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THE UNIVERSITY OF HULL

Knowledge transfer to facilitate Industrial Symbiosis: a  
case study of UK-China collaborators

being a thesis for the Degree of PhD in Human Geography

in the University of Hull

by

Qiaozhi Wang, BE, MS

2013

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# Catalogue

Abstract.....	vii
Abbreviations.....	ix
Table List.....	xi
Figure List.....	xii
Acknowledgement .....	xiv
Chapter I. Introduction.....	1
Chapter II. Research on IS .....	10
2.1 Introduction.....	10
2.2 The concept of IS .....	11
2.3 The practice of IS development .....	13
2.3.1 NISP’s IS network facilitation approach: a good practice or not?.....	14
2.3.2 The Chinese ISD status: Is there potential for the facilitated IS network approach? .....	15
2.4. Summary .....	18
Chapter III. Knowledge management and knowledge transfer .....	20
3.1 Introduction.....	20
3.2 Organisational knowledge: definitions and taxonomies .....	23
3.2.1 Understanding the concept of organisational knowledge .....	23
3.2.2 Organisational knowledge taxonomies .....	24

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3.3 KM in KIBS organisations.....	26
3.3.1 Knowledge creation .....	27
3.3.2 Strategies to process organisational knowledge for dissemination.....	31
3.4 Constructing alliances: foundation for KT .....	36
3.5 Initiation of KT processes .....	43
3.5.1 Knowledge dissemination processes in a knowledge provider’s system.....	43
3.5.2 Knowledge learning processes in a knowledge recipient’s system .....	46
3.6 Determinants of KT processes .....	49
3.6.1 Provider’s internal factors affecting its knowledge dissemination process .....	49
3.6.2 Recipient’s internal factors affecting its knowledge learning process.....	54
3.6.3 Contextual factors affecting KT processes .....	56
3.7 Qualitative case study approaches for KT research .....	59
3.8 Summary .....	62
IV Methodology.....	65
4.1 Introduction.....	65
4.2 Philosophical paradigm and Research Methodology.....	66
4.2.1 Underlying philosophical assumptions .....	66
4.2.2 Qualitative-interpretive research methodology.....	67
4.3 Research Design and fieldwork .....	72
4.3.1 Research Design/Approach.....	72

---

4.3.2 Fieldwork .....	74
4.4 Data analysis .....	82
4.4.1 Principles of data analysis .....	82
4.4.2 Data analysis strategy in this research .....	84
4.5 Research Validity .....	87
4.5.1 Criteria Exploration .....	87
4.5.2 Consideration of the validity in this research .....	88
4.6 Ethical considerations .....	90
4.7 Summary .....	91
Chapter V Policy Contexts affecting ISD in the UK and China .....	93
5.1. Introduction.....	93
5.2. Chinese policy context targeting resource efficiency and pollutants reduction: status and problems.....	94
5.2.1 Policy instruments.....	96
5.2.2 Targets delivery landscape .....	101
5.2.3 Achievements and Problems .....	104
5.3. The UK’s performance-based devolution model for ISD .....	106
5.3.1 Policy instruments.....	106
5.3.2 Targets delivery landscape .....	109
5.3.3 Characteristics of the UK’s model for ISD .....	112
5.4. Lessons for China .....	114

---

Chapter VI The development of NISP & its organisational knowledge .....	117
6.1 Introduction.....	117
6.2 The creation of NISP’s IS network facilitation model: understanding the mechanism and the model.....	119
6.2.1 Pre-initiation stage .....	119
6.2.2 Expanding regional pilot programmes.....	121
6.2.3 Understanding the relationship between the BPS and NISP model.....	124
6.4 KM within NISP .....	131
6.4.1 The development of ICTs.....	131
6.4.2 Collecting and codifying IS programme delivery knowledge .....	138
6.5 KT within NISP .....	154
6.5.1 Formal KT between NISP headquarters and regional teams .....	154
6.5.2 Informal KT between members of the franchising .....	158
6.6 Summary .....	160
Chapter VII KT between NISP headquarters and TEDA eco-centre .....	164
7.1 Introduction.....	164
7.2 The knowledge provider’s previous KT experience in China .....	165
7.3 The knowledge recipient’s profile.....	171
7.3.1 Organisational structure of the knowledge recipient .....	171
7.3.2 Knowledge recipient’s geographical advantages for implementing internationally collaborative projects.....	175

---

7.3.3	ISD in TEDA and the surrounding industrial area .....	178
7.4	The structure of the NISP-TEDA collaboration.....	180
7.5	KT initiatives.....	183
7.5.1	Transferring knowledge on how to build a programme delivery team... ..	183
7.5.2	Transferring the programme development strategy .....	189
7.5.3	Transferring programme operational methods.....	192
7.5.4	Transferring software .....	194
7.5.5	Learning by doing .....	196
7.5.6	UK policy tour to learn knowledge of policy and practice .....	210
7.6	The Progress of KT --- So far so good? .....	216
7.7	Summary .....	221
VIII.	Discussion .....	225
8.1	Introduction.....	225
8.2	KM and KT within NISP's franchising system .....	225
8.2.1A	KM and KT model primarily driven by a franchisor .....	225
8.2.2	Verifying the SECI model.....	229
8.3	KT between NISP headquarters and TEDA eco-centre .....	233
8.3	Factors affecting transnational KT for ISD.....	238
8.3.1	Disseminative capacity .....	239
8.3.2	Absorptive capacity.....	242
8.3.3	Alliance structure and teaching/learning intent.....	244

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8.3.4 KT Media .....	246
8.3.5 Language difference.....	250
8.3.6 Policy gap.....	251
8.3.7 Cultural gap.....	252
8.4 KT within NISP vs. KT in NISP-TEDA alliance .....	254
Chapter IX Conclusions .....	258
9.1 Findings for research questions .....	258
9.1.1 Findings for research question one .....	258
9.1.2 Findings for research question two .....	260
9.1.3 Findings for research question three .....	263
9.1.4 Reflections on research question four.....	264
9.2 Limitations and future research direction .....	271
Reference .....	273
Interviewee List .....	287
Example of Consents Letter.....	289

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## **Abstract**

Interest in how industrial production could be adapted to promote sustainable development has increased in recent decades worldwide. Industrial symbiosis (where one company's unwanted materials become the input for another company) is one approach to reducing the environmental impact of production, which itself has attracted widespread policy interest. The UK's National Industrial Symbiosis Programme has become known internationally as an example of a successful industrial symbiosis initiative, attracting both academic interest and policy imitation. However, the suitability of industrial symbiosis development initiatives to be transferred between geographic contexts is a largely neglected issue in industrial symbiosis literature. Practice replication can be viewed as a knowledge transfer process. In order to address that issue, this study adopts a theoretical framework drawn from the knowledge transfer literature, which suggests that language skills, technical assistance and expertise are among the factors influencing the success of international attempts at practice replication. The knowledge transfer literature, however, has focussed on commercial activity, i.e., firms' primary activities, not environmental initiatives such as industrial symbiosis. Theoretical framework on knowledge transfer is therefore adopted to study the topic.

The research aims to provide a deeper understanding of factors affecting the process of replicating one country's industrial symbiosis development practice to another. A European Commission funded project replicating the UK's industrial symbiosis network

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facilitation approach to the Tianjin Binhai New Area of China has been selected to conduct an in-depth case study. This case study can be viewed as a transnational knowledge transfer practice. In addition, this research used a knowledge transfer perspective to inform an in-depth analysis of the organisation of National Industrial Symbiosis Programme. Also, it conducted the analysis of policy context affecting industrial symbiosis activities in the UK and China to provide a background of industrial symbiosis development in the two countries. Qualitative research methods such as semi-structured interviews and participant observation have been used to collect data.

This research contributes to knowledge transfer theory through proposing a knowledge-based model illustrating the process of knowledge development within an organisation and the process of transnational knowledge transfer from the knowledge source to another. Also, factors affecting the process of transnational knowledge transfer have been summarised. In addition, the research provides a deeper understanding of a industrial symbiosis network facilitation approach which has been widely cited as an industrial symbiosis development exemplar. Theoretical contributions could guide future transnational collaborations on replicating good practices for industrial sustainable development.

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## **Abbreviations**

APEP: Asia Pro Eco Programme

CE: Circular Economy

CRISP: Core Resource for Industrial Symbiosis Practitioners

DEFRA: Department of Environment, Food and Rural Affairs

EA: Environment Agency

EC: European Commission

EIP: Eco-industrial Park

EPB: Environmental Protection Bureau

EU: European Union

ICT: Information and Computer Technology

IE: Industrial Ecology

IS: Industrial Symbiosis

ISD: Industrial Symbiosis Development

KM: Knowledge Management

KT: Knowledge Transfer

MEP: Ministry of Environmental Protection

MIIT: Ministry of Industry and Information Technology

NDRC: National Development and Reform Commission

NISP: National Industrial Symbiosis Programme

RCR: Resource Comprehensive Re-utilisation

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TBNA: Tianjin Binhai New Area

TEDA: Tianjin Economic- Technological Development Area

UK: United Kingdom

WRAP: Waste Resource Action Programme

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## Table List

Table 2.1 Definitions of IS.....	13
Table 3.1 Representative Funded Collaborative Projects on Environmental Sustainability in China.....	41
Table 3.2 Media characteristics that determine richness of information.....	52
Table 4.1 The characteristics of qualitative research methodology.....	69
Table 4.2 Table 4.2 Details of Interviewees .....	78
Table 4.3 Themes of the collected data.....	86
Table 5.1 UK vs. Chinese key policy instruments.....	97
Table 6.1 Identified programme delivery tools.....	124
Table 6.2 Interview Questions for the ‘Blueprints’ project.....	151
Table 7.1 Policy factors learned from site visits.....	210
Table 7.2 TBNA IS network outputs by June 2012 vs. planned goals by November 2013.....	218

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## Figure List

Figure 2.1 The general structure of chapter 2.....	10
Figure 2.2 Relationships between IS, IE and SID.....	11
Figure 3.1 the structure of chapter 3.....	22
Figure 3.2 Knowledge dissemination process in a knowledge provider’s system.....	45
Figure 3.3 Knowledge learning process in a recipient’s system.....	47
Figure 4.1 The structure of chapter 4.....	65
Figure 4.2 Research approach.....	72
Figure 4.3 Relationship between the two case studies in this research.....	85
Figure 4.4 Structure of data analysis targeting theory building in this research.....	86
Figure 5.1 The general structure of chapter 5.....	94
Figure 5.2 The Hierarchy of delivery landscape of RCR/CE.....	102
Figure 5.3 Key Organisations for ISD in the UK.....	110
Figure 5.4 Management method as a percentage of total C&I waste, England, 1998/9, 2002/3, and 2009.....	113
Figure 6.1 The general structure of chapter 6.....	119
Figure 6.2 A simplified NISP delivery and support structure.....	130
Figure 6.3 NISP programme delivery procedures.....	138
Figure 7.1 The structure of chapter 7.....	165
Figure 7.2 The Location of TEDA.....	177
Figure 7.3 Two Levels of KT between NISP headquarters and its Chinese Partners....	182

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Figure 7.4 The proposed structure of the TBNA IS Network delivery team recommended by NISP.....	184
Figure 7.5 IS programme development strategy.....	189
Figure 7.6 The First Conference for the Steering Committee of the Switch Asia Project.....	191
Figure 7.7 The first CEO Dinner Meeting in the April 2010.....	198
Figure 7.8 The synergy workshop session of the first QWW in TEDA in the April 2010.....	204
Figure 7.9 IS activity flow chart in TBNA IS programme.....	217
Figure 7.10 Achievements of completed synergies facilitated by the TBNA IS network.....	219
Figure 7.11 The structure of the planned Tianjin IS innovative technology alliance.....	220
Figure 8.1 KM and KT with franchising derived from NISP’s case study.....	227
Figure 8.2 Typical knowledge creation activities in NISP (“K” refers to “Knowledge”).....	230
Figure 8.3 KM and transnational KT derived from this case study.....	234
Figure 8.4 Key factors affecting a KT process derived from KT within NISP-TEDA funded licensing.....	239

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## **Acknowledgement**

Studying in UK is a very impressive and exciting experience in my life. I would like to express my appreciation to my husband Xiaoming Guo, my parents and parents-in-law who have been supportive and understanding during the period when I was conducting my research and writing this thesis. Thanks to my little angel, Niuniu, whose due-date is 5<sup>th</sup> May 2013 but has experienced all my happiness and pressure during the process of revising the dissertation.

Thank you indeed Pauline Deutz, my first supervisor and friend, who with her sharp eyes and analytic manner has contributed in many ways. Also, without David Gibbs, my second supervisor's guide, this thesis would not have existed – many thanks David. Thank you, my third supervisor, Xiudian Dai, who has contributed his time and energy to my research.

Many thanks to my dear friend, Anne Kildunne, for all the suggestion of improvement possibilities in the thesis script.

Thanks to all the interviewees who kindly supported my research and answered my questions. Without your involvement, this research cannot be completed.

I am sincerely grateful to people in International Synergies Limited and TEDA eco-centre that provided internship opportunities for me to be involved in field that was under my

---

study. During the period of working with you, I received substantial advice for my research and life.

I had the opportunity of sharing a big PhD room. Thanks to the Department Geography, Environment and Earth Sciences of University of Hull and thanks to all the friends and lovely faces in the department.

I acknowledge and am thankful to China Scholarship Council and university of Hull who sponsored my PhD study. Special thanks to my previous supervisor, Wenzhi Cao, in Xiamen University, who guided my master study and supported my application of the PhD study in the UK.

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## Chapter I. Introduction

In less than two hundred years, industrial development has brought human society great economic prosperity. However, anthropological activities relating to these achievements are characterised by the use fossil fuels, which have contributed to the rising concentration of greenhouse gases in the atmosphere. Human activities have altered the physical and biogeochemical properties of Earth's biosphere, contributing to both local and global scale environmental and social-economic problems, such as ozone depletion, polluted water supplies and poor air quality (Parry, *et al.*, 2007). The challenge that we are confronted with today is how to combine economic development with a decrease in environmental pressure.

The role of industry is central to how we address these environmental problems, as industry has considerable potential to improve its performance with respect to the environment. On average 90% of materials and energy used for making a product are never embodied in the final product, as large quantities of by-products which could be reused are poured into landfill sites (Cohen-Rosenthal, 2003). This low efficiency of materials and energy utilisation is largely due to the traditionally linear industrial production systems in which resource moves through to become waste (Allwood, *et al.*, 2011).

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With the growing awareness of the adverse environmental effects of traditional industrial production systems, as well as objectives to preserve and improve living standards, government authorities' initiatives for economic development have had to incorporate pressures for sustainable development (McNeill, 1989; Allwood, *et al.*, 2011). For example, the UK's Zero waste economy<sup>1</sup> and the Chinese circular economy (CE)<sup>2</sup> development both stress improving resource efficiency and economic development through a number of waste or resource management activities (DEFRA, 2010; State Council, 2005)

One type innovative resource management initiatives, known as industrial symbiosis (IS), refers to the collaboration among businesses for exchanging waste resources such as material and energy flows (Chertow, 2000; 2007) and even for the shared use of expertise and logistics (Laybourn & Morrissey, 2009). In theory, IS can promote efficiency and effectiveness to utilise resources and capacities, and to improve relationships with participant organisations which potentially offers social, economic and environmental benefits for whole communities (Gertler, 1995; Chertow, 2000; Gibbs, 2003). The theoretical benefits of IS were discovered in self-evolved IS

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<sup>1</sup> The zero waste economy has been proposed as the Government's overarching goal to waste management, and is described as a longer-term vision to shift the current throwaway society through waste prevention, re-use, recycling and recovery, and disposal is the option of very last resort (DEFRA, 2011).

<sup>2</sup> The CE development refers to the promotion of resource conservation, cleaner production, re-utilisation, and environmental protection industries (State Council, 2005).

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networks, such as the Kalundborg IS network where a number of local manufacturers are collaboratively utilising residual steam, waste water, fly ash and other materials (Brand and De Bruijin, 1999; Chertow, 2000; Jacobsen and Anderberg, 2005).

Inspired by the success of self-evolved IS networks, worldwide there has been a process of diffusing and applying IS development (ISD) strategies for sustainable industrial development. For example, in the early 1990s, there were attempts to replicate the patterns of Kalundborg IS networks through constructing eco-industrial parks (EIPs) from scratch in the USA for regional economic development incorporating environmental goals (Chertow, 2000; Deutz & Gibbs, 2004). Their EIP development strategy introduced requirements or incentives for green building design and plans to encourage inter-firm collaboration on resource utilisation (Deutz & Gibbs, 2004). However, empirical research findings show that these early attempts to apply the Kalundborg practice are problematic. For example, since the 1990s a number of the US EIPs have been confronted with a number of barriers including difficulties in recruiting tenants due to restricted recruiting policies and depressed economic backgrounds (Deutz & Gibbs, 2008). Therefore, developing EIPs from scratch may not be a good practice in implementing the IS concept. It is necessary to develop a theoretical framework to guide ISD rather than to replicate infrastructures used in self-evolved IS networks.

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Another example is the attempt to replicate the experiences of IS network facilitation approach represented by the UK's National Industrial Symbiosis Programme (NISP). NISP has been developed since early 2000s facilitating resource exchange among businesses supported by government funding policy (Mirata, 2004; Kim & Powell, 2008; Paquin & Howard-Grenville, 2009). Recently, the diffusion of the facilitated IS programme to China has received four-year financial support from national and international bodies (Laybourn & Morrissey, 2009). The UK-China collaborated programme aims to use NISP's facilitation approach to develop an IS network in a Chinese industrial area and to learn from the UK's waste policy framework to improve resource efficiency and inter-firm networking activities (TEDA AC, 2009; TEDA IPB, 2010). However, it is unclear how the Chinese side can adapt and expand the programme as China has a different funding policy for resource efficiency from the UK.

Although the process of implementing one country's ISD approach in another country can be treated as a process of knowledge transfer (KT), the ISD literature has paid little attention to the implications of knowledge transfer (KT) either within or between organisations. KT refers to conveying the knowledge (e.g. experience, lessons learned and know-how) of one set of organisational actors (e.g. teams, units or organisations) to another (Awad & Ghaziri, 2004; Wijk *et al.*, 2008).

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Intra-organisational KT is one of the most important stages in organisational knowledge management targeting knowledge sharing, collaboration and networking for business success (Awad & Ghaziri, 2004). Inter-organisational KT can have the objective of obtaining knowledge from an outside source from a knowledge recipient's perspective (Abou-Zeid, 2005; Ding *et al.*, 2009); whilst, inter-organisational KT could be adopted as a strategy to sell products (e.g. consulting services) for commercial benefits from the knowledge provider's point of view (Ajmal and Kosklnen, 2008; Huggins, 2012).

In particular, international KT between different countries has received intensive attention due to its challenging nature covering cross-cultural, political, economic and geographical gaps (Ding *et al.*, 2009; Duan *et al.*, 2010). The key platforms for international KT cover multinational corporations and international joint ventures (Inkpen & Pien, 2006; Hong & Nguyen, 2009; Ding, 2011). Besides the commercial KT platform, there are also international projects supported by governments, the United Nations, the European Commission (EC), and national and international funding organisations aiding developing/undeveloped countries (Duan, *et al.*, 2010). However, there is limited research on how to promote funded international KT activities. Meanwhile, given the nature of efforts to diffuse ISD in diverse geographic settings, the lack of attention to KT theory and literature is a significant oversight. The unique contribution of this work therefore is to address these two important gaps.

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This research focuses both on KT *within* the UK NISP and KT *between* NISP and its Chinese partners in the funded UK-China collaboration to replicate the UK's IS network facilitation approach. The knowledge mentioned in the terms of KT refers to NISP's facilitation approach for ISD and the UK's waste policy knowledge targeting resource efficiency. The KT process accompanying the expansion of the UK's NISP was also studied, as it provides an opportunity to compare KT practices both within and across nations.

Regarding the selection of the NISP-China programme, two reasons were considered: firstly, political and policy contexts affecting ISD differ between the two countries, it is therefore interesting to explore whether it is possible to transfer one country's ISD knowledge to the other. If it is possible, good practices on ISD may be easily promoted to other countries where contexts are less different than China's. Secondly, it is an international and national government funded project, implemented by collaborative non-profit organisations of the two countries for industrial sustainable development. Is this transnational KT different from other cross-national KT brought about by multinational corporations seeking economic benefits in new markets?

To promote international communication of ISD knowledge, this research therefore draws on the theoretical frameworks of inter-organisational KT in the discipline of

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business management. KT theories that can be drawn upon by this research cover approaches to constructing the structure of the inter-organisational KT model (e.g. identifying KT participants, types of transferred knowledge and incentive/barrier factors affecting the KT process) and illustrating the KT process (e.g. knowledge identification, diffusion, acquisition, communication, application, acceptance and assimilation) (see chapter 3). Analysing funded international collaborative programmes sharing ISD approach from the perspective of KT theories helps to conceptualise which types of knowledge constitute the ISD approach and which factors affect the dissemination process. Moreover, it contributes to the KT theory, which lacks case studies on funded international collaboration for industrial sustainable development.

The major research questions are as follows:

Q1: What are the differences between the political and regulatory of the UK and China in relation to IS?

Exploring this question could help to understand national or international policy context for promoting IS activities, the role of IS as a policy tool for sustainable development, and the reason why different policy frameworks have been adopted by high-level decision makers to promote IS in the two countries.

Q2: How have specific organisations attempted to promote IS in each country and how has knowledge transferred among these organisations for ISD?

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This research question is to identify key participants (government departments or non-government organisations) that have been involved in promoting rather than engaging in IS activities. As knowledge is supposed to be transferred among the participants to expand the network of promoting IS activities in each country, KT theory thereby is adopted to explore the mechanism and problems of the KT process. The national KT practice is treated as a contrasting case study of the transnational KT mentioned in Q3.

Q3: What collaborations are there between the UK and China for ISD? Which types of knowledge have been transferred and which factors have affected the KT process?

Investigating the KT process between the UK and China collaboration for ISD is the key task of this research. Undertaking the task begins with the identification of the relevant transnational ISD collaboration. Then, the process of the transnational KT process can be explored. Also, similarities and differences of the two KT cases (national and international KT practices) can be compared to contribute to the KT theoretical framework.

Q4: How can the research findings develop a greater understanding of KT between the UK and China for ISD? How can the research contribute to the future development of KT and IS?

This question focuses on the theoretical contribution of this research. The structure of

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this dissertation is as follows:

- Chapter 2 reviews the literature on the concept of IS and ISD practices in the UK and China
- Chapter 3 reviews the literature on the concept of KT and qualitative research methods to conduct KT studies;
- Chapter 4 presents the philosophical paradigm, methodology and research methods;
- Chapter 5 analyses the differences of the political and regulatory contexts between the UK and China for ISD;
- Chapter 6 describes knowledge management (KM) within the knowledge provider's and KT between NISP headquarters and its UK collaborators;
- Chapter 7 illustrates the KT between the NISP headquarters and TEDA eco-centre;
- Chapter 8 discusses theories generated from the KM and KT case study findings mentioned in chapter 6 and 7 and compares the similarities and differences between the explored two types of KT;
- Chapter 9 discusses how the research findings can contribute to both ISD and KT theories and gives an overall conclusion of this research.

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## Chapter II. Research on IS

### 2.1 Introduction

The transferred organisational knowledge studied in this research is a type of industrial symbiosis development (ISD) approach - the UK organisation's IS network facilitation approach. This chapter therefore focuses on exploring the need to transfer the ISD knowledge. Subsequent sections of the chapter cover:

- Locating the concept of IS in sustainable industrial development tools (section 2.2);
- Summarising ISD practices in the UK and China and analysing the feasibility of the UK organisation's ISD practice and its potential applicability in China (section 2.3).

The general structure of this chapter is presented as follows:

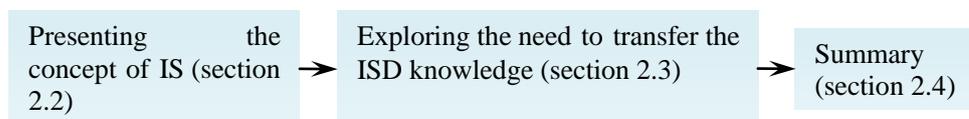


Figure 2.1 The general structure of chapter 2

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## 2.2 The concept of IS

According to Den Hond (2000) and Chertow (2000), IS is a discipline studying inter-firm environmental behaviours belonging to a branch of industrial ecology (IE). In addition, Lankey and Anastas (2002) argue that IE is a collection of ideas and tools geared towards achieving sustainable industrial development (SID), and therefore IE can be considered as a sub-branch of SID. Through compiling the above opinions, the relationships between IS, IE and SID can be expressed as in figure 2.2.

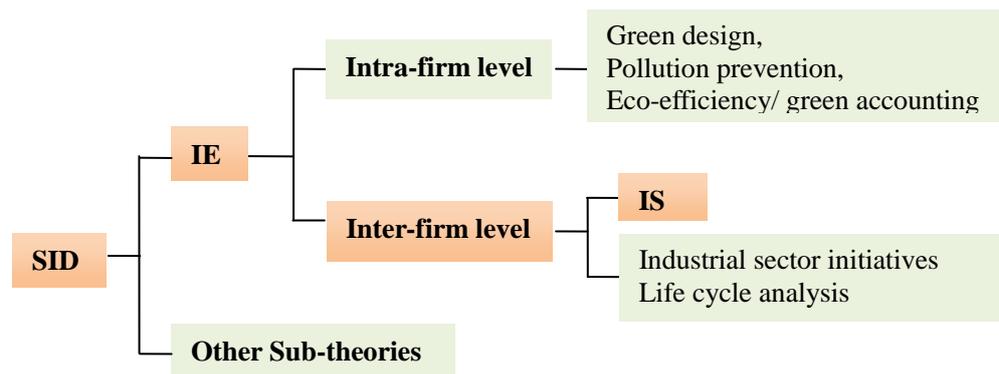


Figure 2.2 Relationships between IS, IE and SID

According to Maltin (2004), IE aims at identifying and implementing necessary changes to shift traditional linear industrial systems to a more sustainable approach through adopting more cyclical resource use patterns, and facilitating the changes with a renewed understanding of industry-environment relations. Chertow (2000) classifies IE practices into intra-firm options such as green design of products, pollution prevention and eco-efficiency/green accounting; inter-firm or regional options such as

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IS, industrial sector initiatives and life cycle analysis. The intra-firm environmental initiatives are believed to be more easily applied but these efforts cannot address the need for more profound shifts in the organisation of production (McManus & Gibbs, 2008). IS differs from the intra-firm level of environmental initiatives in that it emphasises collaborations among firms rather than focusing on environmental options at the level of individual firms, treating firms as ‘nodal points within a networked ecosystem’ (Gibbs, 2008, p. 1140). This research chooses to focus on IS which is one form of inter-firm collaboration strategy under the broader theoretical framework of IE for SID.

