained positive results at the organizational level. The finding of the current research shows that organizational trust ($\beta = 0.300$, $p < 0.001$) has a positive impact on the efficiency of knowledge transfer in Chinese MNCs.

Moderation of subsidiary age. In the literature on the study of subsidiary characteristics (subsidiary age and subsidiary size) and knowledge transfer, the influence of subsidiary characteristics on expatriates is often mentioned (e.g. Bruning et al., 2011). While as a company characteristics, it should also be valued in inter-company communication and activities. The

establishment of a subsidiary company (subsidiary age) often means two concepts in research. First of all, it represents the adaptability of subsidiaries to foreign companies (Stahl & Caligiuri, 2005). With the passage of time, subsidiaries have become more and more adaptable to the external environment of foreign politics, economy, culture, etc., and can be more harmoniously integrated into the local environment for business activities, which makes business activities more and more efficient and smooth (Brewster, 1997). Secondly, it represents more and more resources accumulated by subsidiaries. In addition to material resources, this resource also contains knowledge resources such as experience and technology (Tallman & Li, 1996). Interestingly, subsidiary age only have a significant and positive moderation between subsidiary autonomy (β =0.133, $p<0.05$) as well as organizational trust (β = -0.208, $p<0.05$) and knowledge transfer efficiency in Chinese MNCs. It shows that Chinese MNCs use a good corporate internal system to adjust the influence of subsidiary age, while some subsidiaries have an important position (β = 0.033, n.s.) in the corporation, and no matter how old is the subsidiary, it does not affect the decisions of the parent company.

Moderation of subsidiary size. Many researchers indicate that the larger subsidiary is, the more capability it has to negotiate with the parent company and further have more rights (Johnston & Menguc, 2007). That is to say, as the size of the subsidiary increases, the development resources of the subsidiary will make the asymmetry of power between the headquarters and the subsidiary tilt more toward the subsidiary (Camisón-Zornoza et al.,

2004). However, the results of its moderation are not exactly the same. Subsidiary size (β = -0.092, n.s.; β = 0.054, n.s.; β = 0.129, n.s.) does not have a significant and positive moderation between factors and knowledge transfer efficiency in Chinese MNCs. It may also indicate that Chinese MNCs have a strict management system to avoid changes in power caused by the expansion of subsidiaries.

Conclusion

The finding of the current research, it expands the contextual aspects of knowledge transfer theory. For example, earlier findings suggest that the main influencing factors are the notes of the knowledge transfer process. However, this study thoroughly demonstrates the impact of different external environments faced by Chinese MNCs on the efficiency of knowledge transfer: firstly, it understands the relationship between the characteristics of each node in the network and the efficiency of knowledge transfer; secondly, it promotes the further development of research on knowledge transfer efficiency. It has been confirmed that the knowledge transfer efficiency of Chinese MNCs is indeed affected by various factors, while the nodes that play a role are slightly different from the conclusions of previous researchers. Many valuable results can reflect the uniqueness and strong internal consistency of Chinese MNCs in knowledge management.

Secondly, the conservative management model of Chinese MNCs has gained many benefits in terms of knowledge transfer. It established a solid

internal system that, regardless of other issues, this study only discusses knowledge transfer efficiency, which indeed ensures that internal activities are not interfered with by the external environment to the greatest extent. The influence of subsidiary position and organizational trust also stems from the authorization of Chinese MNCs. Organizations that are more valued communicate more closely with the Chinese parent company and obtain more support at the same time. It is a special discovery that Chinese MNCs are unique at the firm level, and Chinese MNCs are more centralized of power. Therefore, at the company level, when other conditions are met, the management has the ability to achieve it through internal control.

Limitations and Areas for Further Research

Any research conducted has its limitations that need to discuss and improved. The current research has substantial theoretical and practical implications, while it still has few limitations which need to be explained.

In the term of the methodological constraints, it is hard to choose all variables, and there are still variables that will evaluate the knowledge transfer efficiency, just like knowledge characteristics, company support, or capital investment, et al. However, it is impossible to investigate all the variables that might influence the dependent variable in one research. In the design of the questionnaire, since it focuses on testing the influent factors from different levels, there may be limitations in the further research. For example, this study did not collect the countries to which the respondent was sent, and it is

impossible to make a more specific one-to-one analysis between China and one of the overseas countries. It would be getting more interesting and detailed differences between countries.

Despite the limitations, this study provides the following prospects and guidance for future research. First of all, in terms of methodology design, the selection of samples may add to MNCs from other countries for comparison, especially the comparison between Eastern and Western countries. Differences in institutions, economy, and culture will lead to different management modes of MNCs, and whether the difference in management mode will cause changes in the knowledge transfer efficiency is also a topic worth discussing. Similarly, industry comparisons will also be made that inevitably lead to some beneficial conclusions for knowledge transfer efficiency.

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Junshuai Cheng is a PhD candidate in International Business at the School of Management, Universiti Sains Malaysia. Her research interests are in the field of knowledge management.

Shankar Chelliah is an Associate Professor in International Business at the School of Management, Universiti Sains Malaysia. His areas of specialization include International Business and Knowledge Management.

Ai Ping Teoh is currently a Senior Lecturer with Graduate School of Business, Universiti Sains Malaysia. Her areas of specialization include Enterprises Systems, Organizational Performance and Enterprise Risk Management.