Although there is no agreed definition on precisely what constitutes IS, a number of researchers have attempted to give a definition of IS, e.g. Chertow (2000) and Laybourn & Morrissey (2009), in order to build a theoretical framework for this discipline, and to ground practical work. Table 2.1 lists two definitions of IS for comparison.

Table 2.1 Definitions of IS

Definition	Source
Industrial symbiosis engages traditionally separate entities in a collective approach to competitive advantage involving physical exchange of materials, energy, water, and by-products.	(Chertow, 2000, p. 314)
Industrial symbiosis engages traditionally separate industries and other organisations in a network to foster innovative strategies for more sustainable resource use (including materials, energy, water, assets, expertise, logistics, etc.). Through the network, business opportunities are identified leading to mutually advantageous transactions for innovative sourcing of required inputs, and value-added destinations for non-product outputs. Organisations are also exposed to best practice and knowledge transfer, resulting in cultural and process changes.	(Laybourn & Morrissey, 2009, p. 2)

These two definitions treat IS as a type of movement generating innovations in traditional business environmental activities, and the core to the movement is inter-firm collaboration on environmental initiatives. According to Chertow (2000), the innovations are exchange of physical materials, such as by-products, water and energy. Laybourn and Morrissey's (2009) definition broadens the exchanged materials into both physical and virtual materials such as assets, expertise and logistics as a firm's resources cover employees' skills, organisational/social processes and physical and financial assets (Lombardi & Laybourn, 2012).

## 2.3 The practice of IS development

The transferred knowledge studied in this research is the UK National Industrial Symbiosis Programme (NISP)'s IS network facilitation approach, which has been widely cited as an ISD exemplar (see Mirata, 2004, 2007; Mirata & Pearce, 2006;

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Paquin & Howard-Grenville, 2009). This section describes ISD practices in the UK and China, and discusses the need to transfer the UK's practice to China.

### **2.3.1 NISP's IS network facilitation approach: a good practice or not?**

NISP is a not-for-profit organisation funded by the UK government to promote (waste) resource exchanges among different industries free of charge (Laybourn & Morrissey, 2009).

NISP's strategy to facilitate IS networks generally covers holding workshops (to disseminate IS thinking, promote networking and collect network members' data on excess or required waste resources), recording collected data into its database, conducting site visits to network members' companies to confirm more detailed information, sharing synergy opportunities, and reporting synergy achievements to their members and the government (Mirata & Pearce, 2006; Laybourn & Morrissey, 2009). Through NISP's role, increasingly new IS networks have been developed and existing IS networks have maintained. For example, the number of IS projects facilitated by NISP grew from 175 in 2005 to 307 in 2007 in the UK West Midlands region (Paquin & Howard-Grenville, 2009).

NISP therefore acts as an inter-firm network facilitator promoting network members to

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engage in IS activities. Through NISP's work, network members' expenses in seeking IS collaborators can be reduced. The UK's waste policy emphasising landfill diversion (e.g. Landfill tax and its escalator which provide economic pressure to businesses) can potentially drive the network members to take IS activities as one of their waste management options. Also, the funding body pushes the network facilitator to meet programme targets through monitoring the IS network's contribution<sup>3</sup> to landfill diversion, CO<sub>2</sub> reduction and other quantifiable indicators. However, whether the good practice which has emerged in the UK can fit the Chinese context is another matter. The following section focuses on summarising Chinese ISD status and analysing the potential for IS practice in China.

### **2.3.2 The Chinese ISD status: Is there potential for the facilitated IS network approach?**

China has become one of the world leaders in converting traditional industrial parks into eco-industrial parks (EIPs) with the aim of enhancing enterprise competitiveness while reducing resource consumption and mitigating environmental pollution (Fang, *et al.*, 2007; Shi *et al.*, 2010). The motives behind the movement are the pressures of resource depletion and environmental pollution that have come with rapid economic

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<sup>3</sup> The IS network's contribution is also mentioned as NISP outputs in the organisation's publications such as NISP (BCSD UK, 2004) and Laybourn & Morrissey (2009).

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development (Shi, 2007). The potential for Chinese EIP conversion is substantial as the quantity of industrial parks in China is large. According to (incomplete) statistical data from the Chinese Ministry of Land and Resources, there are 6866 industrial parks across the country, of which 113 were government-approved national, provincial, and municipal parks as they have reached the appropriate standards (Geng & Zhao, 2009).

Chinese EIP projects are classified into three categories:

- Sector-integrated EIPs: EIPs constituted by firms from different industries and built from existing industrial parks, such as economic development zones or hi-tech industrial development zones (SEPA, 2006a).
- Sector-specific EIPs: EIPs built from one or more business champions. Through the integration of material and energy flows, more firms from the same industries are built into IS networks (SEPA, 2006b).
- Recycling industry oriented EIPs: EIPs constituted mainly by waste reusing and recycling firms (SEPA, 2006c).

The Chinese EIP conversion approach has covered the following typical strategies:

- Recruiting green businesses (Yuan, *et al.*, 2004). For example, high energy-consuming businesses are not permitted to be recruited into Tianjin Economic-Technological Development Area (TEDA) (TEDA, 2006).
- Recruiting businesses that can utilise local businesses' by-products. For example, between 2000 and 2006, TEDA recruited an electronic waste recycler, waste battery recycler, a scrap recycler and re-producer (TEDA, 2006). Also, Wuxi New Zone, a national EIP led by the local government, was

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reported to have recruited a number of semi-conductor producers and waste management companies to recycle metals from waste metal cutting liquid generated by existing producers (Gao, 2010).

- Promoting intra-firm environmentally friendly activities through providing funding. For example, the Energy Saving, Emission Reduction and Environmental Protection Fund was established to encourage local businesses to engage in environmental activities in a number of EIPs, such as TEDA (Zhang, 2007), and Suzhou Hi-tech Park (DRB Suzhou Hi-tech, 2010).
- Capacity building. For example, in TEDA, the regional state-owned company invested in building a seawater desalination project, and a waste incineration centre (TEDA, 2006). Also, an eco-centre was established in TEDA by TEDA Administrative Commission in 2010 to promote the low carbon economy (ecoTEDA, 2012).

So, rather than sub-contracting any non-government organisations to facilitate IS exchanges, in China, local government authorities of some industrial areas have largely intervened for ISD through selective tenant recruitment and infrastructure development. These government authorities actually have played a role as IS network facilitators of the local industrial area, although their initiatives are described as “resource comprehensive re-utilisation” (RCR)<sup>4</sup> and “CE development”<sup>5</sup>. The strategy

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<sup>4</sup> With regard to the RCR concept, resource refers to mineral by-products, waste residues (water or gases), and various waste or outdated products. Comprehensive re-utilisation means recycling, regenerating and reusing activities (The former State Economic and Trade Commission, 1996).

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emphasises recruiting network members (e.g. green businesses, recyclers) but it has not intentionally facilitated network relations to promote by-product exchange. Thus, there is potential for introducing the NISP's IS network facilitation approach into these Chinese industrial areas as it seems that more could be achieved through disseminating IS thinking, promoting cross-industrial networking, and collecting data to identify synergy opportunities.

## **2.4. Summary**

The chapter has focused on exploring whether it is meaningful to transfer the UK's IS network facilitation approach to China.

NISP's IS network facilitation approach is characterised as networking promotion, data management, IS knowledge dissemination and synergy facilitation. The Chinese EIP conversion strategy which currently lacks network facilitation can learn from NISP's strategy. Therefore, it is meaningful to transfer the IS network facilitation approach to China and select the UK-China collaborative programme (see chapter I) as a case study for KT to facilitate IS.

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<sup>5</sup> The broader concept, CE development mainly refers to the promotion of resource conservation, cleaner production, RCR, and environmental protection industries (State Council, 2005).

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Before proceeding to empirical analysis however, KT theories are reviewed in chapter III to build the theoretical framework to guide this KT research.

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## **Chapter III. Knowledge management and knowledge transfer**

### **3.1 Introduction**

This research focuses on inter-organisational knowledge transfer (KT) between NISP headquarters and their collaborators in the UK and China for ISD (see chapter I). Literature relating to managing organisational knowledge for dissemination and conducting inter-organisational KT is therefore reviewed to establish theoretical guidance for data collection and analysis.

The topic of managing organisational knowledge for dissemination is part of the field of knowledge management (KM), which studies knowledge creation, codification and transfer (Awad & Ghaziri, 2004; Hislop, 2009; Huggins & Weir, 2012). In this chapter, theories on knowledge creation and codification are summarised together as they target knowledge development within the organisational boundary. Summarising these theories can assist the exploration of NISP's knowledge development mechanism and KT within NISP in this research.

KM in knowledge-intensive business services (KIBS) is the focus of this chapter, as NISP can be classified as that type of organisation. KIBS refers to a range of service companies, such as consulting and management services, which rely heavily on

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professional knowledge to supply intermediate products/services that are knowledge based (Miles, 2005). In contrast to other types of businesses, KIBS focus more on KM because their major business is to create, develop and apply technical knowledge to address specific problems of their clients (Muller & Doloreux, 2009). NISP's IS network facilitation approach is one type of knowledge-based resource efficiency solutions for industries (see section 2.4.1). Therefore, NISP possesses features of KIBS and it is necessary to draw upon the literature on KM in KIBS to study NISP's knowledge creation and codification process.

Although inter-organisational KT is a sub-branch of KM, theories on inter-organisational KT are reviewed separately as inter-organisational KT process is across an organisational boundary --- it cannot be discussed without considering a knowledge recipient's engagement with the transferred knowledge in KT process (Thompson, *et al.*, 2009; Chen & McQueen, 2010). Summarising the KT components and factors affecting an inter-organisational KT process can assist the exploration of the mechanism of KT between NISP headquarters and their collaborators.

This chapter begins with the clarification of the concepts and taxonomies of organisational knowledge (section 3.2). Next, theories on KM are summarised covering the process of knowledge creation and strategies to process organisational knowledge for dissemination --- codification and personalisation (section 3.3). Before discussing

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knowledge dissemination, foundation for KT, inter-organisational alliance, is summarised (section 3.4). Once a type of alliance is built, KT can be initiated and therefore, KT process covering knowledge dissemination processes in a knowledge provider's system and learning processes in a knowledge recipient's system is discussed (section 3.5). Then, determinants of KT processes are summarised (section 3.6). Finally, qualitative case study approaches for KT research are reviewed (section 3.7) with a summary of the whole chapter (section 3.8).

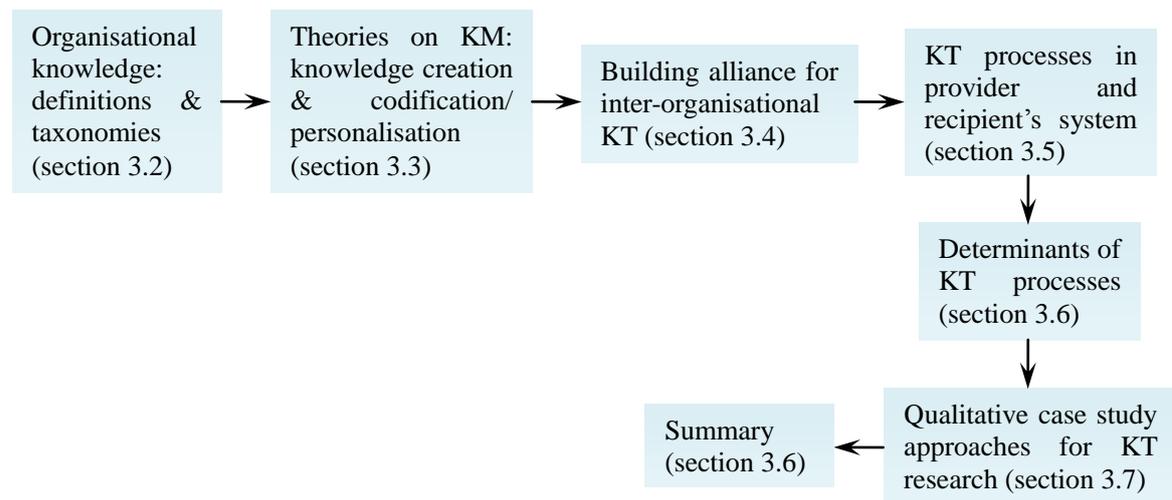


Figure 3.1 the structure of chapter 3

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## 3.2 Organisational knowledge: definitions and taxonomies

### 3.2.1 Understanding the concept of organisational knowledge

With the development of the knowledge economy<sup>6</sup>, firms have treated knowledge as a critical asset, which creates competitive advantage or makes themselves distinct in the process of carrying out their work (Abino *et al.*, 1999; Tsoukas & Vladimirou, 2001).

Definitions of knowledge given researchers vary, but all imply a causal relationship between knowledge and action. For example, Awad and Ghaziri (2004) define knowledge as ‘know-how’ or understanding achieved through experiences or study that enable(s) a person to perform a specialised task. Koskinen & Pihlanto (2008) describe knowledge as an organised structure of facts, relationships, experience, skills, and insights that produces a capacity for action. Thompson *et al.* (2009, p. 325) propose that knowledge is “situated, re-usable human awareness leading to effective action”.

The close relationship between knowledge and action distinguishes knowledge from information. Information is an aggregation of processed data that possesses meaning, whereas knowledge is actionable information that centres on a particular subject (Awad & Ghaziri, 2004). Thompson *et al.* (2009) argue that the key to knowledge is action ---

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<sup>6</sup> “Knowledge economy” refers to production and services based on knowledge-intensive activities that accelerate the economic and social development. The knowledge economy relies more on intellectual capacity rather than on physical inputs or natural resources (Powell & Snellman, 2004).

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knowledge produces effective action which leads to greater knowledge in a cyclical process. Therefore, from the perspective of an organisation, to ensure the continuity of knowledge generation, there is a need to maintain the KM environment and enhance its knowledge activities on a regular basis (Awad & Ghaziri, 2004).

Also, for an organisation, its knowledge is context-specific and is generated from people's practices and situated in a particular work environment (Hsiao *et al.*, 2006; Thompson *et al.*, 2009). The characteristic of knowledge implies the necessity to explore contextual factors affecting the creation and application of the knowledge in the studied organisation. Accordingly, in this research, policy contexts affecting the development and dissemination of NISP's IS network facilitation approach are presented in chapter 5.

### **3.2.2 Organisational knowledge taxonomies**

Contemporary study on organisational knowledge classifies organisational knowledge into two types from the perspective of visibility:

- *Tacit knowledge* refers to a type of 'know-how' that is based on the experience of individuals, embedded in personal beliefs, experiences and values that is non-verbal, intuitive and unarticulated (Yan & Luo, 2001; Cummings & Teng, 2003). One example of tacit knowledge --- when asked how and why things are done in certain way, some people responded "I'm not sure, it is just the way things are done around here", a type of making judgement/decisions without explicitly

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going through a range of rules (Inkpen & Pien, 2006).

- *Explicit knowledge* relates to ‘know-what’ that is transmittable in formal, systematic language and can be made explicit through facts and diagrams (Hong & Nguyen, 2009).

The relationship of tacit and explicit knowledge is viewed as two different types of knowledge, but which are mingled in the holder’s worldview (mind). Tacit and explicit knowledge are inseparable and coexist (Tsoukas & Vladimirou, 2001). Clark (2000) uses the term ‘explicit knowledge’ to linguistically symbolise their inseparability. Also, as mentioned by Mooradian (2005), for any explicit knowledge, there is some extent of tacit knowledge, and explicit knowledge is an extension of tacit knowledge to a new level. The fundamental assumption on the inseparability of the tacit and explicit form is that all knowledge or knowing is personal and it is embedded in, and inseparable from practice (Donald, 2009). Therefore, organisational knowledge that is situated in work practices can be embodied by persons who conduct these practices.

Another way to classify organisational knowledge is from the perspective of knowledge function:

- *Technical knowledge*, relating to staff’s task-oriented skills and functional expertise with respect to the acquisition and implementation of new practices, such as latest production techniques or foreign technology at the frontline operations (Hong & Nguyen, 2009). According to Blackler (1995), one way refresh of the organisational technical knowledge is to introduce and apply new concepts and

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innovative production technologies;

- *Strategic knowledge*, referring to senior managers' mindsets on the criteria of success and strategies to manage the implementation of projects to achieve that success (Koskinen & Pihlanto, 2008; Hong & Nguyen, 2009).

According to Martin and Salomon (2003b), quantifiable technical knowledge and related standardised procedures are codified knowledge and could be easily understood. Strategic knowledge is believed to be more tacit, and is socially embedded in interpersonal relationships and networks, and cannot easily be gained by a newcomer or transferred between personnel (Salk & Simonin, 2003). However, it seems that strategic knowledge can be more easily transferred among experienced managers than transferred from experience managers to other types of personnel.

Inspired by the knowledge classification methods, this research explores the components of NISP's knowledge and groups them from the perspectives of visibility and function. This work can potentially assist the understanding of NISP's IS network facilitation model.

### **3.3 KM in KIBS organisations**

KM refers to the process of capturing and utilising a firm's collective expertise anywhere in the business covering explicit knowledge stored in documents and

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databases, and tacit knowledge in people's minds (Awad & Ghaziri, 2004). The objectives of organisational KM are to achieve specific outcomes such as shared understanding, improved performance, competitive advantage, or higher levels of innovation from a profit-seeking perspective (Awad & Ghaziri, 2004; Koskinen & Pihlanto, 2008). A type of organisation particularly focusing on KM is KIBS as knowledge is at the heart of the professional services they offer (Miles, 2005; Donald, 2009; Huggins and Weir, 2012). KM processes in KIBS generally cover knowledge creation, codification or personalisation and knowledge dissemination (Awad & Ghaziri, 2004; Miles, 2005; Hislop, 2009).

### **3.3.1 Knowledge creation**

Organisational knowledge creation process is connected with innovation in which organisation creates and defines problems and then actively develop new knowledge to resolve them (Nonaka, 1994). The ongoing creation and development of knowledge is a key feature of knowledge staffs' work in KIBS (Donald, 2009). KIBS staff seek to solve complex problems through the development of creative and innovative solutions which requires the application of existing bodies of knowledge and the creation of new knowledge (Morris, 2001).

Regarding the knowledge creation process, scholars have stressed the importance of

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communication. Sveiby (1997) argues that knowledge is supposed to emerge within a certain context through social interaction. Nonaka and Takeuchi (1995) propose a socialisation, externalisation, combination & internalisation (SECI) model to explain knowledge creation processes. The SECI model stressing initiatives of processing tacit and explicit knowledge is a well-accepted framework for describing knowledge creation processes (Lopez-Nicolas & Soto-Acosta, 2010; Esterhuizen, *et al.*, 2012). During these processes, a range of information and communication technologies (ICTs) can either assist and accelerate knowledge creation (Vaccaro, *et al.*, 2008; Felzensztein, *et al.*, 2010; Lopez-Nicolas & Soto-Acosta, 2010). The following parts summarise the mechanism of SECI model.

***Socialisation*** is a process of creating tacit knowledge through sharing *tacit* knowledge among individuals (Nonaka & Takeuchi, 1995). For example, in KIBS such as design and communication services, new tacit knowledge (e.g. ideas on how to re-fresh a client's corporate identity) can be created based on designers' tacit and personal knowledge, face-to-face communication and their observation of clients' business behaviours (Bettioli, *et al.*, 2012). The knowledge creation process therefore adopts a socialisation strategy. Besides face-to-face communication, Avram (2006) argues that a socialisation process would be facilitated by ICTs with social software development. The widespread diffusion of new ICTs such as email, Skype and Facebook has largely overcome geographical distance (Felzensztein, *et al.*, 2010). A number of researchers

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stress that the socialisation process can be only acquired through shared experience and working together rather than through ICTs support as tacit knowledge is difficult to formalise and often time- and space-specific (Flanagin, 2002; Nonaka & Toyama, 2003; Esterhuizen, *et al.*, 2012). Lopez-Nicolas and Soto-Acosta's (2010) survey of more than 200 Spanish SMEs finds no influence of ICTs on companies' socialisation process. The authors propose that current technologies may not be frequently used even though they can assist communication, and a promising avenue for socialisation is likely to be face-to-face interaction with the combination of new ICTs.

**Externalisation** is a process of articulating *tacit* knowledge into *explicit* concepts (Nonaka & Takeuchi, 1995). Examples of externalisation cover using metaphors, analogies and models to clarify ideas, writing manuals for inexperienced colleagues, and presenting principles values and history of a firm in text documents (Vaccaro, *et al.*, 2008; Mart ín-de-Castro, *et al.*, 2008). Externalisation can be supported by group meetings (Nonaka & Toyama, 2003; Lindblom & Tikkanen, 2010). Through dialogue facilitated by community-based electronic discussion or chat groups among dispersed members, mental models and skills are identified, analysed and converted into common terms and concepts (Chou & He, 2004; Lindblom & Tikkanen, 2010). Then, Microsoft Word can contribute to the concepts codification process (Vaccaro, *et al.*, 2008).

**Combination** is a process of re-arranging, categorising, re-classifying, and synthesising

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*explicit* knowledge to form more systematic sets (Nonaka & Takeuchi, 1995). For instance, integrating existing information extracted from databases to create new knowledge is a combination process (Chou, *et al.*, 2005). Compared to traditional working tools such as paper-based documents, ICTs have dramatically improved the combination process (Vaccaro, *et al.*, 2008). Specifically, ICTs (e.g. internet) allow acquiring and triangulating useful knowledge from a wider number of sources, assist selecting and easily recombining important parts of documents previously acquired, and support posting the new documents in electronic database for further use (Vaccaro, *et al.*, 2008). Also, as argued by a number of authors, the combination of explicit knowledge is most efficiently supported in collaborative environments using ICT oriented to communication and workflow<sup>7</sup> (Nonaka & Konno, 1998; Fischer, 2004; Lopez-Nicolas & Soto-Acosta, 2010).

***Internalisation*** is a process of converting created *explicit* knowledge into *tacit* knowledge (Nonaka & Takeuchi, 1995). It has been described as a process of applying explicit knowledge through a series of iterations in which concepts become concrete and are ultimately absorbed as an individually held tacit knowledge (Lopez-Nicolas & Soto-Acosta, 2010; Esterhuizen, *et al.*, 2012). For example, shaping perceptions from available data and information is a case of internalisation (Martín-de-Castro, *et al.*,

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<sup>7</sup> ICT workflow orientation includes the establishment of predefined electronic processes through corporate technologies (Lopez-Nicolas & Soto-Acosta, 2010).

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2008). The internalisation of knowledge by organisations can be in the form of embedding that new knowledge inside technologies for routines and processes, giving birth to ICT oriented automated processes (Lopez-Nicolas & Soto-Acosta, 2010).

Through the conversion process expressed by the SECI model, tacit and explicit knowledge expand in both quality and quantity (Nonaka & Toyama, 2003). Personal know-how is then amplified to knowledge belongs to a group of people at an organisational level through communications (Hislop, 2009). Also, various ICTs have been widely utilised to assist knowledge creation processes. The mechanism of SECI model and the utilisation of ICTs in knowledge creation process can potentially assist the analysis of how the knowledge provider's organisational knowledge was created in this research.

### **3.3.2 Strategies to process organisational knowledge for dissemination**

For KIBS, processing knowledge for dissemination is a means to make profit from their knowledge-based service products (Miles, 2005; Donald, 2009; Huggins and Weir, 2012). So, different from disseminating knowledge during collaboration, KIBS could transfer knowledge for sale. Generally, in KIBS, knowledge can be processed through two strategies: codification and personalisation.

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### 3.3.2.1 Codification strategy

A number of KM researchers have focused on identifying which types of KIBS prefer to use codification strategy to increase their efficiency in KM and KT. Hansen *et al.* (1999) describe them as operations consulting firms that target replicating their knowledge assets to create value. Bettiol *et al.* (2012) refer them to standardised services firms working on offering standard products to a mass of consumers. So, KIBS with competitive edge from the reuse of codified knowledge are suitable to adopt a knowledge codification strategy. In those KIBS, information technology is heavily invested in to facilitate the codification process (Xu, *et al.*, 2011) and to connect people with reusable codified knowledge (Zack, 1999; Andreeva & Kianto, 2012).

Awad & Ghaziri (2004) define knowledge codification as making business-specific tacit or explicit knowledge visible, accessible and usable for value-added decision making processes. So, a codification process covers externalisation (*tacit to codified knowledge*), combination (*codified to codified*) which are part of a knowledge creation process. Also, to ensure the visibility and accessibility, a key task of codification is to store the processed knowledge object in a centralised organisational knowledge base<sup>8</sup> for later use (Shankar & Gupta, 2005; Chai & Nebus, 2012).

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<sup>8</sup> Knowledge base refer to IT support for retrieval and search of knowledge by users (e.g. staff or clients) (Chai & Nebus, 2012).

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Activities of knowledge codification cover creating categories or labels to differentiate and simplify the relevant phenomena and objects (Thompson, *et al.*, 2009). The knowledge codification process can be largely enhanced by ICTs such as database warehousing (Awad & Ghaziri, 2004; Xu, *et al.*, 2011). Explicit organisational knowledge can be easily codified with the assistance of documents and computers, but much of organisational knowledge is highly tacit and difficult to be codified (Donald, 2009). Awad and Ghaziri (2004) mention that codifying tacit knowledge relies heavily on a willing expert with the knowledge and a knowledge developer to capture such knowledge. After codification, customer or project sensitive information of a knowledge object is removed for repeat utilisation in future (Shankar & Gupta, 2005).

To ensure the accessibility of the reusable codified knowledge, centralised knowledge base can be developed to store the knowledge object and serve many users (Chai & Nebus, 2012). Also, given the volume of knowledge and the possibility of a large geographical dispersion across departments and branches of KIBS, knowledge base need to be well structured (Esterhuizen, *et al.*, 2012).

It is often assumed that people turn to their organisational knowledge base to obtain data. However, in practice, people often rely upon a network of relationships (e.g. trusted and capable colleagues) for knowledge and advice (Koskinen & Pihlanto, 2008). For example, Donald (2009) argue that the networks of inter-personal relationships

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refer to social capital<sup>9</sup> which can be used for staff to access various types of knowledge that help to do work efficiently.

Besides the habit of seeking knowledge from social capital, the lack of guidance, motivation or a friendly ICT interface can also affect the use of an organisational knowledge base. For example, the lack of knowledge maps<sup>10</sup> may inhibit people identifying relevant knowledge that can be used (Shankar & Gupta, 2005). In addition, Andreeva & Kianto (2012) argue that implementing ICT systems to construct a knowledge base does not yet mean people will use it; there should be motivational push from human resource management system to get people to really use it for knowledge sharing and creation purposes. Meanwhile, Jasimuddi *et al.*'s (2012) studied KT processes in a UK high technology computer related company. They argue that there is a need for a KM team to ensure the relevancy, currency and location of stored knowledge in the developed knowledge base to guide others to find the stored knowledge efficiently.

Therefore, KIBS adopting a codification strategy for KT should develop organisational knowledge base as well as promote its application to maximise the benefits of the

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<sup>9</sup> Social capital refers to the networks of personal relationships that people possess, and the resources people can learn and apply through accessing to the networks (Donald, 2009).

<sup>10</sup> Knowledge maps software is used to visually represent an overview, detailed information and possible interrelations (Samoilenko & Nahar, 2012).

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developed knowledge base.

### **3.3.2.2 Personalisation strategy**

Rather than just adopting a codification (“*people*” to “*document*”) strategy, another group of KIBS tend to adopt a “*people*” to “*people*” strategy (Hansen, *et al.*, 1999).

The strategy is named as personalisation which refers to process and disseminate knowledge that is closely tied to people who created it through people-to-people knowledge sharing networks (Hansen, *et al.*, 1999; Shankar & Gupta, 2005).

Personalisation emphasises transferring tacit knowledge between individuals in a synchronised way (Jasimuddin, *et al.*, 2012). The strategy therefore saves the procedure of codification and storage. Service products, a mixture of explicit and tacit knowledge, therefore, can be transferred to clients (knowledge recipients) directly. KIBS adopting a knowledge personalisation strategy tend to be strategy consulting firms whose competitive advantage are from providing customised services (Hansen, *et al.*, 1999; Hislop, 2009; Bettiol, *et al.*, 2012). In this group of KIBS, the goal of investing ICTs is to facilitate conversations and to speed up exchanging tacit knowledge, even if it incurs potentially higher costs (Andreeva & Kianto, 2012). Additionally, the development of technological solutions such as multimedia tools or videoconferencing can reinforce face-to-face interaction even at long-distances (Bettiol, *et al.*, 2012).

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Instead of relying on only one type of strategies, KIBS can actually deploy a combination of the codification and personalisation strategies with predominantly pursuing one and using the other as a support function (Hansen, *et al.*, 1999; Shankar & Gupta, 2005; Bettiol, *et al.*, 2012).

Overall, KM theoretical perspectives reviewed in section 3.3 can potentially guide the exploration of how NISP's IS network facilitation knowledge has been created and prepared (codified or personalised) for replication. Another key task in this research is drawing upon theories to facilitate the study of KT between NISP's headquarter office and its national or international collaborators. Although transferring prepared knowledge to clients is part of a knowledge provider's KM activities, outcomes of KT are affected by factors (e.g. knowledge recipient's efforts to absorb the knowledge) controlled beyond the provider's boundary. This is due to KT covers both transmission and absorption (Awad & Ghaziri, 2004). Therefore, theories on KT are reviewed separately. Before summarising KT theories, the pre-condition established for KT is discussed in the following section.

### **3.4 Constructing alliances: foundation for KT**

With the awareness of the importance of knowledge in enhancing organisations' innovation and competitive advantage, acquisition of new organisational knowledge

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(e.g. other's technology, operating methods or home markets) can be a top managerial priority (Nonaka, 1994; Inkpen, 1998; Daniels, *et al.*, 2011). There is broad consensus among scholars that alliances can serve as a platform for inter-organisational knowledge creation, transfer and application (Inkpen & Pien, 2006; Ding *et al.*, 2009a).

Inter-organisational alliances cover a spectrum of equity-based and contract-based strategy among organisations such as R&D coalitions, franchising, licensing, supply-chain partnerships and joint ventures (Inkpen & Tsang, 2007; Easterby-Smith, *et al.*, 2008; He, *et al.*, 2011). Mowery *et al.* (1996), Chen (2004) and Jiang and Li (2009) conducted surveys of the impact of alliance structure on KT in the US, Taiwan and German contexts respectively. These researchers all found that equity-based alliances (e.g. joint ventures) appear to be more effective for transferring complex knowledge than the contract-based alliances (e.g. franchising). However, empirical evidence for the relationship between each distinct type of alliance and the outcome of inter-organisational KT is largely missing (He, *et al.*, 2011). Conducting case studies on KT within certain types of alliances can potentially fill the gap in alliance learning literature.

The alliance focused on in this research is franchising, a contract-based system of business organisations, in which a central firm (franchisor) grants territorial rights to local owners (franchisees) to use a business model devised by the central firm

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(Minguela-Rata, 2010). The franchisees in the system are obligated to comply with quality standards and report relevant data to the franchisor and the delivered products or service with a recognisable brand name or logo (Gorovaia & Windsperger, 2010). According to Tracey and Jarvis (2007), compared to other types of alliance, franchising differs in the following perspectives:

- It is normally confined to products or services requiring proximity to clients and thereby, it involves a chain of geographically dispersed organisations;
- Franchising offered a quicker and more cost-effective mode of expansion than the establishment of wholly owned subsidiaries;
- There tends to be a rigid and clearly defined division of tasks conducted by a franchisor and its franchisees. Also, as mentioned by Hoy (2008), a franchisor takes the responsibility to manage outlets to ensure its developed business model is executed by all franchisees. The process therefore requires KT from the franchisor to franchisees (Gorovaia & Windsperger, 2010; Minguela-Rata, 2010).

It is necessary to distinguish franchising and a similar concept: licensing. The relationship between a licensee and its licensor is not as tight-knit as a franchisees-franchisor relationship as a licensee does not hold the rights to the trademark and logo of the parent company's brand. Instead, the licensee is expected to create its own niche and identity in the market (Brouthers & McNicol, 2009).

In franchising KT literature, researchers have focused on the study of business based

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franchising and little is known about KT in the *non-profit franchising*<sup>11</sup> system (Tracey & Jarvis, 2007). Non-profit franchising refers to a contract-based alliance system usually run by a non-government organisation, but occasionally a governmental body or private company (franchisor) who adopts the structure of a business-based franchising to achieve more than economic goals (Montagu, 2002; Bishai & Shah, 2008; Koehlmoos, *et al.*, 2009). As with business based franchising, accessing to capital (e.g. from government funding) and knowledge resources is the key driver for forming non-profit franchising (Tracey & Jarvis, 2007). However, costs of selecting franchisees are higher in non-profit franchising due to franchisees can only be organisations rather than persons. Also, non-profit franchisees need to meet social objectives as well as commercial ones (Tracey & Jarvis, 2007).

Non-profit franchising is a common model seen in the UK to promote sustainable development in industries. According to Matt *et al.* (2011), in the market-failure approach (e.g. a lack of privately funded collaborations), public programmes are generally considered a solution. A range of public programmes, such as Waste Resource Action Programme (WRAP), have been funded by the UK government to

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<sup>11</sup> Non-profit franchising is called social franchising by a number of researchers. However, social franchising is supposed to achieve social goals, e.g. health care and poverty alleviation (Montagu, 2002; Bishai & Shah, 2008; Koehlmoos, *et al.*, 2009). Given NISP's objective to cover environmental and resource efficiency goals, the term of non-profit franchising is used in this research.

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facilitate business resource efficiency (DEFRA, 2009). A number of these programmes are delivered nationally with a typical franchising model - a central firm is commissioned to command a facilitation programme and a number of firms are sub-contracted by the central firm to deliver programme branches at regional areas (DEFRA, 2009). However, there is a lack of exploration of KT within the type of franchising model in the UK.

Internationally, there are also various programmes funded by the EC for example to support transnational franchises (e.g. alliance between NISP and its Chinese collaborators) with the objective to promote sustainable development in the developing/under-developed world (EC, 2012). As mentioned in the United Nations Framework Convention on Climate Change, developed countries shall transfer knowledge (e.g. environmentally sound technologies and expertise) to the other world for common development (UN, 1992). Between 2002 and 2006, a range of EU-China collaborative projects were funded by the Asia Pro Eco Programme (APEP) in the field of democracy and human rights, non-state actors in development, migration and asylum, investing in people, and environment and sustainable management of natural resources including energy, with a total budget of 34.5 million EUR. Table 3.1 presents a number of EU-China collaborative projects funded by the APEP:

Table 3.1 Representative Funded Collaborative Projects on Environmental Sustainability in China

Programme Objectives	Representative Projects in China	Project Location	Project Partners
-To strengthen the environmental dialogue between Europe and Asia;	Policy Reinforcement for Environmentally Sound and Socially Responsible Development in China	Guiyang city, China	A German academic institute & Guiyang municipal government
-To improve environmental performance in Asian economic sectors via exchanging environmental policies/technologies/practices;	Toward a Better Environment: Implementation of Energy-saving Buildings in China	China	Two Chinese universities & one Italian university
-To promote sustainable investment/trade between EU members and a number of Asian countries	Developing Policy Formulation and Implementation Tools for Providing Support for Ecological Forest Management in China's Urban and Peri-Urban Areas	Xi'an city, China	A British university, A Chinese university, Xi'an Rural Construction Committee, WWF UK
	Capacity Building and Policy Reinforcement in China in the Field of Water Resource Management	Shandong Province, China	German Foundation for Economic Development and Vocational Training, Four Chinese municipal EPBs, A Poland Water Foundation, etc.
	Ecological Use of Pig Waste in Peri-urban Towns	China	A Danish municipality, two Danish universities, a Belgium university, a Chinese municipality and the Animal Husbandry Office of Agricultural Commission of Shanghai (China)

Notes: Details on each project profile can be found from the EC official website (EC, 2012)

Regarding the APEP funded projects between EU countries and China, the programme review confirms that the funded collaborative projects were relevant to the Chinese policy context and needs and were consistent with long-term EU policy goals (EC, 2006b). However, barriers to these transnational projects are significant: for example, although governmental level dialogues were smooth, at the level of project implementation level, language skills, technical assistance and expertise were insufficient to complete projects on time and budget; also, pilot project follow-up was weak and was difficult to be replicated elsewhere in China or at the national level (EC,

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2006b).

From the perspective of KT, the APEP funded projects have provided a platform for transnational KT among those participants that were in alliances. Problems of the transnational projects may indicate the frustration of the KT processes as successful KT exercises are viewed as those producing a satisfied recipient on time/budget (Szulanski, 1996), or the recipients' ability to re-create and utilise the knowledge (Cummings & Teng, 2003; Abou-Zeid, 2005). Based on the APEP, more new programmes have been initiated by EC, such as the Switch-Asia Programme<sup>12</sup> which the funding mechanism for NISP and its Chinese collaborators studied in this research.

Therefore, exploring the KT process in these transnational programmes through case studies can understand how contextual factors affecting the effectiveness of the programmes implemented by the funded transnational alliances. Research finding can potential promote communications between the developed and the developing world for sustainable development. To fill the gap of lacking the understanding of KT in non-profit franchising, two comparable case studies are conducted in this research:

- KT in the EC funded programme between NISP and its Chinese collaborators;

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<sup>12</sup> Switch-Asia Programme is funded by the EC, aiming to promote sustainable growth and contribute to economic prosperity and poverty reduction in Asia. Meanwhile, it is fostering a green economy and mitigating climate change in targeted countries. A €152 million budget is earmarked for the programme under the Regional Strategy for Asia covering the period 2007-2013 (EC, 2012).

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- KT in the UK government funded programme that delivered with franchising approach.

### **3.5 Initiation of KT processes**

KT can be initiated once the inter-organisational alliances are formed. It should mention here that the type of KT reviewed primarily is structured KT which is a formal and planned process in alliance collaborations (see Chen, *et al.*, 2010; Chen & McQueen, 2010).

#### **3.5.1 Knowledge dissemination processes in a knowledge provider's system**

From the perspective of KT, intra-organisational KM activities (knowledge creation and codification or personalisation) mentioned in section 3.3 can be viewed as the knowledge provider's initiatives to prepare knowledge for dissemination. Besides the KM activities conducted within the knowledge provider's boundary, it is the provider's liability to embed the prepared knowledge into the recipient's system (Albino *et al.*, 1999; Thompson *et al.*, 2009).

With respect to KT adopting a personalisation strategy, the process transfers knowledge (a mixture of tacit and explicit form of knowledge) to recipients directly through intensive communications (see section 3.3.2.2). For example, Bettiol *et al.* (2012)

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studied the KT process of two KIBS (design and communication firms) that adopt a personalisation strategy to transfer their knowledge (e.g. solutions to refresh a brand) to clients. The researchers observed that the KT processes from the designers to clients covered listening customers' requirement, providing solutions based on experts' personal and tacit knowledge, getting feedback and revising the provided solutions until clients were satisfied.

Regarding knowledge processed with a codification strategy, besides sharing the information it is necessary for the involved provider to assist recipients to apply the decontextualised knowledge (Apostolou, 2007; Thompson, *et al.*, 2009). Minguela-Rata (2010) argues that the more services provided by franchisers, the easier it is for franchisees to apply the transmitted knowledge and obtain positive results. Knowledge provider's efforts on facilitating recipients' learning processes having been observed in a number of alliance learning case studies (see Inkpen & Pien, 2006; Ding, 2011). According to Gorovaia and Windsperger (2010) and Minguela-Rata (2010), in franchising collaboration, knowledge providers are supposed to offer training (e.g. periodical training to master the transferred business model) and support services (e.g. IT and personnel support) through conference, meetings, visits, telephone, fax and internet.

Based on the above analysis, knowledge dissemination processes in a knowledge

provider's system can be summarised (see figure 3.2).

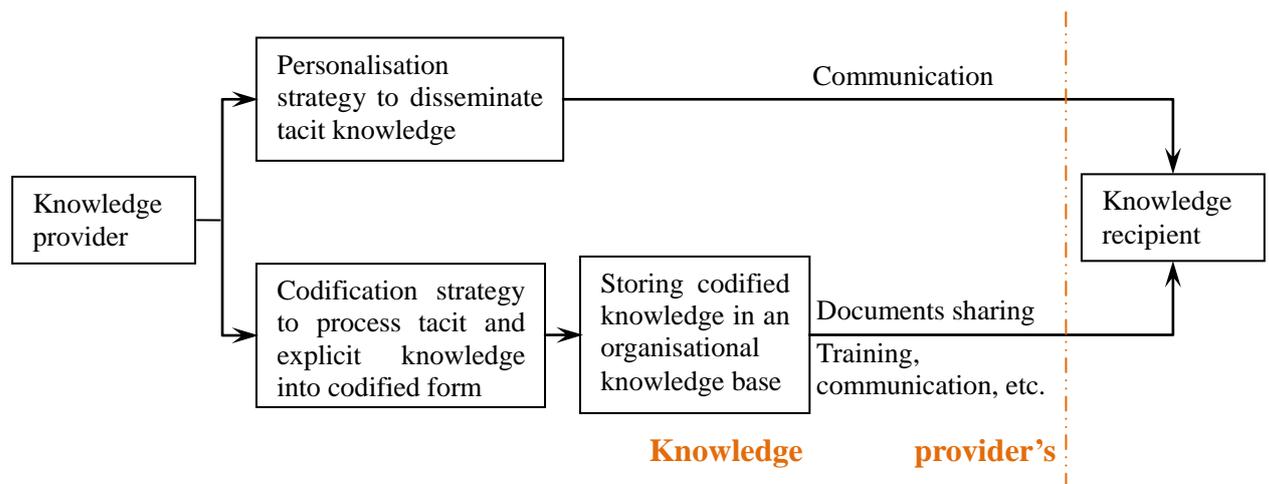


Figure 3.2 Knowledge dissemination process in a knowledge provider's system  
 Compiled from Awad & Ghaziri (2004); Shankar & Gupta (2005); Chai & Nebus  
 (2012)

Figure 3.2 presents knowledge dissemination process primarily in a knowledge provider's system. The provider can choose codification and/or personalisation strategy to disseminate its tacit and codified knowledge. Communication is core in both of knowledge dissemination strategies. Through conducting an in-depth case study of NISP headquarters' KM and KT initiatives, key issues in the knowledge dissemination processes can be explored.

A number of researchers studying KT within a franchising system only considers franchisors' role in disseminating information and training franchisees to ensure the former's business models can be implemented by the latter (see Minguela-Rata, 2010; Gorovaia and Windsperger, 2010). However, it needs to be aware of that one key factor

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determining the outcome KT is from knowledge recipients' side. For example, some researchers highlight the importance of recipients' engagement with the transferred information as no matter how rich the embedded information surrounding them, without engagement, it will remain inert (see Davy, 2006; Thompson *et al.*, 2009). The following section summarises knowledge learning initiatives that are supposed to be conducted in a recipient that is in a structured KT collaboration.

### **3.5.2 Knowledge learning processes in a knowledge recipient's system**

A knowledge recipient's KT initiatives actually occur before the provider begins to disseminate knowledge. This early stage is described as KT initialisation, a period when the recipient is aware of the knowledge gap and the interested knowledge, covering what the organisation *must* know *vs* what the organisation *actually* knows, as well as the strategic gap, including what the organisation *must* do *vs* what the organisation *can* do (Szulanski, 1996; Abzou-Zeid, 2005; Chen and McQueen, 2010). According to Inkpen and Pien (2006), it is important that these gaps should fit each other in a way that promotes the alliance to gain its collaborative objectives, identify types of knowledge to be transferred, and explore the outcome of KT.

After the initiation of KT, with flows of information being transferred to the recipient, an learning process occurs and can be generally divided into three stages –

implementation, ramp-up (practice) and integration (grasp) (Szulanski, 1996). Albino *et al.* (1999) argue the need of knowledge acquisition and intra-organisational communication before the procedure knowledge application. Then, through ‘learning by doing’, individual acceptance of the applied information, and finally the information can be assimilated to create changes in staff’s ability and an organisation’s routines (Albino *et al.*, 1999) (see figure 3.3).

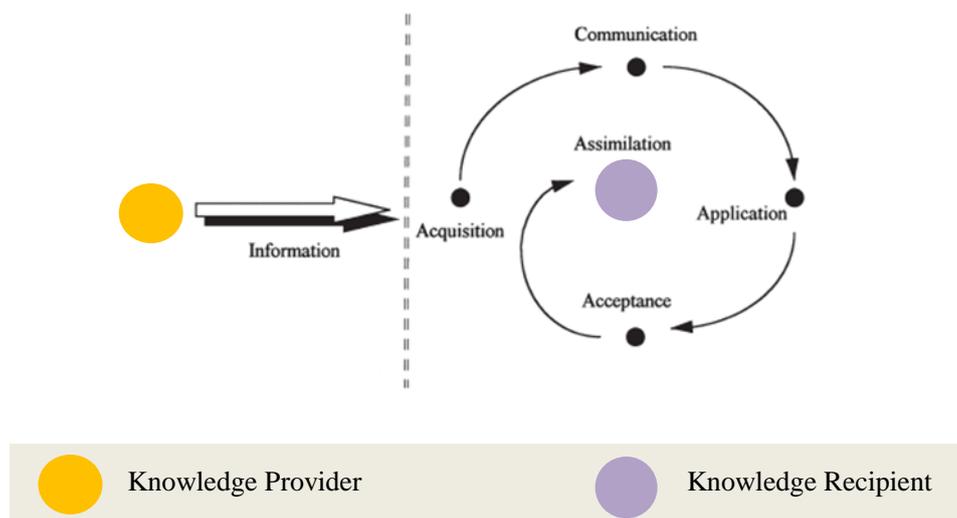


Figure 3.3 Knowledge learning process in a recipient’s system

Compiled from Albino *et al.* (1999)

The proposed knowledge learning stages have been used to empirically examine how factors affect each KT stage (Chen, *et al.*, 2010). However, few researchers explored the mechanism of a knowledge learning process through in-depth case studies.

Although the above two sections review a KT process in a knowledge provider’s and a

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recipient's system separately, it should mention that both participants' KT processes are intertwined. As mentioned by Thompson *et al.* (2009), there is not a split between the information dissemination system and the learning system and the tensions between the two system produce the effects the participants seek.

Also, it should be noted that KT processes are not single-loop. For western multinationals, during the process of transferring skills and techniques to branches in developing countries, such as China, there should be something to learn in return. For example, Lee (1999) suggests the way that foreign parent companies (knowledge providers) could learn local knowledge and experience from their Chinese branches (knowledge recipients), such as through local trading and corporation policies, as well as incorporating aspects of Chinese culture that would facilitate information sharing. In addition, Miesing *et al.* (2007) argue that China is an good laboratory for learning global knowledge and best practices as there has been a tremendous economic transition in China since the late 1970s and vast business opportunities have been created through foreign investment. Besides learning contextual factors of knowledge recipients (e.g. franchisees), there are also purposeful initiatives to capture knowledge from recipients led by a provider (e.g. franchisor) especially in a franchising system to ensure the discovery and dissemination of good practices within the alliance (Lindblom & Tikkanen, 2010).

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Overall, reviewing literature on KT processes in collaborators' systems guides the exploration of KT processes studied in this research. However, KT initiatives are not the only factor affecting a KT outcome. It is necessary to draw upon literature discussing other influential factors.

### **3.6 Determinants of KT processes**

Many researchers have conducted either qualitative case studies or quantitative empirical research to explore which factors affecting a KT process in various types of alliance. Generally, a KT model is viewed as covering actors, context, the nature of transferred knowledge and media adopted for KT. In each component, various KT determinants (absorptive capacity, learning intent, top managerial support, etc.) are proposed and discussed by a number of KT researchers. As these determinants are inter-related, instead of analysing them one by one, this research categorises them three groups: a knowledge provider's (or recipient's) internal factors affecting its knowledge dissemination (or learning) process and contextual factors affecting a KT process.

#### **3.6.1 Provider's internal factors affecting its knowledge dissemination process**

A core internal factor affecting a provider's knowledge dissemination process but having received limited attention in KT literature is the organisation's knowledge

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**disseminative capacity** (which is also called as **KT capacity** or **source transfer capacity**) (Martin & Salomon, 2003a; Tang, *et al.*, 2010<sup>13</sup>; Park, 2011). Disseminative capacity is defined as an organisation's ability to articulate its knowledge in a way that potential recipients can understand the disseminated information and put it to use in another location (Martin & Salomon, 2003a). Disseminative capacity has been argued to be core to a KT process as a knowledge recipient can hardly learn any explicit knowledge if the knowledge provider does not have sufficient disseminative capacity (Tang, *et al.*, 2010; Park, 2011). In addition, Park (2011) argues that two elements significantly influence an organisation's knowledge disseminative capacity can be its existing internal capacity and teaching intent.

- *Existing internal capacity* can be shown from the **possession of relevant knowledge** and **prior collaborative experience**.

Possession of sufficient relevant knowledge is the premise for KT. From the perspective of a knowledge provider, storing professional knowledge of certain field in its organisational knowledge base predetermines its ability to transfer sophisticated technological capacities (Park, 2011). In addition, prior experience with successive projects may improve an organisation's ability to transfer knowledge (Martin & Salomon, 2003a). Rich collaborative experience can result in a knowledge provider's awareness of the importance of cultural differences in cross-national KT collaborations. Meanwhile, **cultural awareness** can help to

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<sup>13</sup> Tang *et al.*'s (2010) research studies the effect of personal disseminative capacity on intra-organisational KT.

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build personal **trust** with local collaborators and therefore eliminate unnecessary safeguard and enhance KT processes (Buckley, *et al.*, 2006; Liu, 2012).

- **Teaching intent** can be reflected by **active managerial support, transfer of expatriate experts** and **intensive communication** with recipients.

Transfer of expatriate experts (top managers and technicians) can play a key role in injecting tacit knowledge into overseas' collaborators (Awad & Ghaziri, 2004; Inkpen & Pien, 2006; Park, 2011). Expatriate experts can assist to assess skills and capabilities of the local employees and then introduce new values and practices which are not available in the knowledge recipient (Park, 2011). Also, through working side-by-side, expatriate experts' working methods can be learned by a knowledge recipient but there should be developed process to ensure that the tacit is to be transferred (Inkpen & Pien, 2006). When working with expatriate experts in transnational projects, **qualified language expertise** who can choose precise phrases and tangible ways to translate or interpret information is core to ensure the communication of KT actors (Duan, *et al.*, 2010).

Intensive communication in terms of face-to-face interactions between KT participants can form a prerequisite for the exchange and creation of technological knowledge (Matt, *et al.*, 2011). Further, communication strategy can be represented by indicators such as **media capacity**<sup>14</sup> and **media richness**<sup>15</sup> (Albino, *et al.*,

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<sup>14</sup> **Media capacity** refers to the ability of the media to process information without losing/misinterpreting information, and it therefore affects the integration and quality of information gained by knowledge recipients (Albino, *et al.*, 1999).

1999). A high level of media richness occurs in intensive face-to-face communications and interactions between the actors (Albino, *et al.*, 1999; Vickery and Droge, 2004). Table 3.2 adapting work by Vickery and Droge (2004) can potentially provide guidelines for knowledge providers to select appropriate media to achieve effective information diffusion.

Table 3.2 Media characteristics that determine richness of information

Medium	Feedback	Channel	Source	Language	Media Richness
Face-to-face	Immediate	Visual, Audio	Personal	Body, Natural	Highest
Telephone	Fast	Audio	Personal	Natural	High
Electronic (email)	Fast	Limited visual	Personal	Natural/Numeric	High/Moderate
Written, Personal (Letters, memos)	Slow	Limited visual	Personal	Natural	Moderate
Written, Formal (bulletins, documents)	Very Slow	Limited visual	Impersonal	Natural	Low
Numeric, Formal (computer output)	Very Slow	Limited visual	Impersonal	Numeric	Lowest

Note. Adapted from Vickery and Droge (2004, p. 1108)

So, as mentioned in section 3.3.1, face-to-face communication is the fundamental means for socialisation (as well as for KT), the development of ICTs such as social software can facilitate interactions between KT actors located in far distance.

After proposing the relationship between the above two elements (existing internal capacity and teaching intent) and a provider's knowledge disseminative capacity, and Park (2011) conducted questionnaire survey to quantify key factors affecting

<sup>15</sup> **Media richness** refers to the ability to make the inter-organisational communications easy within a specific time interval (Albino, *et al.*, 1999).

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technology acquisition in a number of manufacturing alliances. His finding shows that the two elements are positive associated with technology acquisition in alliance and therefore he argues that KT can be affected by a provider's disseminative capacity. However, Park's (2011) research does not give the definition of disseminative capacity and it seems that an organisation's disseminative capacity does not just cover or refer to the two elements. For example, Martin and Salomon's (2003a) definition of the capacity mentions the ability to articulate its knowledge but this factor is not discussed by Park (2011). Also, although teaching intent can affect the process of knowledge dissemination, it is not a component of disseminative capacity. An organisation's knowledge disseminative capacity should be pre-existing before its inter-organisational knowledge dissemination activities and not changing with its decision to share how much knowledge. Given the very limited quantity of in-depth research on knowledge dissemination capacity, it is necessary to fill the research gap.

Based on KM and KT literature reviewed in above sections, it seems that when a codification strategy is adopted to transfer knowledge, disseminative capacity is also associated with the knowledge provider's (tacit and explicit) knowledge codification ability and knowledge base development capacity. Whilst, when a personalisation strategy is adopted, disseminative capacity can be affected by staff's communication skills of the knowledge provider. Studying KT between NISP headquarters and their collaborators can potentially gain an in-depth understanding of factors affecting

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disseminative capacity.

### **3.6.2 Recipient's internal factors affecting its knowledge learning process**

One internal factor affecting a recipient's knowledge learning process refers to its knowledge **absorptive capacity** (Easterby-Smith, *et al.*, 2008). The concept has been widely accepted as the most significant determinant of organisational learning process (Park, 2011). One of the widely cited definition of absorptive capacity is that it is an organisation's ability to identify the external valuable information, absorb it and utilise it to commercial ends (Cohen & Levinthal, 1990).

Therefore, the fundamental premise of absorptive capacity is that organisations need to possess **prior knowledge** to evaluate and utilise external information (Lau, *et al.*, 2002).

Basically, the prior knowledge includes essential skills or general knowledge that share a **business relatedness**<sup>16</sup> (Park *et al.*, 2009; Park, 2011). Easterby-Smith *et. al* (2008) argue that although absorptive capacity is widely used as a KT determinant, it is difficult to explore the factor directly. Indirectly, it can be assessed through exploring an organisation's **past experiences** in knowledge learning (Lane & Lubatkin, 1998) or

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<sup>16</sup> Business relatedness refers to possessing similar knowledge processing system and norms to those of the knowledge provider (Park, *et al.*, 2009).

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a firm's **prior knowledge base** covering existing managerial expertise and experience (Lau, *et al.*, 2002). In other words, great **knowledge distance/gap** between the KT collaborators can cause difficulties for the recipient to follow up the provider's knowledge level (Hamel, 1991; Dixon, 2000).

Another internal factor affecting a recipient's knowledge learning process is its **learning intent** which refers to the level of efforts contributed by organisational members to solve problems (Hamel, 1991; Easterby-Smith, *et al.*, 2008; Park, 2011). Inkpen & Tsang (2007) argue that an organisation with a learning-oriented cooperation strategy usually possesses clear learning intent to absorb the critical knowledge acquired from providers and ultimately have its own capacity enhanced. Clear learning intent likely to bring in **top-management commitment** to the learning goals and **resources allocated to learning process** (Liu, 2012). Meanwhile, top management support is connected to **project priority**. Cummings and Teng (2003) mention that when a recipient treats the KT project as a high priority, the recipient will have a great motivation to learn knowledge.

In addition, Pérez-Nordtvedt *et al.* (2008) argue that learning intent depends on the relevance of the provider's knowledge to the recipient's own competitive advantage. Liu's (2012) study of KT between Taiwanese companies and multinationals found that when Taiwan companies (knowledge recipients) would sometimes accept the project

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from their foreign buyers (knowledge providers) even though they need to invest heavily in product development. This is probably because learning intent driven by future competitive advantage is the major strategic rationale to initiate the collaboration.

### **3.6.3 Contextual factors affecting KT processes**

In this research, contextual factors are classified into two levels --- organisational level and supra-organisational level. Organisational level of contextual factors can cover the **structure of alliances** (see section 3.4), **trust and risk issues**, **power relations** and **social ties** (Easterby-Smith, *et al.*, 2008). Supra-organisational level of context can cover **local policy context** and **cultural issues** (Buckley, *et al.*, 2006; Liu, 2012).

Regarding **trust and risk issues** generated in KT collaborations, existing KT literature has valued the importance of mutual trust between actors in a KT process (Inkpen, 2000; Norman, 2002; Lucas, 2005). However, especially in transnational KT research, there is a tendency to stress knowledge providers' role in building trust through being aware of cultural differences in the recipient's system (see Buckley *et al.*, 2006; Chen *et al.*, 2010; Liao and Yu, 2012). This is probably due to their studied cases are more like intra-organisations KT between multinationals and Chinese branches. Multinationals are therefore advised to proactively build trust with their local partners to survive in

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new markets (Buckley, *et al.*, 2006).

Risk can come from providers' concerns of losing competitive advantage caused by recipient's competition activities (Norman, 2002). Inkpen & Pien's (2006) case-study research mentions a risk which is caused by the knowledge recipient's using learned skills to compete with the provider in the same market. The type of activities potentially undermine knowledge providers' motivation to do further teaching or collaboration. However, for government funded collaboration (or non-profit franchising) in the form of public programmes (e.g. EU funded projects), Matt *et al.* (2011) argue that the participated knowledge providers do not mind disclosing their information due to three reasons:

- The type of projects normally transfer generic, non confidential, knowledge;
- The transferred knowledge in the projects are not the providers' critical knowledge assets;
- Revealing the knowledge is a deliberate signaling strategy to display a technical competence or its willingness to cooperate.

With respect to the role of power relations to the process of KT, Easterby-Smith *et al.* (2008) argue that as a recipient's pace of learning shifts its dependency relation with the provider, when there is little to learn from the recipient, the basis for cooperation may deteriorate.

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As regards local policy context, a number of KT researchers have stressed the role of **government support** on promoting the knowledge dissemination process. At first, some cases of KT collaboration are actually funded by national or international government (see Rashman, *et al.*, 2005; Matt *et al.*, 2011). So, funding bodies' requirement may affect the involved providers' knowledge dissemination activities. Also, in developing countries, such as China, to promote economic development, different levels of Chinese government bodies have promoted KT (through alliance collaboration) between multinationals and local Chinese firms in terms of providing preferential policies (e.g. tax reduction) to attract multinationals' investment. For example, local government support has been reported by foreign investors as the chief external factor affecting multinationals in China as "Chinese government support has been selective but nevertheless powerful when (multi-national businesses) falls into the designated priority categories of the host local governments" (Buckley, *et al.*, 2006, p. 283). Chinese central government is also seen to promote KT between Singapore to China to construct industrial parks (Inkpen & Pien, 2006). According to Pereiara (2007), in 1980, Jiang, who later became the Chairman of China, was interested in Singapore's secrets in gaining investment as China had cheaper resources (e.g. land and labour) but limited investment at that time. The high-level government interactions therefore triggered the Singapore-China collaboration on constructing an industrial park in China in 1990s (Pereira, 2007).

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With regard to cultural issues, a number of researchers studying KT between multinationals and their Chinese affiliates have analysed specific Chinese cultural elements that need to be aware of by western investors (who normally act as knowledge providers). For example, *guanxi* (personal connections) and *mianzi* (face/image) are found to be core cultural elements in China (Buckley, *et al.*, 2006). In addition, Wagner (2012) mentions that hierarchy in terms of who is sitting to whom and talking to whom is cautious in formal occasions in China and the core custom is to show the highest member of a group the most respect.

KT Determinants summarised from section 3.6.1-3.6.3 can potentially guide the identification and analysis of factors affecting KT processes between NISP headquarters and their collaborators.

### **3.7 Qualitative case study approaches for KT research**

A key stream of KT research has adopted quantitative methods to analyse the relations between KT determinants and the success of KT through conducting surveys with a number of firms with the experiences of KT (Cumminga & Teng, 2003; Duan *et al.*, 2010; McLaughlin *et al.*, 2008). This type of research simplifies the complicated KT processes into models that quantified a limited number of factors. Michailova and Mustaffa (2012) point out that there has been over-representation of quantitative studies

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and a sharp under-representation of qualitative ones in the KT research. The authors stress that utilizing qualitative research approaches can potentially produce much-needed rich and in-depth stories and particularised interpretations of the studied KT processes.

In this research, qualitative case study approach is adopted as mentioned in the introduction chapter. Therefore, existing qualitative case study approaches that have been applied in KM and KT research are examined here in order to inform the research methodology used in this thesis.

Inkpen and Pien (2006) conducted a single case study of the KT in a China-Singapore collaborative project, Suzhou industrial park. The authors classified the project as a learning alliance as the collaboration agreements specified the transfer of park planning and management methods from the Singaporean government agencies led by the Singapore Jurong Town Corporation to Suzhou municipality. In the case study process, the authors conducted open-ended and semi-structured interviews with 18 Singaporean and Chinese individuals and collected press articles associated with the collaborative project. The authors provided a rich description of the alliance involving the initiation and objectives of the alliance, cross-country KT, participants' KT activities, cross-cultural issues, and both cooperative and competitive issues. The initial KT was slower than expected as the Singaporean partner struggled to convince the Chinese side

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of the value of the tacit knowledge (software) covering public administration, town planning and the legal framework. Instead, the Suzhou authorities were more interested in benefiting from the high-value investments that Singapore could attract (hardware). However, with intensive communications and the evolution of their relationship, the transfer of tacit knowledge increased. Based on the findings, the authors generated five propositions to explain how factors such as misunderstanding, evolved relations, absorptive capacity, unbalanced benefits gained by participants and social capital affect KT in a learning alliance. However, the authors did not provide sufficient discussion on the generalisability of the proposed theories.

Duanmu and Fai (2007) adopted a multiple case study approach to classify KT processes and identify factors affecting KT in each process. Participants in 16 international supply-chain collaborations in electrical and electronic industry were interviewed. Through comparable patterns emerging from the 16 pair of cases, the authors classified their KT processes into three stages: the initiation stage (focusing on factory evaluation and sample tests), the development stage (targeting quality stability, delivery performance and cost control), and the intensification stage (working on continuous product improvement and new product development). Also, for each stage, they identified the types of embedded knowledge that were transferred from the multinational companies to Chinese suppliers. Generally, KT started with the transfer of explicit technical information and then explicit managerial information; with the

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development of the collaboration and increased investment, more sophisticated managerial and tacit technological knowledge was transferred. The cases explored were successful KT cases between multinationals and their Chinese suppliers. Little was known about each multinational's previous unsuccessful KT and collaboration experiences.

### **3.8 Summary**

This chapter has presented an overview of the literature in the field of KM and KT covering intra-organisational knowledge creation, codification and transfer, and inter-organisational alliances and KT. The theoretical frameworks reviewed provide potential guidelines on how to conduct my own research.

First, different means to classify organisational knowledge were introduced. Similar methods can be adopted to categorise the transferred knowledge in the studied case of this research to clarify what has been transferred. The work can potentially assist the understanding of NISP's IS network facilitation model.

Then, the reviewed mechanism of SECI model and ICT function in knowledge creation process of KIBS can potentially assist the analysis of how the knowledge provider's organisational knowledge has been created in this research. Also, the summarised KM

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theoretical perspectives guide the exploration of how NISP's IS network facilitation knowledge has been created and prepared (codified or personalised) for replication.

Through summarising national and transnational non-profit alliance platforms for sustainable development, the gap of lacking relevant KT studies is identified. Therefore, the author decided to study KT in the EC funded programme between NISP and its Chinese collaborators, and KT in the UK government funded programme that delivered with franchising approach. Finding of this research can potential promote communications between the developed and the developing world for sustainable development.

Two types of knowledge dissemination processes covering codification and personalisation are summarised. Through exploring KT processes participated by NISP's headquarters, key issues in the processes can be identified and analysed. Another focus regarding KT in this chapter is to reviewing factors affecting KT processes. Key problems identified cover the insufficient study on an organisation's knowledge dissemination capacity and it is necessary to fill this gap. However, the summarised KT determinants can potentially guide the identification and analysis of factors affecting KT processes between NISP headquarters and their collaborators.

Considering the limited quantity of KT cases between the UK and China to facilitate IS,

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this research selects a case study approach. Case study approaches adopted by a number of KT researchers were reviewed. Besides contextualising the KT process between the UK and China for ISD, KT within the UK for ISD is selected as a parallel case study. Participants involved in the KT process are approached to find psychological and effort-specific factors affecting the KT process. Data collection and analysis methods are explored and discussed in chapter 4.

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## IV Methodology

### 4.1 Introduction

This chapter focuses on illustrating how the research has been organised and conducted. Firstly, section 4.2 clarifies the philosophical paradigm and research methodology employed in this research, including a presentation of the ontological, epistemological and methodological considerations. Then, the research design and fieldwork (covering interviews and participant observation) are described in section 4.3. Thirdly, the principles and plans of the subsequent data analysis are given in section 4.4. Following the discussion of the research validity in section 4.5, the ethical considerations in the data collection and analysis process are described in section 4.6. Finally, section 4.7 presents a summary. Figure 4.1 outlines the structure of the chapter in diagrammatic form.

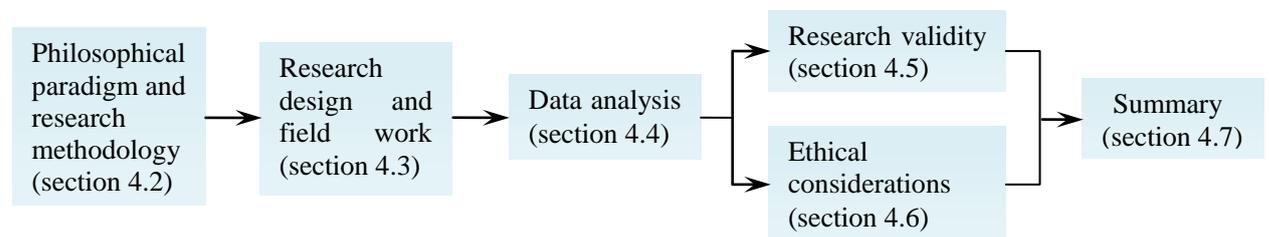


Figure 4.1 The structure of chapter 4

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## **4.2 Philosophical paradigm and Research Methodology**

This research adopts a qualitative-interpretive framework. The following sections illustrate the detailed philosophical paradigm and how it has been embodied in the methodology and research design.

### **4.2.1 Underlying philosophical assumptions**

The objective of undertaking a dissertation is to provide answers to questions and by providing such answers, a researcher will be claiming to know something; any claim to knowledge relates to philosophical questions about whether and how such claims are warranted (Graham, 2005). Researchers' basic worldviews (paradigm) are interrelated with their theoretical perspectives; researchers' ontological and epistemological assumptions are required to be made explicit before undertaking any research project (Guba & Lincoln, 1994; Andrade, 2009).

A philosophical paradigm needs to take into account the following ontological and epistemological considerations (Willis, 2007; Hesse-Biber, 2011).

- ***What is the nature of 'reality'? (ontological considerations)***

Ontology is concerned with the nature of reality through reflecting different prescriptions of what can be real (Burrell & Morgan, 1979). Interpretive researchers' ontology is that social reality is locally and specifically constructed by humans through their action and interaction (Guba & Lincoln, 1994). They see the

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world strongly bounded by a specific time and context (Andrade, 2009).

- *Relationship between the knower and the known? (Epistemological considerations)*

Epistemology refers to what humans know about reality and how to know it (Crotty, 1998). Burrell and Morgan (1979) describe epistemology as how one might start to understand reality and how to communicate the understanding of this as knowledge to other people. Interpretive researchers' epistemological assumption is that findings are literally created with the proceeding of the investigation (Guba & Lincoln, 1994). With the investigation process, researchers' understanding the meaning of the experience can be developed.

Taking into consideration the above philosophical assumptions, I identify myself as an interpretive researcher who believes that research can be conducted to understand the process and problems of a practice through collecting participants' attitudes and observing their activities. Therefore, interpretive research methodology is explored to conduct the research.

#### **4.2.2 Qualitative-interpretive research methodology**

A methodology is a system of ontological and epistemological assumptions on which research is to be based, and it relates to considerations on procedures for conducting

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research, such as the selection of subjects, research design, data collection, and analytical methods (Willis, 2007). Hesse-Biber (2011) categorises the ontology, epistemology, methodology, and methods (tools to collect evidence) as the major dimensions of a research project, and each dimension affects how a study is conducted. Furthermore, the author describes methodology as a bridge joining our philosophical framework (ontology and epistemology) with our research methods; researchers' methodological and method choices form their research design.

A key consideration was to explore the methodologies used in qualitative research to build the approach to conduct the research in this dissertation. Qualitative research can be described as a situated activity that locates the observer in the world to explore research problems (usually expressed in the form of *how, why & what*) (Denzin & Lincoln, 2008; Hesse-Biber, 2011; Creswell, 2012). Qualitative researchers seek to extract the “social meaning people attribute to their experiences, circumstances, and situations, as well as the meanings people embed into texts and other objects” (Creswell, 2012, p. 4). The data analysis is inductive with established themes; the final presentation covers the reflexivity of the researcher, the interpretation of the studied problem and the findings which signal a call for action (Denzin & Lincoln, 2008; Creswell, 2012). Figure 4.1 summarises a number of complementary characteristics of qualitative research.

Table 4.1 The characteristics of qualitative research methodology

Characteristics	Denzin & Lincoln (2008)	Hesse-Biber (2011)	Creswell (2012)
Research questions usually begin with words like <i>how, why or what</i>		√	
Natural setting (field focused), a source of data for close interaction	√		√
Researcher as a key instrument of data collection		√	√
Multiple data collection methods	√	√	√
Analysis of data inductively		√	√
Focus on participants' perspectives, their meanings, and their subjective views	√	√	√
Emergent rather than tightly prefigured design	√		√
Fundamentally interpretive inquiry --- a researcher reflects his/her own role and the role of participants in shaping the study	√	√	√
Interdisciplinary landscape comprising diverse perspective and practices for generating knowledge		√	

Source: compiled from Denzin & Lincoln (2008), Hesse-Biber (2011), and Creswell

(2012)

Table 4.1 summarises the characteristics of methodologies for conducting case studies combining a number of authors' points. Although they share a lot comments on characteristics of qualitative research, they have a disagreement on whether qualitative researchers should try a rigid or a flexible research design. Hesse-Biber (2011) advises a tight fit between the research purpose and the selected method, viewing the whole research choice - from topic selection to final presentation - as interrelated. Therefore, researchers are advised to master various tools (research methods) and know when to use specific tools in the toolbox to cope with different problems (research questions) (Hesse-Biber, 2011). In contrast, Denzin & Lincoln (2008) and Creswell (2012) recommend a flexible design as they mention the possibility of having changes in research questions or the fieldwork locations within the process of conducting the fieldwork.

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This research has adopted a flexible design as it is a novice researcher's work. Within the process of conducting research, my knowledge of the qualitative research approach and the understanding of the research topic were gradually developed. The knowledge accumulation process inevitably has affected and changed the pre-designed research questions and approach. So, it is probable that for a PhD researcher, a flexible research design can be usually selected, but with the researcher's repeat practices on conducting qualitative research, the person will tend to adopt a more rigid research design focusing on exploring answers for pre-set research questions.

Qualitative-interpretive research is a branch of qualitative research<sup>17</sup> focusing on subjective experience, small-scale interactions and understandings (seeking meaning) (Hesse-Biber, 2011). The essence of qualitative-interpretive research is to work with (people's) subjective meanings residing in interactions, actions and objects, to reconstruct and understand them, and to use them to build theory (Orlikowski & Baroudi, 1991; Hesse-Biber, 2011; Goldkuhl, 2012). Qualitative-interpretive research methods cover field research, interviews, oral history, (focus group) interviews, case studies, discourse analysis, grounded theory, content or textual analysis, evaluation, visual or audiovisual analysis, historical comparative method, ethnodrama and

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<sup>17</sup> Another branch is qualitative-naturalistic research which studies social phenomena in their natural settings (Hesse-Biber, 2011).

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narrative inquiry (Denzin & Lincoln, 2008; Hesse-Biber, 2011).

When a researcher wants to understand a real-life phenomenon in-depth, a case study method can be selected (Yin, 2008). Case studies have been widely used to study specific programmes, projects, and initiatives to document and analyse the implementation processes (Yin, 2012). Case study research covers the exploration of a contemporary phenomenon in one or more cases (e.g. an event, a process, or a particular place) within one or more bounded system(s) (e.g. context) through detailed and in-depth data collection (e.g. through observations, interviews and documents), and presents a case description and case-based themes (Baxter, 2010; Creswell, 2012).

The aim of this research is to explore knowledge transfer (KT) within the UK and between the UK and China for industrial symbiosis development (ISD). A case study method thereby is applied to explore key factors affecting the KT process and how each collaborative organisation/country can learn from its international partner. The specific focus (i.e. ISD) restricted the potential number of case study organisations as the number of organisations engaging in ISD knowledge-sharing between the UK and China is limited.

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## 4.3 Research Design and fieldwork

### 4.3.1 Research Design/Approach

On the basis of these ideas on how to select a research methodology mentioned in the previous section, the research approach developed as follows (see Figure 4.2).

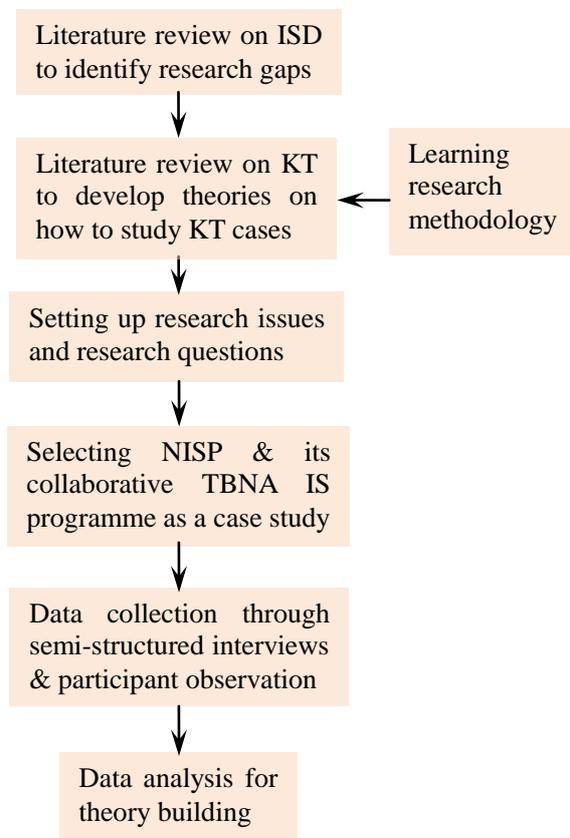


Figure 4.2 Research approach

At first, around my study interest (ISD approaches), a range of literatures discussing IS and analysing ISD exemplars in various geographical boundaries were reviewed. One concern was whether one country's good practice on ISD is applicable, or can be transferred, to another country with a different cultural, political and policy context. At

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that time, the researcher identified the differences of ISD approaches between the UK and China and was aware of a UK organisation's attempts to replicate its facilitation approach to a Chinese regional industrial area for ISD funded by the EC. This UK-China collaboration formed the basis for part of this research study and generated a number of questions of interest to the researcher: How has the collaborative programme initiated? Who has been involved? Which activities have been conducted in the programme? Which factors have affected the progress of the programme?

Following on from the review of ISD, theories on KT were then drawn upon to provide a theoretical tool to explore research questions, the UK-China collaboration being viewed as a transnational KT process. The KT theories have focused on building a KT model --- identifying the knowledge provider and recipient, exploring participants' initiatives, capacity and relationship on knowledge sharing and application, classifying types of transferred knowledge and analysing contextual factors affecting the KT process (see chapter 3). Besides reading the KT literature, research methodology/methods were learned through reviewing the literature on qualitative research methodology and attending relevant courses provided by the university. Then, research questions were shaped with the major objectives of exploring similarities and differences of national and international KT for ISD.

The development of NISP and its collaboration with the eco-centre of the Tianjin

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economic-technical development area (TEDA) were selected to conduct contrasting case studies. Then, a preliminary research design focusing on exploring answers to the research questions was developed.

Following the research design, I began to contact NISP regional teams, in order to undertake in-depth interviews. Through the contacts with the international team at NISP headquarters developed at this stage, I was able to arrange a two-month internship with the TEDA eco-centre in China, which is the knowledge recipient of NISP's facilitation approach. After this internship in China, I had another chance for an internship with NISP headquarters. During these two internships, research data were collected through participant observation and further in-depth interviews.

Finally, through referring to a range of data analysis methods for case studies, the collected data were analysed to generate new theoretical points for ISD and KT research.

## **4.3.2 Fieldwork**

### **4.3.2.1 Interviews**

According to Daniels and Canniece (2004), there are three situations where interview techniques may be appropriate. Firstly, interviews are particularly useful for

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exploratory studies. In this case, interviews allow the researcher to explore new relationships or situations not previously conceived. Secondly, interviews are highly suitable where only a small population of potential interviewees can be approached. In this sense, the researcher must focus on the depth of collected data when the breadth is not attainable. Thirdly, interviews can allow the researcher to develop a closer relationship with interviewees than is possible through written questionnaires; the greater trust that can be generated during the interview relationship may help the researcher to get further information for the research. Therefore, through conducting interviews, a researcher can develop a network of new data and insights which can be used to achieve research efficiency (Lindlof & Taylor, 2002)

Semi-structured interviews employ interview guides with a number of drafted themes and questions, but the questioning process is flexible (Dunn, 2010). Some advantages of semi-structured interviews include the generally high response rate, flexibility, ability to observe nonverbal behaviour and the identification of essential issues that deserve to be intensively explored (Page & Meyer, 2000). According to Daniels and Cannice (2004), well-informed respondents can provide insightful perspectives, unique expertise, or areas of knowledge that researchers probably cannot access by themselves

The selection of relevant and suitable interview respondents is important for researchers. Usually, interviewees are chosen on the basis of their experience relevant

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to the research topic; sending emails or making phone calls to them is a key method for recruiting interviewees (Longhurst, 2010). From my own perspective, I was not quite comfortable to make phone calls at that time because I was not a native English speaker and the method of sending emails were preferred. In the enquiry email, I introduced myself, my research objectives, key topics of the expected interviews, and asked the possibility to have an anonymous and recorded interview with the person.

My first research interview was conducted at the end of 2009 accompanied by my supervisor who demonstrated skills on how to ask questions around the key themes. The first interviewee even introduced another two interviewees to me for further interviews. Also, when I attended a number of NISP events (e.g. meetings) and talked informally with a number of NISP practitioners, they were interested in my research and wanted to be interviewed, and gave me their business cards. Further intensive interviews were then conducted with these practitioners between January and early March 2010. Later, during the interview with a NISP international project coordinator, my research background in the field of IS and my understanding of NISP's operation process impressed the coordinator. My contacts were then given to the IS project manager of a NISP-TEDA collaborative project called Tianjin Binhai New Area (TBNA) IS Network programme. As it was a newly initiated programme in TEDA, the Chinese team needed extra hands to contribute to the project. In the later March 2010, I was invited by the TEDA IS project manager to participate in their project. During the

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two-month period of work with the programme delivery team, eight interviews were conducted. In the September of 2010, I was invited by NISP headquarters to do a three-month internship to facilitate the administration of the Chinese project in TEDA. During the process, more interviews were conducted and a good relationship with various staff in NISP headquarters was developed which provided further opportunities to contact them for more data for the research.

In my interviews conducted in the UK and China, most of those approached agreed to take part. The key to the high response rate<sup>18</sup> was due to the relationship/trust building with interviewees gained either through referral by my supervisors or by supporting NISP's events before interviews. Also, as the researcher's bi-lingual skills and the understanding of the NISP IS facilitation methodology were thought to be valuable to NISP's Chinese project, interviewees readily helped with the researcher's data collection where there was a need.

The research selected multiple respondents from NISP headquarters, three NISP regional teams, and TEDA eco-centre. The interviewees cover:

- IS practitioners, (previous) IS project managers, regional directors and technical assistants from NISP regional teams;

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<sup>18</sup> 18 out of 19 persons approached accepted interviews, one person had emergency to deal with so she asked her colleague to attend the interview.

- (Previous) NISP international project coordinators and directors from NISP headquarters;
- (Previous) TBNA IS network practitioners from TEDA.

Table 4.2 Details of Interviewees

Interviewee No.	Workplace	Interview date	Interview type	Major Interview topics
1	NISP regional team A	Oct 2009	In-depth, semi-structured	The regional team's development history, interactions with other teams /organisations, and the general content of the team's routine work.
2	NISP regional team A	Jan 2010	In-depth, semi-structured	The regional team's development history, interactions with other teams /organisations, and the general content of the team's routine work.
3	NISP regional team A	Jan 2010	In-depth, semi-structured	The regional team's development history, interactions with other teams /organisations, and the general content of the team's routine work.
4	NISP regional team A	Jan 2010	In-depth, semi-structured	The regional team's development history, interactions with other teams /organisations, and the general content of the team's routine work.
5	Previously worked with a NISP regional team B	Feb 2010	In-depth, semi-structured	The regional team's development history, interactions with other teams /organisations, and the general content of the team's routine work. The cause of his resignation.
6	NISP regional team B	Feb 2010	In-depth, semi-structured	The regional team's development history, interactions with other teams /organisations, and the general content of the team's routine work.
7	NISP regional team C	Mar 2010	In-depth, semi-structured	The regional team's development history, interactions with other teams /organisations, and the general content of the team's routine work.
8	NISP regional team C	Mar 2010	In-depth, semi-structured	The regional team's development history, interactions with other teams /organisations, and the general content of the team's routine work.
9	NISP regional team C	Mar 2010	In-depth, semi-structured	The regional team's development history, interactions with other teams /organisations, and the general content of the team's routine work.
10	NISP headquarters	Mar 2010	In-depth, semi-structured	The origination of the NISP-China collaboration; the person's role and experiences in the programme.
11	NISP headquarters	Apr 2010	In-depth, semi-str	The origination of the NISP-China collaboration; the person's role and

	s		uctured	experiences in the programme and knowledge sharing process.
		Jul 2012	Email interview	Methods used to codify NISP's organisational knowledge which was transferred to TEDA eco-centre.
12	Previous worked with NISP headquarters	July 2012	Email interview	Approach to codifying NISP's organisational knowledge which was transferred to TEDA eco-centre.
13	NISP headquarters	Feb 2010	In-depth, semi-structured	The origination of the NISP-China collaboration; the person's role and experiences in the programme and knowledge sharing process.
14	TBNA IS network practitioner	Apr 2010	In-depth, semi-structured	The origination of the NISP-China collaboration; the person's role and experiences in the programme and knowledge learning and application process.
15	TEDA eco-centre	Mar 2010	Informal interview	The progress and problems of running the TBNA IS network programme at the early stage.
16	NISP headquarters	Nov 2010	In-depth, semi-structured	NISP's development process and method to build an IS facilitation programme
17	TEDA eco-centre	Jun 2012	Informal interview	Current progress of the TBNA IS Network programme and the person's role and experiences in the programme and knowledge learning and application process.
18	TEDA eco-centre	Apr 2010	In-depth, semi-structured	The origination of the NISP-China collaboration; the person's role and experiences in the programme.
19	NISP headquarters	Jun 2012	Informal interview	Current progress of the TBNA IS Network programme, the person's role and experiences in the programme and knowledge sharing process.

In all the interviews conducted in the UK listed in Table 4.2, electronic recording was allowed by the interviewees. After the recorded interviews were conducted, the recorded data were transcribed into texts. The recording approach allowed me to fully focus on the interaction, instead of feeling pressure to get the important information recorded in my notebook. Doing interviews with British interviewees was quite challenge as the researcher is not a native English speaker. To ensure that each

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interview question was understandable, the researcher pre-listed all the interested questions and invited her supervisor to check the content. During the process of interviewing, the researcher concentrated on listening to interviewees' talk. When some key contents were not understood, the researcher politely requested the interviewees to explain a little bit further. Most of them talked extensively to each interview question and when the interview was nearly finished, they kindly reminded the researcher to check whether any important questions had been missed. One of the interviewees told the researcher that when she was a student, she received a lot of help from others; therefore, she thought that she should also contribute to a student's research.

Doing interviews with Chinese interviewees was helped by the researcher being a native Chinese speaker. People in the TEDA eco-centre knew that doing interviews and recording internal meeting were very important to the researcher's study. A relationship with them was built during the researcher's internship in the TEDA eco-centre. So, they readily allowed the researcher to record meetings and interviews and discuss programme problems/barriers during the process. This may show that the people delivering the TBNA IS network programme could face their problems and had the confidence to run the programme successfully. In contrast, business interviewees in TEDA preferred the conversation not to be recorded as during the conversation their attitudes toward the local government's programme (e.g. the IS programme) were asked. It may indicate that business representatives were very cautious in giving

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personal opinions about government promoted projects as they did not want their comments to bring any negative effect to the programme or the local government.

#### **4.3.2.2 Participant observation**

Participant observation refers to researchers' taking part in the daily activities/events of a group of people as a means to understand their life routines and culture, and it is viewed as a supplementary method for interviews as it provides contextual information for other data collection methods (DeWalt, 2011). Further, the method includes the collection of the information gathered from participating and observing through explicit recording (e.g. field notes) and analysis of the information. The use of note-taking can help the researcher to recall the details of the situation which the person wants to describe (Laurier, 2010).

Commenting upon the outputs of participant observation in human geography, Laurier (2010) argues that it is effectively 'commentary', i.e. commenting on the culture, society and geography of various spaces and places. Laurier further stresses that the best participant observation is generally conducted by those who have participated in and attempted to do and/or be a part of the things that the researcher is observing. Good data from a participant observation can usually be a particular instance of some practice or event or feature that elicits a researcher's interest. The instance can be something (e.g. a rule in a game) that the researcher never knows before or it can be something that is

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found to be recurring all the time (Laurier, 2010).

Through the internships with both TEDA eco-centre and NISP headquarters, and through attending IS facilitation events held by NISP regional teams, the researcher had opportunities to collect data through participant observation. Data collected through participant observation were recorded through meeting attendance notes and internship diaries. The contents of the data cover:

- The process and atmosphere of IS facilitation events held by NISP regional teams v.s. TEDA eco-centre;
- TEDA eco-centre's IS facilitation process at the early stage of the TBNA IS network programme;
- TEDA eco-centre's UK visit to NISP's business and government partners from the early to middle stage of the TBNA IS network programme.

## **4.4 Data analysis**

### **4.4.1 Principles of data analysis**

In the process of data analysis, the researcher had concerns about how to build theories from the case studies and about the generalisation of the research findings. Lessons were drawn from the following points.

- **Giving a rich description**

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Creswell (2012) emphasises the need to make a detailed description of the case and its setting in the analysis section; and Baxter (2010) argues that good case studies are believed to be those being richly described with a produced work brief enough to appeal to a wide audience.

- **Coding the transcribed data**

Stake (1995) describes analysis as a matter of separating our impressions and observations and giving meaning to the parts. A researcher can begin with looking at a single instance and drawing meaning from it without looking for multiple instances; trying to establish patterns and looking for a correspondence between two or more categories (Stake, 1995). Cope (2010) mentions that during the coding process, four types of themes can be considered covering conditions (e.g. geographical context and the circumstances of individual participant), interactions among actors (e.g. relationships or conflicts), strategies and tactics (which relate to participants' purposeful intent), and consequences.

- **Grouping codes**

The next step to be considered is to organise the structure of the codes so that they are grouped together according to their similarities, substantive relations, and conceptual links (Cope, 2010). Regarding multiple-case studies, Baxter (2010) advises researchers to focus on both common and contrasting issues in cross-case

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comparison.

- **Generalising findings**

Yin (2012) stresses the need to distinguish analytic generations from statistical ones. It is incorrect to assume that findings can be generalised from a small set of cases to wider application from a social science perspective; in contrast, it is possible to establish a logic --- e.g. how the findings have informed the relationships among a particular set of concepts, theoretical constructs or sequence of events--- that might be applicable to other situations. The relevant analytic generations may be no more than a series of hypotheses.

#### **4.4.2 Data analysis strategy in this research**

This research in this dissertation was focused upon of two inter-related case studies about KT for ISD. The major objective in conducting two case studies was to compare the international and national KT process and the factors influencing this.

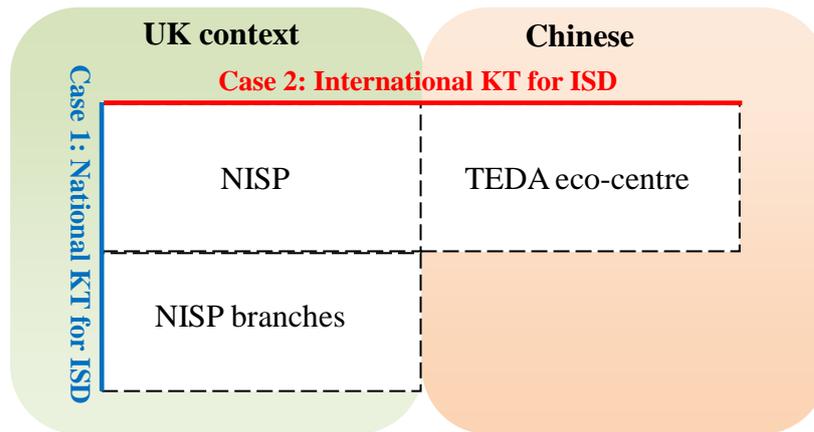


Figure 4.3 Relationship between the two case studies in this research

In this research, the first major case study is of KT within NISP. In this case, the transferred knowledge includes NISP’s central database, database operational methods and general IS facilitation methods. The second major case study is of KT between NISP headquarters in the UK and TEDA eco-centre in China. In the second case study, the knowledge transferred covered NISP’s IS facilitation methodology and the UK’s waste policy context affecting the origin of NISP as a government-funded NGO promoting resource efficiency.

Based on the information regarding how to code case study data (see section 4.4.1), descriptions of the two cases - the ‘story’ of the situation, the historical development paths etc - were given. In addition the contexts affecting KT within NISP and KT between NISP headquarters and TEDA eco-centre were specified in terms of how the IS facilitation knowledge has been developed, how the NISP-TEDA collaboration has been initiated and which factors have affected the KT process. The structure of this data analysis can be illustrated in figure 4.4.

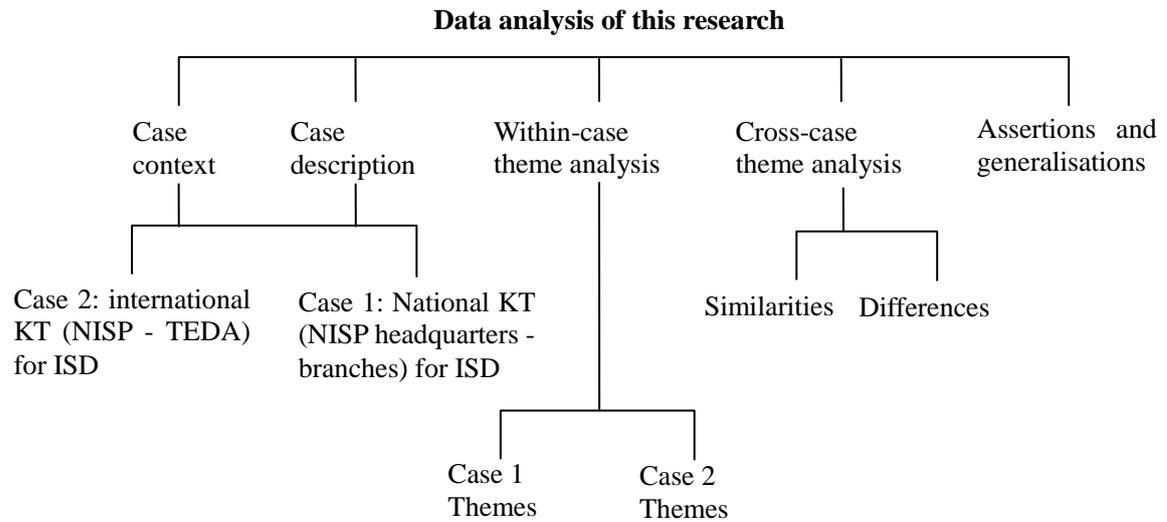


Figure 4.4 Structure of data analysis targeting theory building in this research

The next step was to re-arrange the collected data, and try to present the data in an understandable manner through classifying the data and extracting common or conflicting themes in the studied cases. In this research, themes were classified through drawing upon the KT theory (see chapter III) and analysing the transcribed data. Specifically, themes cover attributes of the KT participants, characteristics of the transferred knowledge and details of KT activities.

Table 4.3 Themes of the collected data

Key Themes	Sub-themes
<b>Attributes of KT participants</b>	-Organisation structure of the participants
	-Alliance structure
	-Differences/gap of the participants
	-Relationship of the participants
	-...
<b>Characteristics of the transferred knowledge</b>	-Contents of the transferred knowledge
	-Activities to develop the knowledge
	-Context factors affecting the development of the knowledge
	-...
<b>Details of KT activities</b>	-Provider's activities to disseminate knowledge
	-Recipient's activities to learn/adapt the transferred knowledge
	...

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Regarding case 1, KT within NISP, key themes cover the development of NISP, organisation structure of NISP, the creation/development of NISP's IS network approach, and KT activities within NISP. With respect to case 2, KT between NISP headquarters and the TEDA eco-centre, key themes cover profile of the TEDA eco-centre (knowledge recipient), KT initiatives, and the progress of the KT.

This coding and categorisation process helped to illuminate the relationship of the codified information and provide answers to the research questions. Subsequently, the relationship between the themes developed from the two case studies was compared with existing theoretical explanations.

## **4.5 Research Validity**

### **4.5.1 Criteria Exploration**

Bradshaw and Stratford (2010) advocate that qualitative researchers' take serious responsibility in data interpretation as qualitative data often present others' experiences. Generally, the following points can be used to establish the validity of an interpretive case study research.

- **Defining operational measures**

According to Yin (2008), to ensure the standard of constructed validity, a

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researcher must define the key topic being studied in terms of specific concepts and identify operational measures that match the concepts. Also, Thomas (2011) suggests that researchers check that definitions are provided where necessary and that there is a consistency in their use of terms during the writing process.

- **Triangulation**

Thomas (2011) writes that the term “triangulation” can be understood as meaning that viewing an issue from various points is better than viewing it from only one . Specifically, triangulation refers to using multiple sources of evidence, discussing our process and interpretations with our supervisors or colleagues, and checking our case study reports with our research participants (Bradshaw & Stratford, 2010). Using multiple sources of evidence in case studies allows researchers to find a series of historical and behaviour issues; also, it develops converging lines of inquiry, a process of corroboration (Yin, 2008).

## **4.5.2 Consideration of the validity in this research**

### **4.5.2.1 Defining operational measures**

The title of this research is called ‘Knowledge transfer to facilitate industrial symbiosis: a case study of UK-China collaborators’. In this research, “to facilitate industrial symbiosis” refers to using facilitation approach to promote business to adopt the IS

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concept (see chapter 2). Transferred ‘knowledge’ refers to NISP’s facilitation approach, programme development strategy and contextual factors (waste policies and culture) affecting ISD in each country. A case study approach is applied focusing on the national KT within NISP and the transnational KT between the NISP headquarters and the TEDA eco-centre.

#### **4.5.2.2 Triangulation**

In this research, various sources of data (evidence) were collected --- through participant-observation, in-depth interviews and document collection (e.g. policy documents, organisational reports, and emails) which covered qualitative data.

The data analysis was not a discrete activity but was conducted concurrently with the evidence collection process occurring during the whole process of the case study research. Interview data were checked with data collected through participant observation (e.g. fieldwork diary), public organisation reports, press releases, internal documents of the organisations, and articles written about the case study organisations’ operations. On certain occasions, the researcher communicated with the respondents to clarify some issues when inconsistencies were encountered. Also, a number of former staff were approached to collect their opinions about their previous work in the organisations under study.

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## 4.6 Ethical considerations

Stake (2003) highlights the privileged position of the case study researcher when he says “qualitative researchers are guests in the private spaces of the world. Their manners should be good and their code of ethics strict.” (Stake, 2003, p. 154). Yin (2008) argues that researchers have the responsibility to gain informed consent from all those who are part of their case studies and to protect respondents’ privacy and confidentiality. Dowling (2010) recommends that the relevant measures with regard to matters of privacy and informed consent cover:

- The researcher needs to provide participants with an overall outline of what the research is about, issues to be explored, and what is expected to be obtained from them and then to get their permission.
- The original field notes, tapes, and transcripts need to be stored in a safe place where access to them is restricted.
- Ensuring that others are unable to identify informants in the analysis e.g. through giving each of them a number rather than using real names.

Further, Dowling (2010) reminds researchers to keep reflecting on their own situation and affect in the process of designing and conducting the research. Dowling summarises the process of research as “a dynamic and ongoing social process that constantly throws up new relations and issues that require constant attention” (Dowling, 2010, p. 30).

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These ethical issues outlined in the preceding paragraphs have been incorporated into the conduct of this research. During the interviews and participant observation process, the researcher contacted the participants in advance to get their permit to conduct the fieldwork. They were informed about the researcher's identify and research objectives. As promised, when their comments were cited in the dissertation, their names were withheld; interviewees are identified only by their position. During the researcher's internship with the TEDA eco-centre and NISP headquarters, the researcher was required to sign confidentiality agreements as the research had opportunity to access their databases covering business members' detailed information.

## **4.7 Summary**

This chapter has presented the ontology and epistemology of the research which affect the researcher's belief of what is the social reality and how to conduct research to understand the reality. The research is clarified as an interpretive work seeking to explore the understanding of the structure and process of national and international KT for ISD, and contextual factors shaping the KT structures and processes.

Case studies on KT both within UK NISP and KT between NISP headquarters and TEDA eco-centre in China were selected given their potential to contribute to both KT

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and ISD theories. Data were collected through un-structured in-depth interviews, participant observation and document review. Data analysis has focused on giving a rich description of contextual factors of the case studies, abstracting themes in each case, and comparing similarities and differences of the two cases to build theories.

When conducting the research, triangulation and ethical issues were also considered to generate the validity of the research with the consideration of protecting participants' confidentiality and privacy. Having established the methods and methodology utilised, the next chapter moves on to present contextual policy factors affecting ISD in both the UK and China.

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## **Chapter V Policy Contexts affecting ISD in the UK and China**

### **5.1. Introduction**

As mentioned in section 4.4.1, in case study research, it is necessary to provide a rich description of the context of the cases (Creswell, 2012). In this research, the selected cases are the transfer of an IS facilitation technology within NISP, and between NISP and its Chinese collaborators. Contextual factors affecting the emergence and development of the technology are therefore explored.

In the IS literature, there is an awareness of the importance of policy frameworks that affect the national ISD. For example, the Danish government was seen to use environmental regulations emphasising performance standards rather than technology criteria to allow businesses to select pollution control technologies ensuring their waste streams can be utilised as other's feedstock (Ehrenfeld & Gerter, 1997). In addition, Danish ISD are seen to be promoted by its increasing incineration and landfill tax coupled with a strong landfill ban on combustible waste since 1997 (Costa *et al.*, 2010).

Therefore, the policy context affecting ISD in both the UK and China area analysed. There can be a significant discrepancy between stated policy and actual practice (Lowe, 1998). Nonetheless, the latter occurs within the context of the former. Unlike the

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cultural context, which needs to be observed to perceived, policy context can be abstracted through analysing policy documents.

This chapter begins by analysing the Chinese policy context, focussing on its resource, energy and environmental policies. Policy instruments and the delivery landscape from national to regional levels are analysed and problems of the Chinese policy context are discussed (section 5.2). Section 5.3 describes the UK's performance-based devolution model for ISD. Section 5.4 provides suggestions to Chinese waste policies through drawing upon the UK's model. The structure of this chapter is as follows:

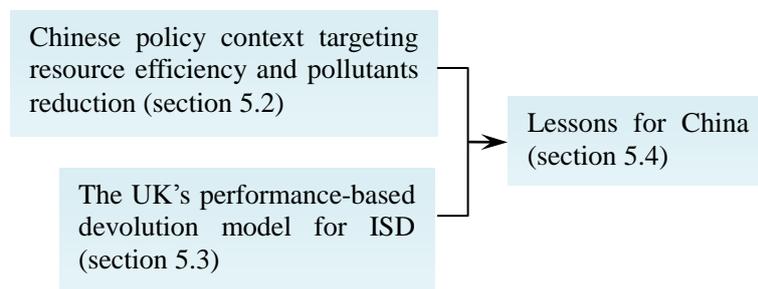


Figure 5.1 The general structure of chapter 5

## **5.2. Chinese policy context targeting resource efficiency and pollutants reduction: status and problems**

The Chinese policy context for ISD is shaped by national policies targeting resource efficiency and pollutant reduction. To achieve these targets, the government has

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promoted development models such as RCR and the CE. With regard to the RCR concept, resource refers to mineral by-products, waste residues (water or gases), and various waste or outdated products. Comprehensive re-utilisation means recycling, regenerating and reusing activities (The former State Economic and Trade Commission, 1996). The broader concept, CE development, mainly refers to the promotion of resource conservation, cleaner production, RCR, and environmental protection industries (State Council, 2005). Although there is no official promotion for ISD, the ISD can be understood as a sub-branch of RCR and CE development, although there is no emphasis on inter-organisational collaborations in the latter two concepts. This inevitably leads to the Chinese ISD technology (EIP conversion) lacking in an element directly or indirectly promoting inter-firm networking for resource efficiency.

The national targets and strategy for resource efficiency, energy conservation, and pollution reduction are formulated in the national government's policy documents such as *Several Opinions of the State Council on Speeding up the Development of the CE Development* (2005), the *Comprehensive Strategy for Energy Conservation and Pollution Reduction* (2011), the *Guidance on RCR for the 11<sup>th</sup> and 12<sup>th</sup> Five-year Plans* (NDRC, 2006; 2011d), the *Implementation Plan on the Comprehensive Re-utilisation of Bulky Solid Waste Streams* (2011b), and the *12<sup>th</sup> Five-year Plan on the Comprehensive Re-utilisation of Bulky Industrial Solid Waste Streams* (2011a). The policy targets are expressed by a number of quantifiable indicators such as the rate of

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reuse of recycled materials or industrial solid waste or mineral by-products and energy consumption per 10<sup>4</sup>RMB GDP.

In responding to the above national policy documents, various policy instruments are formulated and adopted by a range of government departments in China. The following sections give an in-depth analysis of how the policy tools and target delivery landscape are deployed from the central government down to the regional level.

### **5.2.1 Policy instruments**

The policy instruments proposed in the Chinese Government's policy documents are a mixture of legislation, guidance, tax and funding projects as shown in table 5.1. The research considers key policy instruments relating targeting resource efficiency and pollutants reduction rather than policy instruments such as regulations relating to pollution prevention and waste shipment.

Table 5.1 UK vs. Chinese key policy instruments

<b>Instrument Type</b>	<b>UK Targeting resource efficiency &amp; landfill diversion</b>	<b>China Targeting resource efficiency &amp; pollutants reduction</b>
<b>Regulation</b>	1. Landfill ban (e.g. tyres) 2. Requirement to register with the EA according to regulations for WEEE, packaging and waste batteries	1. Catalogue of restricted and eliminated techniques, equipment, and material ( <b>Restriction Catalogue</b> )
<b>Levy</b>	3. Landfill Tax 1996	
<b>Stimulus</b>		2. Preferential taxes (Corporate Income tax & Value-added tax)
<b>Guidance</b>	4. Waste Protocols Projects	3. Catalogue of promoted CE technology, technique and equipment ( <b>Promotion Catalogue</b> ) 4. List of technically innovative pilot CE projects
<b>Funding</b>	5. Funding Facilitation Programmes 6. Financing individual projects (e.g. Anaerobic Digestion plant)	5. Funding pilot projects (e.g. individual energy/water conservation, EIP/agricultural industrial park development, waste disposal, utilising large solid waste streams) (NDRC, 2011c)

Unlike in the UK, there is no landfill tax in China. Landfill is the cheapest way of waste disposal option in China and the average landfill cost is round £4 per ton, much lower than any other disposal technologies (Zhang, Li, Hu, & Song, 2012). According to Wang and Zhang (2010), due to the limited level of RCR capacities, large quantities of industrial solid waste in China are directly transported to municipal solid waste landfill sites and have caused secondary pollution.

The mandatory regulation for resource and environmental target is the *Catalogue of restricted and eliminated techniques, equipment, and material (Restriction Catalogue)* listed in table 1. The restricted techniques are those found unsafe, causing pollution, and high resource/energy consumption (MIIT, 2010). According to the CE Promotion

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Law<sup>19</sup> (2009), the CED administrative department should collaborate with other ministerial government department to issue the *Restriction Catalogue* periodically, and different levels of fine will be imposed if enterprises violate the ordinance. However, through reviewing official documents relating to the *Restriction Catalogue*, two versions are found. One is the *Guiding Catalogue of eliminating outdated techniques, equipment, and products in several industries* (MIIT, 2010), and the sections of restricted and eliminated techniques in the *Guiding Catalogue of Re-structuring Industries* (NDRC, 2011a). The two guiding catalogues are issued by different ministerial government department and a number of restricted or eliminated techniques are not consistent. For example, the former restricts iron-smelting furnaces with effective volume between 300m<sup>3</sup> and 400m<sup>3</sup> but the later restricts those with effective volume between 400m<sup>3</sup> and 1200m<sup>3</sup>. The *Restriction Catalogue* should have the potential to drive businesses to use good applicable techniques and equipment but the criteria issued by government departments should be consistent.

Besides the mandatory regulation, preferential tax policies are implemented in China. To receive a tax break, an enterprise's technology, techniques and equipment utilising by-products should meet the criteria of the *Promotion Catalogue* and the practice

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<sup>19</sup> The CE Promotion Law (2008) is a re-statement of the core preferential policies targeting the country's resource, energy and environmental goals as well as the legal notice about penalties on using outdated technique, equipment and material which bear the risk of high energy consumption and pollution.

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should be registered and assessed by the local RCR administrative department (MIIT, 2006). However, small businesses may therefore lack the financial capacity to introduce the promoted practices to enjoy the preferential taxes. Also, although the *Promotion Catalogue* is updated annually, the number of promoted technologies utilising waste resources is limited and cannot cover all ranges of RCR technologies. Therefore, businesses actually engaging with RCR activities cannot pass the assessment to get a tax break if their technologies are not covered in the *Promotion Catalogue*.

Incorporated into the above preferential tax policies, the *Promotion Catalogue* can drive capable enterprises to introduce the promoted RCR techniques, equipment and material. Moreover, *the List of Technically Innovative Pilot CE projects* aims to compile good technical practices working on building production chains for resource utilisation in heavy industrial networks and in industrial parks (MIIT, 2011b), and the first list was issued in 2012 covering 23 pilot CE projects (MIIT, 2012b). The catalogue can potentially guide inter-business IS activities, but so far, funding support for future innovative pilot CE projects is unclear as it is a newly developed programme, and therefore, its impact to date has been limited.

The policy instrument referred to by most of Chinese IS literature is developing EIP incorporating the IS concept. However, there has been no specific policy to promote

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implementing IS through EIP development. According to the State Council's policy document (2005), CE pilot projects should be promoted at key industries, industrial parks and cities to explore effective technologies and methods for resource, energy and environmental protection. Also, the government should support these pilot projects in terms of providing direct investment, grant funds, or subsidised loans. Besides providing funding support, in practice, local governments where EIPs are located have also worked on recruiting tenants to 'eat' local businesses by-products and developing sewage treatment plants and solid waste recycling facilities to enhance park-wide environmental service capacities (TEDA, 2006; Gao, 2010). During the process, the IS concept has been implemented to convert traditional industrial parks (or cities) into EIPs (or eco-cities). By 2012, China had developed 60 national pilot EIP projects since its commencement in 2001 (Zhao, 2012). Although the engagement with EIP development is entirely voluntary, cities compete to develop EIPs to promote their public images but are found to lack genuine environmental commitment to actually implement EIP development plans (Shi, Tian, & Chen, 2012).

Besides supporting the development of EIP projects, the government also committed to fund a range of technical, innovative individual RCR activities, infrastructure building for waste treatment and projects utilising large solid waste streams (NDRC, 2011c). These funds have a potential to mobilise businesses and regions to target resource efficiency and pollutants reduction. However, the scale of the supported subjects is

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restricted as the document (NDRC, 2011c) stresses the priority as supporting projects containing significantly innovative technologies. Lu *et al* (2010) study a range of central funds especially for environmental protection, and point out that there is insufficient attention on assessing project progress and effectiveness of using the funds and therefore problems emerged in the process of project implementation which cannot be effectively addressed in time.

### **5.2.2 Targets delivery landscape**

By contrast to the UK, the delivery landscape of the Chinese policy instruments is largely government-led rather than utilising extensive involvement of non-government organisations (NGOs) to deliver government resource efficiency targets. At the national level, responsibility for promoting resource efficiency and pollutants reduction is split among the National Development and Reform Commission (NDRC), Ministry of Industry and Information Technology (MIIT), and the Ministry of Environmental Protection (MEP). The NDRC, a ministerial department commanding the national economic and social development strategies is in charge of RCR and CED promotion of the whole society (NDRC, 2012b); the MIIT mainly promotes RCR and CED in industrial and information technology sectors (MIIT, 2012a); the MEP, a waste monitoring and enforcement ministry, is responsible for guiding and promoting CE, cleaner production and environmental protection industries (MEP, 2012a) through

funding support on pollution reduction activities.

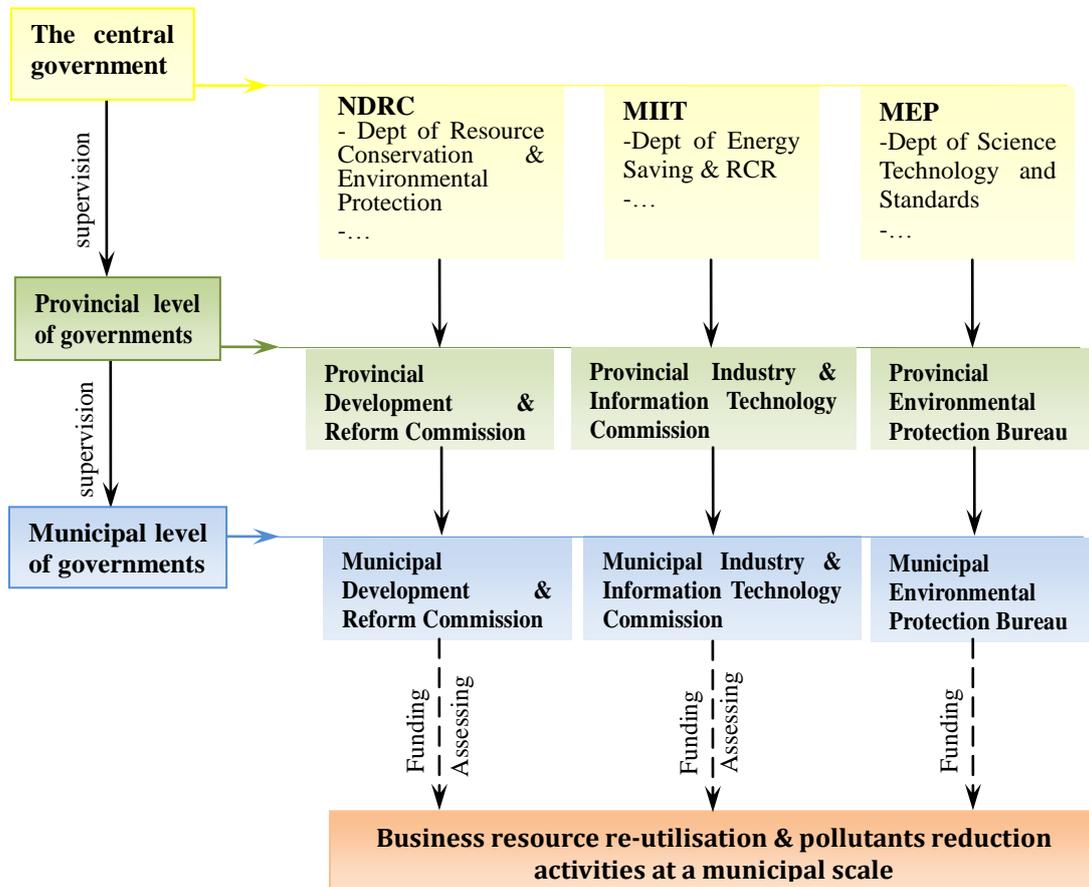


Figure 5.2 The Hierarchy of delivery landscape of RCR/CE

Compiled from NDRC (2012a), MIIT (2012c) and MEP (2012b)

At the sub-national level, the subordinate departments of NDRC, MIIT and MEP are responsible for delivering the regional and local targets through funding a number of pilot projects as mentioned in table 5.1. It is the NDRC initiated the assessment<sup>20</sup> of

<sup>20</sup> As mentioned in section 3.1, once businesses pass the assessment, they can enjoy certain tax break policies.

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local industrial RCR activities but at the regional level, it can be either the subordinate of NDRC or that of the MIIT to deliver the assessment. Therefore, the institutional settings delivering the targets are not consistent from the national to local level.

The complicated delivery landscape for resource and environmental targets is due to a series of reforms of the central government structure and the gradual adaption of a lower level government structure. The central government structure reforms have covered the formation of the NDRC to replace the former State Development and Planning Committee (State Council, 2003), and later establishment of the MIIT to replace the former Ministry of Information Technology, and to take over the NDRC's industrial administration responsibility including promoting RCR and cleaner production in industrial and information technology sectors (State Council, 2008). During the process of reform, provincial governments had the autonomy to either establish new or use existent departments to operate under the NDRC and the MIIT (Jin, 2009), and this therefore resulted in an uneven national delivery landscape.

Central to regional level of governments interact to implement resource and energy policies. Policy documents indicate that lower-level government authorities have to follow instructions issued by higher level units. However, the process is iterative. Ma *et al* (2012) studied the case of implementing energy policies in China and find that the process is characterised by the central government proposing policies; then, sub-level

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government begins to put them into practices; the central government then issues new policies based on experiences drawing from regional innovative and successful practices; finally, all regional governments are encouraged to follow the new policy.

### **5.2.3 Achievements and Problems**

According to the review (NDRC, 2011a; MIIT, 2011) of the national RCR achievements between the 11<sup>th</sup> five-year periods, during 2005 to 2010, the re-utilisation rate of certain resources, such as mineral resources (35%), solid industrial waste (69%), fly ash (68%), smelting slag (60%) and agricultural straw (70%) have exceeded the proposed target set in the 11<sup>th</sup> year plan; secondly, the gradual technical innovations have increased effective utilisation of household electronic waste, textile waste and certain mineral waste; thirdly, policies for RCR activities have been improved with the recent introduction of the regulation and stimulus summarised in Table 1; finally, there have been growing social benefits such as creating substantial job opportunities through RCR development. The report shows a positive progress of the national RCR development led by government. However, a number of points are needed to be clarified such as the source of the statistical data about resource re-utilisation rates, and the effectiveness of the funded pilot projects.

Given the Chinese policy instruments and delivery landscape targeting resource

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efficiency and pollutants reduction, four problems are identified: firstly, the lack of incentives for the reduction of landfill and businesses may not engage with RCR/CE activities if the landfill cost is lower than cost for other waste management activities. Secondly, fiscal incentives (both tax and funding resources) for SMEs' RCR/CE activities are limited due to the over-emphasis upon technical innovations of a limited number of RCR activities based on the annual updated Promotion Catalogue. Thirdly, compared to the UK, there is insufficient SMEs RCR/CE facilitation mechanism for utilising unwanted materials or energy. Fourthly, there are overlapping policy documents issued by the NDRC and the MIIT, and the responsibility boundary of their sub-national subordinate departments in promoting local resource efficiency is not clearly defined.

Generally, Chinese government departments have played a crucial role in promoting technical innovations on RCR and CE activities including IS initiatives. Chinese policy makers and related enforcement authorities could learn from the experiences of other countries. Through a process of lesson drawing, an exchange of information on the policies and practices of other nations could lead to the improvement of the national strategies for resource and environmental targets.

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### **5.3. The UK's performance-based devolution model for ISD**

In the UK, the Zero Waste Economy (ZWE) has been proposed as the Government's overarching goal to waste management, and is described as a longer-term vision to shift the current throwaway society through waste prevention, re-use, recycling and recovery, and disposal is the option of very last resort (DEFRA, 2011c). Instead of referring to generating no waste, the ZWE targets to waste nothing; specifically, the ZWE is characterised that resources are both financially and environmentally valued; one individual's waste is treated as another's resource; zero landfill may be realised over time; public are promoted to have new attitude to waste (DEFRA, 2010). To move towards the ZWE, improving resource efficiency and landfill diversion are adopted as key policy approach (DEFRA, 2012). Compared to China, the UK has a clearer policy context implementing ISD led by the UK's National Industrial Symbiosis Programme (NISP) assisting by a number of other policy instruments such as landfill bans, tax, guidance and funding support as shown in Table 1. The following sections analyse how the UK performance-based decentralisation model for ISD has been organised and delivered.

#### **5.3.1 Policy instruments**

In the UK, NISP can be treated as a networking facilitating policy instrument for ISD. The financial support for the networks is in the form of the financing the broker, NISP. The broker's performance, which is crucial to secure future funding, is measured by the

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impact it has delivered, such as the tonnages of waste diverted from landfill (Agarwal & Strachan, 2007). Facilitating networking seems to promote trust among network members for inter-organisational collaboration, which is connected to generating innovations and mutual competitive advantages (Hanna & Walsh, 2002).

The UK Landfill Tax was introduced in 1996. Landfill site operators are required for registering with the UK's tax and custom department to pay the landfill tax for every tonnage of waste that is landfilled. However, the tax is passed to businesses and local councils on top of their normal landfill fees. Also, value-added tax is charged on the landfill fees and the landfill tax. The tax rate has increased annually since the introduction of the landfill tax in 1996 (Seely, 2009a). The increasing landfill tax has potentially pushed businesses in the UK to seek reduction, reuse and other waste management solutions, such as IS activities. For example, according to a representative of a waste management company, the landfill 'escalator' has the potential to allow non-landfill technologies to compete with landfill:

“At an £80/t landfill tax, the total cost of landfill would rise to approximately £100/t and at such levels it is considered that there are a number of alternative waste treatment technologies (including mechanical biological treatment, anaerobic digestion and large thermal plants such as incineration with energy recovery) which are capable of operating at a lower total cost to users than landfill. Accordingly, there is an opportunity to target C&I (commercial and industrial) residual waste for disposal in non-landfill treatment technologies.”

(MT Waste Management, 2011)

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Besides adopting landfill tax and bans to divert business to other waste management options, the landfill tax has worked as a special funding resource to support business resource efficiency activities and programmes (such as WRAP<sup>21</sup> and NISP) to promote resource efficiency (Eunomia, 2008; Seely, 2009b).

The Waste Protocol Project (WPP) was launched in 2006 with the collaboration of the WRAP, the Environment Agency (EA), DEFRA<sup>22</sup> and industry (Laidlaw, 2008). A variety of waste materials have been examined to establish if, and how, they can be fully recovered and turned into one or more alternative products. Until now, the waste resources studied have covered aggregates from inert waste, compost, anaerobic digestate, flat glass and 20 other waste streams (EA, 2012a). Achievements of the project include Quality Protocols which set out the end-of-waste criteria on how to make products from a range of waste streams allowing businesses to use the recovered products without waste management controls, and a statement that confirms to the business community the legal obligations they must comply with to use treated waste material (Laidlaw, 2008; EA, 2012a).

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<sup>21</sup> WRAP refers to the Waste Resource and Action Programme. Launched in 2000 with government funding, the programme aims to help recycling take off in the UK and to create a market for recycled materials (WRAP, 2012). Unlike NISP focuses on promoting cross-industry resource efficiency, WRAP focuses on creating markets for recycled resources (DEFRA, 2009).

<sup>22</sup> DEFRA refers to the Department of Environment, Food and Rural Affairs. It is a government department in the UK (DEFRA, 2011a).

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With the objective of exploring the end-of-waste status of a number of waste streams, the introduction of the Waste Protocols Project reflects the UK's valuation of an accurate definition of waste, and what activities cause waste to cease to be waste. The role of an accurate definition of waste has been connected to the collection of precise information about the nature and volume of wastes arising, and the formation of appropriate waste options and strategies (Phillips *et al.*, 1999; Jamasb & Nepal, 2010). Meanwhile, the clarification of certain activities ceasing waste status can guide businesses to try different options to reuse and recover waste to products which potentially promote IS activities among businesses.

### **5.3.2 Targets delivery landscape**

DEFRA is identified as the key national government department promoting resource efficiency and landfill diversion through financing and supervising a range of delivered partners to implement its ZWE goal. Under the control of DEFRA, a number of key organisations promoting the UK ISD are identified (see Figure 5.3).

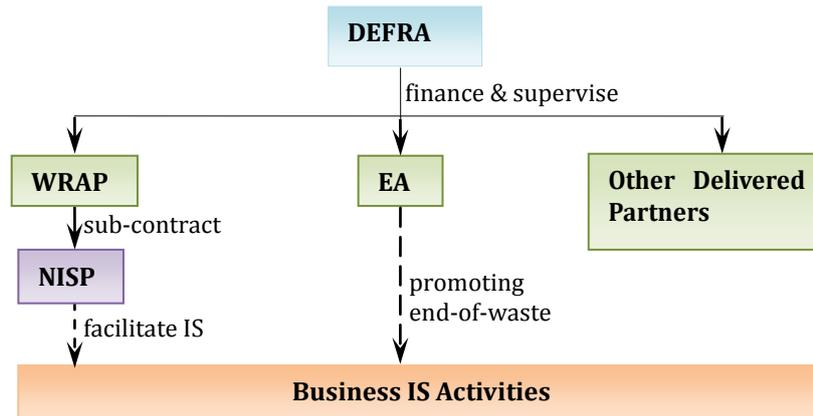


Figure 5.3 Key Organisations for ISD in the UK, compiled from DEFRA (2011a)

The EA as a waste regulator has led the development of the guidance on the end-of-waste criteria to stimulate businesses to utilise waste streams to produce quality products, and the major motivation for the EA’s involvement in resource efficiency promotion is the EA’s objective to help producers and managers to treat waste as a resource and divert it away from landfill (EA, 2012a). Meanwhile, as an environmental regulator, the EA is responsible for providing general information and advice on complying with WEEE, packaging and waste batteries regulations for relevant producers who are required to register with the EA by these regulations (EA, 2012b).

NISP is a non-government organisation (NGO) delivered regionally by a number of environmental services organisations with government funding to facilitate business networking for ISD. Since 2010, NISP has been under the control of its previously parallel organisation, WRAP. The re-organisation of bodies was aimed at reducing

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customers' confusion by the myriad of services and bodies, and bring clarity for those seeking advice and support on resource efficiency (Letsrecycle, 2009). Seeking continued funding is one of NISP's key tasks (Mirata, 2004), but it was based on the generated outputs which were argued to be necessary to establish a method to quantify (Agarwal & Strachan, 2007). Since the initiation of the programme, NISP has focused establish quantitative methods to calculate its achievements. The quantified indicators cover landfill diverted, CO<sub>2</sub> reduction, hazardous waste eliminated, virgin material saved, water saved, cost savings to UK industry, private-sector investment attracted, and additional sales generated (relating to value created by utilising waste resources). Recording and calculating outputs are also required by NISP funding bodies, maximising resource re-use and meeting associated funding targets are a priority for NISP (Jensen *et al.*, 2011).

In Britain, there has been a devolution of responsibilities for NGOs or so-called delegated agents, such as WRAP and NISP, with funding or other support from government since 1980s (Wettenhall, 1981 & 2005; Flinders, 2004). The NGOs are therefore given a certain degree of management autonomy to achieve given policy objectives (Laking, 2005). To some extent, using NGOs instead of government departments to provide certain public services, such as facilitating industrial resource efficiency, has been argued by Laking (2005) and Tan (2010) as a more efficient way to deliver better results. NGOs can be more focused on specific objectives and have the

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freedom to make management decisions without operating with multiple or unclear objectives and limited managerial freedom. However, for these delegated organisations, securing sustainable funding resources has been described to be the key problem (Macmillan, 2011). Since 2008, the budget allocation for DEFRA has been seen a significant reduction in the money available for national business support for resource efficiency, and most public sector organisations are being forced to adjust to cuts in their funding. WRAP's budget will be cut by 37%, from £48 million in 2010/11 down to £30m in 2014/15. NISP receives the largest proportion of WRAP funding and its funding will be cut by 30% (Croner-i, 2012).

### **5.3.3 Characteristics of the UK's model for ISD**

With the development of the national waste policy instruments, there has been a significant achievement in commercial and industrial (C&I) waste management activities in England. Figure 5.4 compares the development of C&I waste management methods in different years:

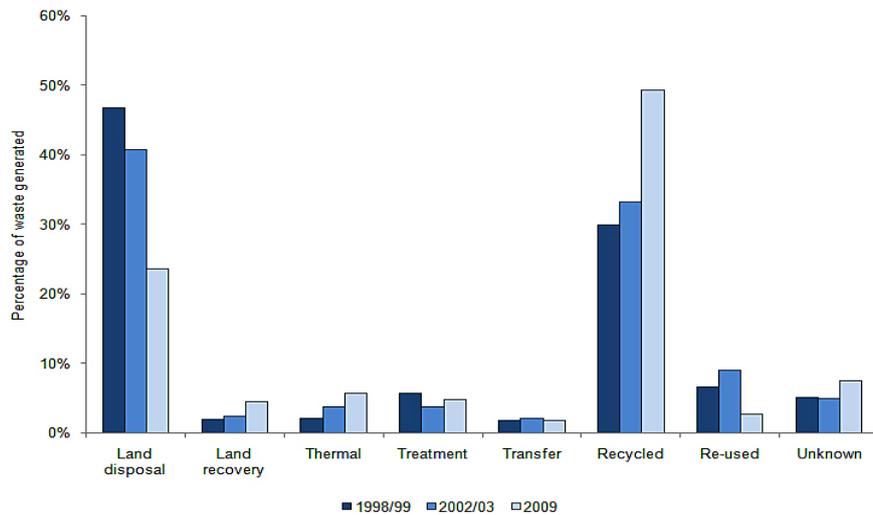


Figure 5.4. Management method as a percentage of total C&I waste, England, 1998/9, 2002/3, and 2009

Source: DEFRA (2011b)

According to DEFRA (2011b), in 2009, 52% C&I waste was recycled or reused in England compared to 42% in 2002/3; whilst, 24% of C&I waste was landfilled in 2009 compared to 41% in 2002/3. There has been a trend of decreasing landfill options and increased recycling activities on business C&I waste management activities in recent years. With regard to the sources of the statistic data, private consultancies were commissioned to undertake the national survey of C&I waste arising and management methods by DEFRA. The consultancies' method and data were externally evaluated and signed, and the details of the sampling and data analysis methods of the national survey are published (Jacobs, 2010).

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Led by NISP, the funded cross-industrial resource efficiency facilitation programme, the UK's model for ISD is clearer compared to the Chinese policy context affecting ISD. The model integrates a number of inter-supported policy tools, such as the landfill tax, WWP projects, providing both “sticks” and “carrots” to businesses engaging in resource efficiency activities rather than landfill options. In terms of the delivery landscape, the UK's ISD model is decentralised to performance-based NGOs. However, there is huge uncertainty regarding this ISD delivery model as the funding is not permanent and is affected by the NGO's performance and the national financial environment.

## **5.4. Lessons for China**

This chapter provided an indepth analysis of Chinese and the UK's policy contexts targeting their resource efficiency and pollutants/landfill reduction goals. The Chinese model focuses on government's funding support, preferential tax and guidance to drive different levels (enterprise, park and city levels) of significant technical innovations on resource efficiency and pollutants reduction; whilst, the UK's model provides both “sticks” (e.g. landfill tax) and “carrots” (e.g. business facilitation programme and guidance) to businesses engaging in resource efficiency activities. Regarding the delivery structure of the UK's model, it is devolution of public services to NGOs whose funding support relies on the short-/medium-term programme outputs.

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The UK's performance-based devolution model for ISD would be valuable for China in terms of its possibility to facilitate SMEs' resource efficiency activities, and to manage information exchange among the business networks. In China, as there has been the promotion of concepts such as RCR and the CED, when drawing upon the UK's model, it is necessary to understand the UK's policy context and then consider how to integrate the ISD approach into the Chinese policy framework to meet its resource and environmental targets.

With regard to the extent of utilisation of the UK's model of ISD, it will rely on the decision of Chinese central/regional government. As argued by Wolman & Page (2002), it is the recipient who should evaluate the quality and relevance of the received information. The policy knowledge utilisation can range from getting an inspiration to replication. The inspired points can be (1) giving pressure to business to divert landfill; (2) using "the tonnages of waste diverted from landfill" rather than the "pollutants reduction rate" as an important environmental protection assessment indicator; (3) clarifying the responsibility boundary of the NDRC, MIIT, MEP and their subordinates. The MEP's responsibility could be set to provide businesses with guidance to treat waste as a resource and divert it away from landfill, to advise businesses about methods to obey certain resource efficiency regulations, and to monitor waste activities; whilst, the MIIT's responsibility could be encouraging industries to engage in resource

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efficiency activities; (4) opening up the resource efficiency data collection and calculation methods rather than only publishing the statistical data.

This chapter provides policy context for ISD in the UK and China, and how the Chinese side could draw upon the UK's policy context fostering the transferred knowledge (NISP's IS network facilitation model). The following chapter describes empirical research findings on KT and KM in NISP which is a programme shaped by the UK's waste policy context.

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## **Chapter VI The development of NISP & its organisational knowledge**

### **6.1 Introduction**

In the overall research framework, NISP is identified as the knowledge provider which has been transferring its organisational knowledge to TEDA eco-centre, the knowledge recipient, in China. In contrast to the trans-national (inter-organisational) KT case, KT within NISP is identified as a national (intra-organisational) KT case. The transferred knowledge refers to NISP's IS network facilitation knowledge. This chapter focuses on exploring KM and KT within NISP to fill the gap of relevant case study research into non-profit franchising (see section 3.4).

There have been intensive discussions on knowledge creation mechanisms and strategies to process organisational knowledge for dissemination in KM literature (see section 3.3). These theoretical perspectives can potentially guide the exploration of how IS network facilitation knowledge has been created and prepared (codified or personalised) for replication. Regarding KT literature, KT processes and factors affecting these processes are summarised in section 3.5 and 3.6 and can guide the exploration of processes and influential factors in KM and KT within NISP.

Previous KM research has focused on classifying organisational knowledge types from

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the perspectives of visibility (e.g. *tacit* vs. *explicit* knowledge) and function (*strategic* & *operational* knowledge) (see section 3.2.2) but there is little discussion on what the transferred knowledge is. For example, NISP's IS network facilitation model has received substantial academic interest (see Kim & Powell, 2008; Dom énech & Davies, 2009; Costa, *et al.*, 2010). However, this has not analysed NISP's organisational knowledge to provide a deeper understanding of NISP's IS network facilitation model.

This research therefore uses NISP's IS network facilitation knowledge as an example to develop a deep understanding on how an organisation's knowledge has been developed and processed for dissemination. Specifically, NISP's organisational knowledge is abstracted and classified through analysing a number of practitioners' opinions on how they have conducted routine work in their organisation and internal documents collected through participant observation.

The structure of this chapter is expressed in figure 6.1. Section 6.2 describes the origination and development of NISP's IS network facilitation approach. Section 6.3 presents the foundation for KM and KT within NISP --- a non-profit franchising system. Section 6.4 explores KM activities within NISP. Section 6.5 discusses formal and informal KT with NISP. Section 6.6 presents a summary.

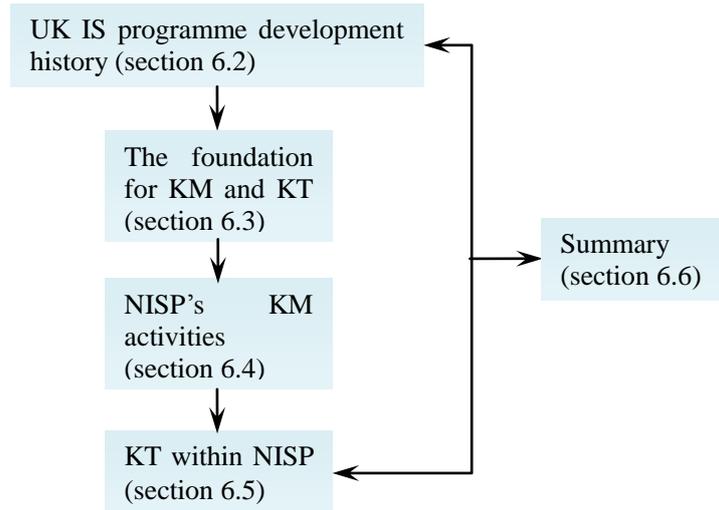


Figure 6.1 The general structure of chapter 6

## **6.2 The creation of NISP’s IS network facilitation model: understanding the mechanism and the model**

### **6.2.1 Pre-initiation stage**

Regarding the origination of IS programmes in the UK, people participating in the programmes at the early stage have confirmed that lessons were drawn from the U.S.

By-product Synergy (BPS)<sup>23</sup> programme.

“The idea behind NISP came from a chance meeting in 1999 between Andy Mangan of the United States Business Council for Sustainable Development (US BCSD) and Peter Laybourn, NISP’s founder and Programme Director [...]. Peter was introduced to Andy who explained the By-Product Synergy (BPS) Programme that they had set up in Tampico Mexico in 1997. This idea inspired Peter to develop the IS model that has become NISP.”

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<sup>23</sup> In later 1995, the BPS model began to be conducted by BCSD-GM which received a grant from U.S. EPA to identify synergy opportunities within BCSD-GM member companies (Mangan, 1997).

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--- Laybourn, the founder of NISP, (2009, p. 69)

“Peter Laybourn, founder of NISP, credits its creation to hearing about the BCSD-Gulf of Mexico programmes through the U.S. BCSD”

--- Mangan<sup>24</sup> and Olivetti (2010)

From the perspective of organisational knowledge creation, through personal interactions, the knowledge (idea) gained by the NISP’s founder from Andy Mangan (funder of the PBS-US) has been the main trigger for the idea of NISP. This can be viewed as a socialisation process for knowledge creation and face-to-face communication played a key role in process. Similarly, Sveiby (1997) proposes that knowledge is supposed to emerge within a certain context through social interaction (interactions among participants involved). However, when the knowledge was received by the NISP’s founder, it was still a personal knowledge instead of an organisational knowledge. It is probable that socialisation in terms of personal communications resulted in the creation of personal knowledge. The following section discusses how this type of personal knowledge had been developed into an organisation’s knowledge.

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<sup>24</sup> Mangan is the founder of the BPS-U.S. programme (Mangan, 1997).

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## 6.2.2 Expanding regional pilot programmes

The early development history of IS programmes facilitated by BCSD-UK is recorded by Mirata<sup>25</sup> (2004). In summer 2000, an international oil and gas company in the Humber region had a Mexican branch that had joined the regional BPS programme facilitated by BCSD-GM. The company planned to develop a CHP plant in Humber and sought support for its project. So, they invited the coordinating team in Tampico to raise awareness for the project and led the initiation of the Humber region IS programme (HISP). Shortly after the initiation of HISP in 2000, BCSD-UK was assigned to coordinate HISP. NISP's founder, Laybourn, has been involved in the establishment and management of the BCSD-UK (EBC, 2003; BPS, 2011). Working with BCSD-UK potentially provided NISP's founder opportunities to lead the organisation to practise IS network facilitation approach shared by coordinating team from Tampico.

BCSD-UK adopted the methodologies applied by BCSD-GM which focused on raising the awareness of the IS programme, collecting waste data, analysing synergy opportunities, implementing and evaluating achievements and providing on-going

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<sup>25</sup> Mirata was the research associate from IIIIEE and was seconded to BCSD-UK to participate in the pilot IS programmes and to conduct research on how to promote the development of IS networks (Mirata, 2004)

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support. Also BCSD-UK invited an academic institution<sup>26</sup> to participate in the programme to improve the methodologies such as widening the facilitated synergy types from material/energy flows to general business needs and capacities (Mirata, 2004). These are examples of acquiring another organisation's knowledge. Through collaboration with other organisations, IS network facilitation knowledge was acquired and implemented by BCSD-UK.

Besides acquiring knowledge from other organisations, there was KT from BCSD-UK to organisations in other regions to expand the network of the IS programmes in the UK in the West Midlands and North West regions:

“A regional environmental business association (Midlands Environmental Business Communications—MEBC), that is historically well embedded in the area [...]. BCSD-UK informed MEBC personnel about the details of an IS programme, and shared their experiences about HISP. MEBC agreed to become the regional coordinator for the West Midlands IS programme (WISP).”

---Mirata (2004, p. 975)

“A private organisation with a long history in the region, the North West Chemical Initiative (NWCII), decided to coordinate an IS programme in Mersey Banks (MISP) [...]. The BCSD-UK informed regional coordinators about the programme's details and shared their experiences from HISP and WISP.”

---Mirata (2004, p. 977)

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<sup>26</sup> The institution refers to the International Institute for Industrial Environmental Economics (IIIEE) at Lund University, in Sweden. The institute has expertise conducting research to support regional environmental development and was collaborating with BCSD-UK to promote pilot IS programmes between 2000 and 2002 (Mirata, 2004).

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Through socialisation (experience sharing, see section 3.3.1), BCSD-UK's organisational knowledge therefore was disseminated to other organisations. The objective of the inter-organisational KT was more about marketing the significance of the knowledge to expand the IS network. As mentioned by Matt *et al.* (2011), in some types of non-profit collaborations, knowledge providers do not mind disclosing their information. One of the possible reasons is that revealing the knowledge is a deliberate signaling strategy to display a technical competence or its willingness to cooperate or expand (see section 3.6.3).

In the process of programme implementation, the key barrier for BCSD-UK has been a problem of funding. At the end of 2001, HISP's progress was stagnant due to lack of funding. Applying for government funding support rather than charging business membership fees was considered as a solution to develop the programme as well as organisational knowledge:

“Participating companies were required to sign a contract for their involvement in HISP, entitling them to channel a certain percentage of their economic gains from possible synergies to the coordinating body. This element caused reluctance in local companies, as they did not feel comfortable with making such a commitment.”

---Mirata (2004, p. 973)

“I managed to persuade (a NISP funder) to get some funding there to develop the (programme operation) methodologies.”

---Interviewee 1, 2009

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The problem awareness, discussion and resolving activities during the process of knowledge implementation potentially resulted in the updating of organisational knowledge – facilitating IS network free of charge unlike the BPS model. In 2003, BCSD-UK received funding from the Onyx Environmental Trust through the UK's Landfill Tax to lead the delivery of a number of regional IS programmes (Laybourn & Clark, 2006). The funding had provided an opportunity for BCSD-UK to expand IS programmes to more UK regions. As mentioned by a NISP founder, “We used the money in the West Midlands and in Yorkshire and the Humber, and that was in 2002, and by 2004, we had some good early results. So, I then approached the UK government, and I bid into a programme for money there.” The second round of public funding support therefore provided resource for regional pilot IS programmes to expand with nationwide coverage.

### **6.2.3 Understanding the relationship between the BPS and NISP model**

Typical programme delivery tools adopted by the regional trial programmes, NISP and BPS programme are listed in table 6.1.

Table 6.1 Identified programme delivery tools

Types of programme delivery tools	Original BPS programme around 1996	UK regional trial industrial symbiosis programmes (ISPs) (2000-2003)			NISP (2005-on)
		Humber region	West Midlands	Mersey Banks	
Conducting workshops for awareness raising	√	√	√	√	√
Sending questionnaires to companies to collect waste information		√	√	√	
On-line waste information collection			√		
Using PAGs <sup>27</sup> to facilitate decision		√	√		√
Membership fee to solidify business participants' commitment	√	√	√	√	

Compiled from (Mangan, 1997), Mirata (2004) and Laybourn & Morrissey (2009)

It seems that although there were initiatives to share these IS network facilitation tools from the BCSD-UK to three regional trial programmes, there was no formal (contract-based) knowledge codification or dissemination activities (see Mirata, 2004). So, the type of inter-organisational KT was based on socialisation, e.g. face-to-face communications to exchange tacit knowledge.

During NISP's development history, although there have been changes in the identity of programme delivery organisations (e.g. ISL replaced BCSD-UK), NISP's key organisational knowledge (programme operation methods) were retained due to the key

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<sup>27</sup> PAG refers to programme advisory groups which constitute by business members and are supposed to take key decisions about the trial IS programmes (Mirata, 2004).

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personnel (e.g. the founder and participants engaged in early pilot IS programmes) remaining in the programme. With regards to the adopted programme delivery tools, a number of them had been abandoned by the NISP model as shown in table 6.1. For example, sending questionnaires to companies and waiting for their return was initially used as a key method to collect participants' waste flows. However, the data collection was difficult due to business members attaching low priority to engaging with IS activities (Mirata, 2004). So, this data collection method was abandoned. Also, one of the trial projects used an on-line database which could be accessed by business participants to input their waste data. Although Mirata (2004) believed that the method would be widely adopted in future, it was not retained as the quality of data provided could not be guaranteed.

“When NISP started, [...] their original idea was to train all the industries to use the database directly. So, everybody wouldn't input wrong data [...] but after a while they changed their mind [...]. That's sort of open using IT didn't quite work as they hoped [...]. It (data quality) relied on people consuming their time put the date in it and then go and search for the other solutions. Most of these guys had a day job [...]. So, it's hard to get them to concentrate”.

---Interviewee 5, 2010

Thus, it is not feasible to train business members to use input resource data and find synergy opportunities as it increases business costs to conduct IS transactions in terms of contributing time to accept training and to find synergy opportunities themselves. Rather than keeping the data collection method, NISP's data collection process was

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mainly conducted through Quick Wins Workshops (QWWs<sup>28</sup>) and practitioners' site visits.

“Workshop is a tremendous recruitment and getting information quite quickly from companies.”

--- Interviewee 1

“By visiting and collecting these data, it's good quality data that we have into the database. As to workshop, where you [...] may not have the experts in the company, [...] you don't always get a good quality data [...]”.

--- Interviewee 3

The idea to use face-to-face approach (through workshops and site visits) to collect data from companies is to increase the credibility of the data. The revision of the data collection methods is an example of updating organisational knowledge during the process of programme implementation.

Meanwhile, a number of tools adopted by the early trial programmes had been revised and retained into the NISP model. For example, conducting workshops was used to raise business awareness of the IS programmes, rather than to directly implement IS (Mirata, 2004). The method was still there to market the IS programme.

“In my opinion the QWW data was used more for 'marketing' purposes to show the potential of IS”

---Interviewee 12

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<sup>28</sup> QWW is usually a half-day event, through which NISP created interaction spaces through facilitated information exchange and networking activities around sharing individual firms' waste and resource needs (Paguin & Howard-Grenville, 2012).

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The researcher attended three QWWs held by different NISP regional teams in 2009. In every workshop, there was a session for a NISP practitioner to present the idea of IS and successful cases facilitated by NISP. The type of presentation on QWWs assisted marketing the significance of NISP.

The early trial programmes tried to set up regional PAGs to assist programme delivery teams to make decisions. This strategy was also retained as PAG was valued as a ‘think-tank’ of NISP.

“All the regions have a group. I think the idea came from the structure of the pilot programmes who is the industrial based steering group to oversee the work of the pilot programmes [...]. Honestly, they’ve been one of the elements that we’ve been success [...]. So, it’s a chance to interact with some of the industries that we’ve worked with on our regular basis.”

--- Interviewee 8

“(Regarding organising PAG meetings), it’s a sort of feeding up from the bottom up to what you’re doing [...]. You’ve got input from practitioners’ working and how we think to improve but also listen to your customers the same time.”

--- Interviewee 7

So, PAG acted as a steering group guiding the development strategy of NISP. Through keeping networking with PAG members, business members’ demand could be identified and satisfied.

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Therefore, parts of the initial BPS elements have been revised and retained in the NISP model based on experiences gained from repeated practices. In addition, NISP had evolved with the development of programme delivery tools more than those mentioned in table 6.1. The process of giving up unsuitable methods, retaining feasible ones and exploring other good practices had inevitably promoted organisational knowledge development. With the roadmap to expand the IS programme or further develop the organisation, KM and KT were required. Before exploring KM and KT within NISP, the foundation for the activities is introduced.

### **6.3 Non-profit franchising: a foundation for KM and KT within NISP**

After BCSD-UK's contract to deliver NISP was completed in 2006, International Synergies Ltd. (ISL) which was founded by a number of key personnel of BCSD-UK began to delegate the delivery of NISP through subcontracts to a number of environmental consultancies to establish NISP regional teams. By 2010, the landscape of a national scale IS programme had emerged as shown in figure 6.2.

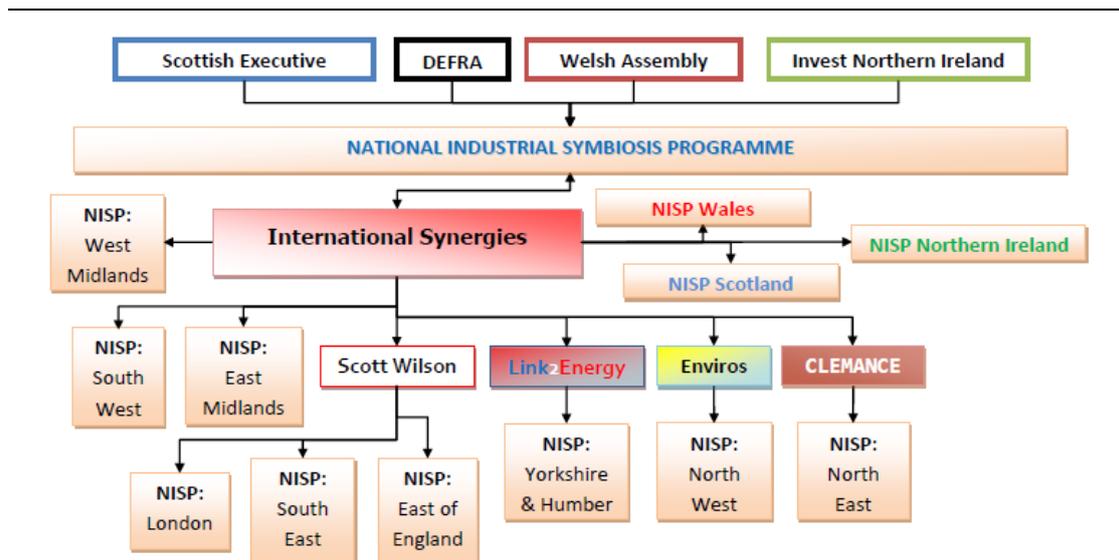


Figure 6.2 A simplified NISP delivery and support structure

Source: Interviewee 4 (a NISP staff). The information has been double checked with the description provided by the website of International Synergies Ltd. (Enviros now is called SKM-Enviros)

The funding and delivery bodies of each regional IS programme is shown in figure 6.2. Four major national funders were the Scottish Executive, DEFRA, the Welsh Assembly and Invest Northern Ireland. International Synergies Ltd. (ISL), an environmental services company, bid for the main contract from government to deliver NISP, a non-profit organisation (Laybourn & Morrissey, 2009). Another four environmental consulting organisations, Scott Wilson, Link2Energy, Enviros, and CLEMANCE were sub-contracted by ISL to run NISP regional programmes.

As the four organisations had to provide IS network facilitation service to local

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businesses with specific requirements such as the same programme name, logo and standards (Laybourn & Morrissey, 2009), they could be viewed as franchisees of ISL who led the funded non-profit franchising system as a franchisor. With the contribution from all collaborators, a national programme quickly developed. According to Jarvis (2007), the formation of franchising is a solution for a quick and cost-effective mode of expansion. Also, to ensure that the franchisor's business model (IS network facilitation approach) was executed by all franchisors, there had been KM and KT within the non-profit franchising led by NISP's headquarters, ISL. The following sections therefore present research findings about how KM and KT activities were conducted in NISP.

## **6.4 KM within NISP**

This section focuses on illustrating three types of NISP's KM activities covering the development of its ICT, and collecting and codifying programme running procedures and synergy facilitation knowledge.

### **6.4.1 The development of ICTs**

Developing ICTs can be knowledge-intensive business services' (KIBS) key approach to promoting knowledge acquiring and transferring (Koskinen & Pihlanto, 2008). In NISP, an ICT software program, Core Resource for Industrial Symbiosis Practitioners (CRISP), was developed to enable NISP practitioners to input collected information on

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resources “wants”/”haves”, on-line communications, synergy management and outputs monitoring from business members (Laybourn & Morrissey, 2009).

#### **6.4.1.1 The knowledge of operating CRISP**

Based on the CRISP operation manual that read by the researcher through internship with NISP, and the software introduction in a NISP publication (Laybourn & Morrissey, 2009), the general steps to use CRISP can be described as follows:

- Information on resource “haves”/“wants” is input into CRISP;
- Synergy opportunities are identified by practitioners based on the input data and personal industrial knowledge;
- The synergy is then recorded in CRISP through manually matching the resource “wants” and “haves” recorded in the database;
- Practitioners begin to share the information with relevant business members, and leave space for them to decide whether or not to make the synergy happen;
- Practitioners also track and record the progress of the synergies, and add occurred (economic, technical, resource and legislative) barriers in the synergy facilitation process;
- Once practitioners know that any synergy is completed, they contacted business participants to collect data on tonnages of waste diverted from landfill, tonnages of saved raw material or other benefits. Tonnages of reduced CO<sub>2</sub> emission are calculated through a built-in algorithm.

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The above procedures mentioned in CRISP manual can be viewed as codified information. Therefore, developing and compiling the software manual is a type of externalisation (*tacit to explicit*) activities to create new knowledge in NISP (see section 3.3.1).

Besides having opportunities to operate CRISP, during the internship with NISP, the researcher communicated with the IT team about how the synergy-details recorded in CRISP could be processed and utilised. Basically, the IT team was able to export the data stored by CRISP into a spreadsheet including columns of resource owner details (e.g. name, location, contacts and standard industrial classification code), resource information (e.g. required or excess resource, quantity and European waste catalogue code), synergy implementation status (e.g. whether the resource has gone into a synergy and the synergy progress), synergy outputs calculated by a built-in algorithm, and synergy facilitator's details. Also, information inputted into CRISP could form a database of utilising various by-products under certain conditions (e.g. geographical locations and regulatory requirement). Similarly, as mentioned by an IT staff.

“This data (which were stored in CRISP) could be manipulated in excel and spaghetti diagrams to show various metrics / trends, this same data was also used in a Geographic Information System (GIS) to plot resource hases & wants on a map of the UK, as well as showing various outcomes (and their size) on a map of the UK.”

--- Interview 12, a NISP IT staff

So, generating metrics, trends or a map of resource distribution can be viewed as a

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combination process which refers to re-arranging, categorising, re-classifying, and synthesising *explicit* knowledge to form more systematic sets (Nonaka & Takeuchi, 1995) (see section 3.3.1). The development of CRISP assisted NISP's headquarters to manage and utilise synergy data collected by all franchisees and to monitor their synergy facilitation progress.

Based on the researcher's experience, all facilitated synergies were recorded in CRISP. Therefore, CRISP could also act as a knowledge base storing successful options of utilising waste resources and problems of conducting certain types of synergies. Through retrieving and learning the information, practitioners' synergy facilitation knowledge could be enhanced. So, CRISP could be treated as a synergy dictionary. However, whether or not to use the dictionary relies on practitioners' willingness.

Also, as mentioned in section 3.3.2.1, storing the codified or explicit knowledge object into the organisational knowledge base is a key task in KIBS to ensure visibility, accessibility and re-utilisation (Shankar & Gupta, 2005; Chai & Nebus, 2012). However, rather than relying on the synergy opportunities identified by CRISP to match resource "haves" and "wants", practitioners interviewed also used their own knowledge to identify synergy opportunities:

"You can search on CRISP to see what happened before [...] but we don't necessarily live by CRISP. So, when it comes to matching companies, we often know it rather than relying on the database. "

---Interviewee 6

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“We’ve got an idea about who’s about anyway. So, we won’t either look into CRISP because it’s knowledge that you’ve got from here of who’s about, and that’s why these events (QWWs) are useful because then you were introduced to more companies [...].”

--- Interviewee 7

“It is the relationship that the practitioner has with that company that would lead me to say ‘the difficulty is that (using boiler ash as a fertiliser identified by CRISP) can’t go to land because it would contravene regulatory things’ [...] So, the computer system is really just a trigger to remind the practitioner, of hours in their head because you cannot as a human being, you cannot hold all this information [...].”

--- Interviewee 2

The above opinions show that frequently, synergy opportunities identified by CRISP were unfeasible. Based on the researcher’s experience of using CRISP, for example, the special size or condition of wooden pallets required by a company was often a barrier to utilising discarded wooden pallets. So, practitioners needed to recruit new business members through QWWs for wood waste industry for example to increase the opportunity that a special type of wood waste can be utilised. It was necessary to use personal and tacit knowledge to identify synergy opportunities in CRISP and the software did increase practitioners’ working efficiency. However, it is also probable that information inputted into the database was not sorted in a way that could be accurately retrieved. Functioned as a database to store key organisational knowledge --- synergy facilitation approach (e.g. successful resource re-utilisation options), there was a need to improve functions of CRISP were for better KM. The following section

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discusses the potential to improve CRISP.

#### **6.4.1.2 Potential to improve functions of CRISP**

The main problem with CRISP was that it was not user-friendly enough to collect synergy facilitation details from practitioners.

“Initially CRISP was designed to collect data and also knowledge about how IS projects were executed. However, we discovered that CRISP was not seen as a user-friendly system by the practitioners, so they only entered the very minimum information, which was mainly about synergy outcomes, companies involved and resources, the important knowledge about how projects were executed and the critical success factors was missing.

--- Interview 12, a NISP IT staff

Interviewee 12's comments show the relationship between ICT technology and effectiveness of knowledge management. Knowledge of synergy facilitation was NISP's core organisational knowledge 'asset'. However, due to the design limitation of CRISP, practitioners' synergy knowledge could not be effectively collected and codified. Therefore, the IT team began to develop an up-graded version of CRISP, called 'SYNERGie'. According to interviewee 12, “the new system (SYNERGie) was purposely designed to be much more user friendly and centred around collecting knowledge about project execution and success factors.”

During the researcher's internship in NISP, she was assigned to analyse data stored in CRISP and give advice to improve functions of the software. Key problems were found

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in the method of recording synergy barriers. When recording barriers to facilitated synergies in CRISP, practitioners could only select options under general headings such as resource, technical, financial and legislative barriers. However, no definition on what classified each type of barrier was given. For example, regarding the volume of one company's waste resource was too low to be accepted by another, some practitioners marked it as a resource barrier but some others recorded it as a financial one. Also, a "write-in" space might be useful to capture information that did not fit pre-designated categories. For example, if a legislative barrier was recorded for utilising food waste, it was unclear which type of regulation affected the synergy implementation process. Therefore, lessons that could draw upon from this synergy would be limited.

In the researcher's internship report, she recommended the need to give accurate definition of each type of barriers, collect more details on existent synergy barriers from practitioners, and codify them into a number of categories. Then, the IT team could add the categories into CRISP as sub-options of resource, technical, financial or legislative barriers for practitioners to select (e.g. resource barriers – different size specification, contamination, etc). Then, the IT team could periodically export statistical reports on barriers affecting the use of certain waste resources from CRISP. The information could be published in the ICT platform for practitioners to learn. The internship report was shared with the IT team and the IT staff agreed that the barrier record method in CRISP did not encourage practitioners to give more details. They also agreed to incorporate

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these ideas into the new system, SYNERGie.

## 6.4.2 Collecting and codifying IS programme delivery knowledge

### 6.4.2.1 IS Programme delivery knowledge

Based on data summarised from in-depth interviews, participant observation and NISP's documents, the IS programme delivery procedures can be summarised as illustrated in 6.3



Figure 6.3 NISP programme delivery procedures

As shown in figure 6.3, the general programme delivery procedures cover two components. The first one refers to programme development strategy including seeking funding support from government and establishing a programme delivery team to

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develop and facilitate IS networks. The second one is programme operation procedures – e.g. holding various events to recruit business members for data collection, facilitating identified synergy opportunities and releasing outputs report for successful synergies. Programme executing knowledge is analysed in details to develop a better understanding of NISP’s organisational knowledge and NISP’s knowledge dissemination style relating to codification and personalisation mentioned in chapter 3.

### **(1) Strategic knowledge of developing the IS programme**

Strategic knowledge of developing the IS programme covers the knowledge of seeking funding support and establishing a programme delivery team. Regarding seeking funding support, the key knowledge is to prepare funding proposals and continuously look for potential funding sources.

“I wrote a proposal and I then sent it to the Onyx Environmental Trust Board and convinced them it’s worth trying and they gave me 300,000 pounds (straight) away to do a pilot project [...]. We used the money in the West Midlands and in Yorkshire Humber, and that was in 2002. And by 2004, we had some good early results. So, I then approached the UK government, and I bid into a programme for money there.”

---Interviewee 10

“...It was a very big pressure to keep this consistently search for funding [...]. I was advised by somebody else “start looking for the next sort of funding now not in two years time [...].” So, from the very start, the industrial symbiosis programme was trying to work out where we could get other sources of funding from all the time.”

---Interviewee 5

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So, to bid for funding support, at first a funding source should be identified. The availability of a funding source for business resource efficiency facilitation programme relied on the waste or resource policy and strategy of the country. Also, a funding proposal presenting the programme strategy to target the country's waste or resource policy goals should be prepared. The person writing the proposal needs to know how to write a proposal, what the funder is looking for, the language that is acceptable, and where is other sources of funding.

This type of knowledge contains both explicit and tacit parts. The explicit part can be templates of proposals and flow charts of funding application procedures. The tacit part can be that know how to interact with funders and how to organise human and financial resources to develop programme delivery strategies to meet funders' requirement. This type of knowledge can be largely held in the 'reservoir' of management level staff. Even the knowledge can be codified, it is unlikely to be transferred to sub-contracted environmental consultancies as the knowledge is supposed to be mastered by the non-profit franchisor.

Another type of strategic knowledge for IS programme development refers to setting up a programme delivery team which is constituted by practitioners facilitating synergies and a number of IT and financial staff. Regarding the recruitment of practitioners, the key knowledge is to recruit people who have profound industrial process experiences

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and communication skills as described by the following two interviewees.

“So throughout the period when we recruited people, it’s usually been people who actually have some industrial background, if you actually know the language, feel comfortable with all issues that the industry’s got... So that’s fundamentally important rather than they were experts in chemistry or whatever.”

--- Interviewee 1

“I don’t think you can train somebody to be an industrial practitioner. You can give them basic materials, a database. You can give them the knowledge of which companies are working with NISP in a particular area. You can look at the information to say what resources we have but actually going to a company and talking to a company is (different) [...]. I’m doing that periodically, it’s not something that can learn from a training course.”

--- Interviewee 3

The knowledge of establishing a programme delivery team covers both explicit and tacit parts. The explicit part can be the structure of the delivery team and the number and characteristics of staff to be recruited. The tacit part of the knowledge can be knowing how to organise resources to promote the development of the team members and monitor team members’ performance. The need to codify this type of knowledge could be high as it can be shared with franchisees to set up a team capable to deliver NISP in regional areas for meeting NISP’s targets promoting landfill diversion and CO<sub>2</sub> reduction.

## **(2) Operational knowledge to deliver the IS programme**

At practitioners’ level, procedures to deliver the programme generally cover holding

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various events to recruit business members for data collection, identifying synergy opportunities, facilitating identified synergy opportunities, and releasing outputs report for successful synergies. Key contents of each type of operational knowledge is summarised as follows based on findings from participant observation and in-depth interviews.

Regarding holding programme events (e.g. QWWs), the programme delivery team needed to decide which industrial waste to target before sending invitation information to businesses.

“The initial workshops were quick wins, not specific materials at all. Just they gave us information and resources that caused you problems, cost you money. And more recently, we’ve done some targeted ones because we know what the issues are.”

--- Interviewee 1

Based on interviewee 1’s opinion, the more business members that had been recruited (or data of excess and required by-products have to collected), the more targeted QWWs tended to be held. For example, by 2009, which was the fourth year of the initiation of NISP, more than 12,000 businesses had been recruited into the facilitated IS network (Laybourn & Morrissey, 2009), although not all of them had engaged in IS activities. The three QWWs attended by the researchers during 2009 were all targeted workshops to find solutions for food, wood or construction waste for existing network members.

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Also, there is a need to consider when and how to book venues, print leaflets and information packs and inviting keynote speakers and attendees. When the researcher was doing an internship in NISP, she had the opportunity to observe how one workshop was held during that time. Led by the delivery team leader, some practitioners were responsible for selecting the venue, some worked on preparing the PowerPoint presentation, other practitioners focused on calling companies to introduce the programme and to invite them to attend the QWW. A progress form allocating each practitioner's task at different weeks was printed out and stuck on the wall. Once a task was completed, the responsible practitioner went to tick off the task. Thus, the whole team members were clear what had been prepared and what needed to be done next. The premise to work systematically like this was to have all the workshop organising procedures and tools summarised, codified, and shared with the team members (see 6.4.2.2). Also, this type of knowledge was treated as part of NISP's organisational knowledge that could be transferred to international teams.

With respect to the knowledge of identifying synergy opportunities, it is personal and tacit knowledge belongs to practitioners (see section 6.4.1.1). It is due to the knowledge that one practitioner was recruited by the programme as industrial background were valued during job interviews (see part (1) of this section). This type of knowledge can also be enhanced through communicating with colleagues.

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“We spent a lot of time in the office just talking about different things, different projects and you just normally picked up really. That’s how we learn.”

---Interviewee 6

“There is a programme or workshop that I think is Get Together, Work Together where each region sends a delegate, a representative to (the headquarter) [...], and they take place periodically [...]. The point is that you could get some practitioners together in a room from different regions, and they would then start, you know, discussing issues they got, problems [...]. (The interviewee began to give examples about topic they discussed) ‘We’ve got a company, we’ve got this and this problem, here or that problem, and then you got the wisdom, the collective wisdom from other regions’.”

---Interviewee 2

So, interactions with colleagues can be means of exchanging and learning synergy facilitation knowledge. This process of knowledge creation can be viewed as socialiation. Similarly, Donald (2009) argue that the networks of inter-personal relationships can be used for staff to access various types of knowledge as social capital (see section 3.3.2.1).

With regard to facilitating synergy opportunities, the knowledge covers knowing how to identify synergy opportunities, when and whom to contact for synergy facilitation, when and how to conduct site visits to check more details, and how to collect data on synergy progress, barriers and achievements. When a synergy opportunity was identified, NISP practitioners would arrange a meeting for relevant business members through phone calls, emails or meetings and give the the opportunity to collaborate.

“We’ll arrange a meeting, make that happen, set it up, and if we do that, then it happens. If you rely on them doing it, it doesn’t [...]. A synergy might not

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happen because they're too busy. So, our role is to break to facilitate to ease the conversation [...] and we say 'we'll be on this day at this time here' and you get them in a room, talking and that is the best chance you have [...]. Everybody all smiles and handshakes, and it all looks good, and you came up a way of thinking 'This is set, I'll give you some space.' ”

--- Interviewee 2

“The work we do on NISP which is all about facilitation and networking and a sort of taking high-level stand by, a sort of sit back position. It's like 'OK, I'll introduce you to you. So, you two get on with it and tell me what the outcome is.' ”

---Interviewee 8

Thus, the IS facilitation work undertaken by NISP focused on introducing synergy opportunities and fostering inter-firm networking rather than providing technical support to make the synergy happen.

The explicit part of the knowledge covers knowing possible solutions for waste materials based on a person's education or industrial background and knowing the facilitation procedures and tools. The tacit part of the knowledge is knowing how to judge the potential of implementing the synergy and motivate participants' interest to engage in synergy implementation at the very beginning. This knowledge is so tacit that when asked how to select synergies to facilitate, the interviewee 1 replied “I don't introduce companies if I don't think there's a synergy there [...]. It's the knowledge [...] in their heads.” As an IS network facilitation programme, synergy facilitation knowledge is the organisation's core “asset”. Although the knowledge contains

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substantial tacit knowledge, codifying the knowledge could potentially add value to NISP's "asset". So, they had initiatives to collect and codify synergy facilitation knowledge (see section 6.4.2.3).

It is worth to mention that synergies facilitated by NISP were not only IS activities as finding outlets (e.g. cheaper recyclers) were counted as solutions in the programme as it could bring economic benefits to its business members.

"Often, industrial symbiosis, I would say it has different levels in it. The basic level is where people phone us and say 'I've got this particular waste problem. Can you find me solutions?' Sometimes, it's just putting them in touch with the local waste management company and our companies specialised in the treatment of particular material. It doesn't necessarily mean linking them with another company where that by-product or waste can be used as a raw material. So, I'd like to say it's like true industrial symbiosis where by-product or waste is used as raw material, and so lower level of business support where you simply connecting people together or finding a better solution."

--- Interviewee 6

"There're some people in the sectors who are brokers in that sense [...]. We work with people who provide with waste management services to companies as well because they can provide solutions [...]. They will charge. Yeah. But sometimes the other way for something to work is at the brokerage level because they're better at some pieces [...]."

--- Interview 1, a NISP regional team director

Waste recyclers or brokers were also considered as solutions for businesses having waste resources. The potential reason was that achieving resource efficiency and landfill diversion targets through IS was specified in the funding body's requirement.

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Based on NISP's achievement report (Laybourn & Morrissey, 2009), there are requirements for landfill diversion, CO<sub>2</sub>, hazardous waste, industrial waste, virgin material reduction and other social benefits. However, there is no requirement for innovative resource utilisation which can result from IS activities. This could be result from the national waste policy viewing IS as only one of policy tools for resource efficiency and pollution or landfill reduction (see chapter 5). Therefore the 'passion' to facilitate 'pure' IS activities reduced. So, it shows that putting academic ideas (e.g. IS) into practice requires adaptability to contexts such as national policy targets and feasibility on programme implementation.

As regards releasing output report for successful synergies, the type of knowledge belonging to NISP practitioners was quite explicit as inputting collected synergy achievements into CRISP could automatically generate a case study report with the assistance of a built-in case-study template in the software. However, this task was important as the successful cases and quantified outputs could assist the application for future funding support and acted as a marketing tool on workshops.

Overall, the explicit part of programme delivery knowledge covers processes and tools and can be easily codified into a number of templates to improve programme delivery efficiency, which can be used to improve the efficiency of replicating the programme to other countries. The tacit part of programme delivery knowledge is connected with a

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person's character and experiences which can be difficult to be codified but if this knowledge is the organisation's core knowledge asset, the requirement to codify the knowledge is high. However, as a funded public programme that suffering funding reduction (chapter 5) in recent years, the provided incentive to codifying this type of knowledge could be limited.

#### **6.4.2.2 Initiatives of collecting and codifying programme delivery procedures and tools**

At the early stage of the programme, there were attempts to establish procedures to run the programme such as conducting QWWs.

“Again, the importance of the engagement companies, as well, we said to them how we are going to do this [...]. We wanted to do a workshop [...]. So, four of us (including the interviewee and business members) sat down together, and we thrashed out the principles of how to do a workshop. We batted it backwards and forwards with this consultancy company as to what we were doing, [...] they helped us to run the first workshop.”

---Interviewee 1

Inviting consultancy companies to give advice on organising programme events was a means to capture external organisations' knowledge. Through constant practice, the knowledge on how to conduct QWWs was learned by NISP. The knowledge capturing activities can be understood as inter-organisational KT initiatives and in which NISP acted as a knowledge recipient absorbing and applying other organisation's knowledge. This research does not focus on exploring detailed KT process from other organisations

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to NISP although these activities have largely contributed to NISP's organisational knowledge base as mentioned in section 6.2.2. More focus has been placed on knowledge codification and intra-organisational KT within NISP, and KT from NISP to its Chinese partner.

In NISP headquarters, knowledge collection and codification work was intentionally undertaken by a number of IS practitioners focusing on collecting experiences of the whole NISP teams and transcribing them into documents.

“A number of people were involved in the template development (organisational knowledge codification) which mainly occurred from around 2007 to 2008...We developed the type of information that we thought we would need to capture during a site visit and workshop...the general process has been me looking at what people in the UK have done and then taking what I consider to be the best bits / methods / tools and formalising them, developing a training around them and introducing them in to the international market.”

--- Interviewee 11

The codification process largely relied on experiences of the knowledge collector. During the process, collective individual staff's knowledge was codified into documents. The outputs of the transcribed documents were compiled into a large booklet covering procedures and tools (templates of leaflets, successful synergy case studies and data collection forms) guiding programme-related activities such QWWs and site visits. For example, according to the codified synergy facilitation flow chart (NISP, 2010), the approach to run QWWs covers a range of tasks starting two months

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ahead of a workshop from deciding the theme of the coming workshop, to sending invitations, to confirming delegate attendance, to preparing and delivering the event, to collecting attendees' feedback, and to conducting post-workshop internal de-briefs. The tasks are grouped by timeline, and where it is necessary, detailed procedures are attached to explain how to complete each task. The type of programme event delivery procedures could be classified as technical knowledge. Without specific training or skills, experienced practitioners could undertake the task to codify the knowledge. According to Martin and Salomon (2003b), quantifiable technical knowledge and related standardised procedures are codified knowledge and could be easily understood.

#### **6.4.2.3 Collecting and codifying synergy facilitation knowledge**

As mentioned briefly in section 6.4.1.2, CRISP was to be upgraded into SYNERGie, which was more user friendly, for practitioners to input more details on synergy project execution and success factors. Large quantity of synergies had been facilitated previously, but limited information was recorded in CRISP as mentioned above. So, a lot of messages would be missing once transferring data recorded in CRISP into SYNERGie. 'Blueprints' project was therefore initiated by a number of NISP IT staff in early 2010 to resolve the problem. The project focused on collecting and codifying practitioners' synergy facilitation knowledge through face-to-face interviews.

“Regarding the Knowledge 'Blueprints', these were designed to collect a

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broad spectrum of knowledge from Practitioners (not from clients)...To add further detail & create a very concise document regarding project execution knowledge, I designed project ‘Blueprints’. These are documents that are compiled from data already in ‘CRISP’ and additional knowledge about project execution. These blueprints were only completed because we used a specific questionnaire and people who conducted the interviews (going through the questionnaire) [...]”

---Interviewee 12

So, the need to conduct one-by-one interviews shows that individuals’ personal knowledge was important as it relied on memory to store codified knowledge. As it is not viable to collect details of facilitating all previous synergies, only top 100 successful synergies which possess highest outputs (e.g. weight of waste diverted from landfill) were selected to be explored. These synergies were facilitated by practitioners in various NISP regional teams. Then, these practitioners were interviewed by the ‘Blueprints’ project team. When the researcher completed her internship in NISP in the end of 2010, the project was still in data collection (conducting interviews to collect IS facilitation knowledge) stage.

A sample of the interview questionnaire is provided in table 6.2 to give an overview of the KM project.

Table 6.2 Interview Questions for the 'Blueprints' project

**1. Data collection & verification**

**-What waste fraction (broad heading) did the synergy address?** e.g. plastics, organics, metals etc.

**-Please provide a specific description of the material(s) involved.** e.g. low density plastic, plastic bottles.

**-Which of the following best describes the synergy?**

-A direct 'Have -Want' exchange of material between organisations

-A diversion of material from landfill to material recovery

-A 'Have -Treatment -Want' exchange between organisations

**-How was the 'resource' data on which the 'match' was identified initially obtained?** Was it:

-Readily available within participant organisations i.e. through Quality/environmental management systems, financial accounts etc.

-Recorded through site visit i.e. practitioner audit/recognisance

-Deduced through external sources (please specify) i.e. IPPC, Market intelligence

-Obtained from mixed and/or other sources (please specify)

**-Were any significant problematic issues encountered in collecting resource data?**

**2. Resource/Technical**

1). Where intermediate treatment was necessary or material was diverted to a recovery facility-

**-Please provide the name and/or description of the treatment/recovery process.**

**-What technical considerations are relevant to the acceptance of 'Have' material to this process?**

-Is it necessary that material is segregated or is the process able to accept mixed waste?

-Is the process able to accept contaminated waste or are there certain quality conditions on acceptance?

-What is the throughput of the process? i.e. how much material is it able to deal with over a given time period?

**-What is the product of the treatment/recovery process?**

2). Where a direct 'Have-Want' exchange of material between organisations was possible-

**-What were the key technical considerations pertaining to the use of this material in the opportunity identified?**

**-To what extent are these unique to the opportunity identified?**

**-Was the sourced 'Have' material lower quality than previous supply?**

-If yes or no to the above – **What criteria will determine the lower limit of material quality for this application?**

3). Where a barrier was in place – whether permanent or removed-

**-What type of barrier occurred?** e.g. technical, fiscal, legislative

**-At what stage was the barrier implemented?**

**-To what extent are these unique to the opportunity identified?** e.g. What criteria may be relevant to this barrier being applied to alternative applications and which will be broadly relevant to all applications.

**-Was the barrier removed?**

**-What actions led to the barrier being resolved?**

**-Was it necessary to source technical expertise on the synergy opportunity?**

**-How would you summarise the technical expertise provided by NISP in facilitating the synergy opportunity identified?**

**-What technical expertise was gained through the facilitation process?**

**-Are there any intellectual property rights to the idea/approach employed in the synergy?**

[...]

According to table 6.2, the interviews were conducted in a structured approach.

Answers were expected to be concise so that they could be inputted into SYNERGie.

The outcomes of the interviews will be a database of detailed factors leading to the top

100 successful synergies. These factors could then be inputted into SYNERGie to add

more details to the synergy process. The enhanced database was supposed to guide

practitioners to identify and facilitate potential synergies.

“The trending and data analysis done from successful synergies and blueprint data could help to build a model that allows you to calculate the probability of a synergy/synergies to be successful, and therefore give practitioners a more targeted approach to following up after QWW.”

--- Interviewee 12

Therefore, based on interviewee 12’s opinion, inputting collected data into SYNERGie

was not the final target of the Blue Prints project. They still needed to work on

exploring trending from the data collected from interviews to optimise synergy

facilitation process.

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The synergy facilitation knowledge collecting and codifying process shows that there is a need for a team of KM experts (e.g. IT experts and those familiar with survey techniques and data analysis) to conduct tacit knowledge development in an organisation. Codifying knowledge with more tacit content and transferring the codes into straightforward information requires complicated knowledge collection techniques and ICT support to analyse the collected information. KM in this type of knowledge is meaningful to NISP as synergy facilitation skills are NISP's core organisational knowledge assets.

## **6.5 KT within NISP**

Generally, KT within NISP can be classified into formal KT between the NISP's headquarter office and NISP regional teams (vertical KT between the franchisor and franchisees) and informal KT between NISP regional teams (horizontal KT between members of the franchising). The transferred knowledge primarily covered software operation, programme running procedures and synergy facilitation methods.

### **6.5.1 Formal KT between NISP headquarters and regional teams**

Regarding the knowledge of operating software, to ensure the use of the same system (CRISP) by all regional teams, NISP's headquarter office arranged training courses to new staff from regional teams.

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“There’s been specific training on software, CRISP, and on mechanic sort of how to try to create and complete a synergy. We have to just follow up the system.”

--- Interviewee 8

“(NISP headquarters) do run training sessions every now and again on CRISP and marketing and on workshops and things like that [...].”

--- Interviewee 6

When the researcher started an internship in NISP headquarters, she attended one-day training on the use of CRISP with two new practitioners from the same regional team. A training staff from NISP’s headquarter office provided the training course. In the training room, we brought our laptops and accessed to CRISP database with the guidance of the tutor. Then, with the assistance of a manual book, a laptop and a projector, the tutor demonstrated step by step on how to use CRISP. The key functions demonstrated covering recording a resource and its owner details, matching required and available resources to form synergy records, recording progress and barriers, and generating synergy reports with a built-in template. By the end of the training session, all of us mastered these functions. The process is the same as the process of learning using software such as Endnote or SPSS. It was not training in IS or synergy facilitation. A learner can learn to use the software through reading an electronic manual but with a tutor’s demonstration, the learning efficiency can be largely improved as learners can simply follow tutor’s step to use the software and have all questions answered promptly.

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With regard to the knowledge of programme running procedures, there was not an intensive sharing of this type of knowledge by the NISP headquarters. As mentioned in section 6.4.2.2, NISP headquarters had worked on collecting and codifying knowledge on programme running procedures such as how to conduct QWW events. However, this codified knowledge was not primarily for the regional teams, although there was no suggestion of keeping information from the regional teams.

“Codification (of programme running procedures) has had a number of attempts – some for the UK teams but a lot of it, especially the practical training, for the international work [...].”

--- Interviewee 11

Also, all interviewees from NISP regional teams expressed that they did not accept any formal training from the headquarters regarding how to run IS programmes. Instead, they had the autonomy to deliver programmes with their own strategies.

“In national issues, we’ve actually looked after our own but we know what we’re doing. So there’s not a lot of macro-management of where we act [...]. The decision to focus on (facilitating IS among within industries) is our decision [...]. I don’t need to refer it to anybody.”

--- Interviewee 1

The autonomy of sub-contracted organisations on the strategy of regional IS programme delivery would inevitably affect the process of KT between NISP’s headquarter office and its sub-contracted consultancies as the delegated organisations did not have to replicate the headquarter office’s procedures to deliver the regional IS

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programmes.

As regards synergy facilitation knowledge, there was neither any formal KT conducted from the headquarters to regional teams. As mentioned in section 6.3, each NISP regional team was commissioned from environmental consulting organisations. The expertise on facilitating business environmental management was the main advantage that these consultancies offered to NISP.

“That sort of experience (skills to identify synergy opportunities) is what we’ve brought into the business from our previous work roles in industry or in another consulting area”

--- Interviewee 8

As mentioned in section 6.4.2.3, NISP headquarters had worked on collecting practitioners’ previous experiences facilitating successful synergies and this information would be inputted into the upgraded software, SYNERGie. With the introduction of SYNERGie in all the NISP teams, the successful factors resulting in synergies could be viewed by all NISP regional teams if they choose to access the database. Whether it would be regional teams themselves or NISP headquarters to summarise synergy facilitation knowledge from the database is unclear at the moment but there was no indication that either the knowledge of programme delivering procedures and synergy facilitation was kept from regional teams. However, given that experience/background varies between practitioners, there would be an ongoing need for the development and transfer of synergy facilitation knowledge as it is the core

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knowledge asset of NISP.

### **6.5.2 Informal KT between members of the franchising**

Besides formal or vertical KT from NISP headquarters to its regional franchisees, there was also horizontal KT between the experienced regional teams which were involved in early pilot programmes (see section 6.2.2) and the newly developed ones. This type of KT was conducted mainly through attending QWWs and conducting fact-finding missions.

“The way that we worked is when we ran another one [workshop], we asked people [practitioners] could come from other regions. So there’s a period, we never ran a workshop without 2 or 3 people from the rest of national team [...]. They would come up and sit in on our workshops. So, we actually didn’t train them such, and we didn’t actually have a written methodology at that stage.”

--- Interviewee 1

“So, [another NISP regional team] were interested to do something very similar. They had a vegetable grower who wanted to do something similar. So, they came over [...] to find out. So, a little bit of fact-find mission and we took them around several companies in the region. So, that’s one region having been learning from us really.”

--- Interviewee 6

Through learning by doing, observation and communication, knowledge of delivering programme events and synergy facilitation were transferred from experienced regional teams to inexperienced ones. Compared to formal vertical KT, this form of KT was

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more based on personal networking. To certain extent, this type of KT was similar to that mentioned in section 6.2.2 that a number of environmental business organisations approached BCSD-UK to learn their strategy to deliver an IS programme and BCSD-UK shared their experiences through giving a speech (Mirata, 2004). However, the difference is that NISP's franchisees were connected by a shared database (CRISP) which characterised the KT as an intra-organisational form. NISP's franchisees could access to synergy data recorded in CRISP by other members. It was easy to find other region's successful synergies through searching in the database. So, CRISP acted as a platform for sharing explicit knowledge on synergy facilitation.

Besides the link created from CRISP, NISP national and sub-national events could also act as a platform for KT between NISP regional teams.

“So, it's working out roughly as once a year. A big NISP get together but in between that, there is a programme of workshop that I think is ‘Get Together, Work Together’ where each region sends a delegate, a representative to something in Kings Norton in Birmingham whether that to be about workshops or reporting or data or whatever, just some kinds of skills refresh type thing, and they take place periodically and you know [...]. That's good because that gets people from regions catching up.”

--- Interviewee 2

“There have been a couple of national practitioner days when we all were together down to Birmingham (NISP headquarters) to network with the other practitioners.

--- Interviewee 8

Through the arranged cross-regional networking events, practitioners from different regions could communicate and exchange tacit knowledge on synergy facilitation with

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each other. Also, these events could foster close relationships for practitioners and establish foundation for future cross-regional KT.

Therefore, informal cross-regional KT in terms of learning by doing, fact-finding missions and inter-person experiences sharing could be facilitated by a shared database and cross-regional networking events. This type of KT assisted NISP regional teams to master programme events delivery skills and synergy facilitation experiences. Therefore, not only the need of vertical KT from headquarters was reduced, skills mastered by regional teams provided resources for headquarters to collect and codify organisational knowledge for international KT.

## **6.6 Summary**

This chapter began by reviewing NISP's early development history. NISP's (or BCSD-UK's) early initiatives to develop IS programmes can be viewed as a process of acquiring IS network facilitation knowledge from other organisations (e.g. BCSD-GM & IIIIEE) through formal and informal collaborations. Also, through socialisation process in terms of experience sharing, significance of the programme was marketed to other regions with the formation of a number of short-term regional IS trial programmes. Through drawing upon the BPS model and practice through programme implementation and expansion, NISP's early organisational knowledge was created and

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developed.

With the UK government funding support, a franchising model was adopted by the delegated organisation, ISL (the headquarters of NISP), to expand the programme nationwide. The structure of a funded non-profit franchising system was formed. KM and KT initiatives in the franchise were therefore conducted by the headquarters to develop and manage the organisation's knowledge, and acquire good practices in the franchising system for dissemination activities.

One of the major KM activities in NISP headquarters was CRISP development and implementation to store data provided by business members, acquire personal knowledge of synergy facilitation, monitor and assist staff's synergy facilitation progress. Through exploring barriers to using CRISP by the researcher, a number of suggestions were proposed for NISP headquarters. Direction to improve CRISP could include giving clear definition of each type of synergy barriers, collecting more details on existent synergy barriers and facilitation experiences, and codifying them into categories for practitioners to select. Other KM initiatives in NISP headquarters referred to developing, collecting and codifying IS programme delivery knowledge.

NISP headquarters primarily took a codification strategy for KT within its franchise. The transferred knowledge primarily covered software operation, programme running

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procedures and synergy facilitation methods. Generally, the KT initiatives covered formal KT between the NISP's headquarter office and NISP regional teams (vertical KT between the franchisor and franchisees) and informal KT between NISP regional teams (horizontal KT between members of the franchising). Formal KT had focused on the dissemination of CRISP operation knowledge; whilst, informal KT in terms of learning by doing, fact-finding missions and inter-person experiences sharing had assisted NISP regional teams to master programme delivery skills and synergy facilitation experiences. Information KT supported by social networks and geographical proximity therefore had offset the need of formal KT.

Besides exploring KM and KT within NISP, this research also has paid attention to the content of NISP's organisational knowledge. NISP's core organisational knowledge was know-how to identify synergy opportunities. It is found that although the programme was named as IS, it sourced outlets for waste resources rather than only facilitated by-products exchanges among manufacturers. This could be result from the national waste policy tool viewing IS as only one type of policy tools targeting national resource efficiency and pollution or landfill reduction in the UK. So, it shows that putting academic ideas (e.g. IS) into practice requires adaptability to contexts such as national policy targets and feasibility on programme implementation. It also shows that the organisational knowledge (IS network facilitation approach) was highly policy context specific. The theoretical application of the finding can be that --- when

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exploring the potential of replicating an organisation's knowledge, it is probably need to identify and understand which contextual factors are core to shape the knowledge.

The next chapter explores KT between NISP's headquarter office and its Chinese partners.

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## **Chapter VII KT between NISP headquarters and TEDA eco-centre**

### **7.1 Introduction**

This chapter contextualises the KT process within the funded alliance between NISP and Tianjin Economic-technological Development Area (TEDA) targeting setting up a IS programme in the Tianjin Binhai New Area (TBNA), China. The transferred information package mainly covered NISP's IS network facilitation approach. The KT is compared with KT within NISP to analyse the differences and similarities of the two types of KT initiatives.

The structure of this chapter is as follows: section 7.2 describes the knowledge provider's past KT experience in China which led to the NISP-TEDA collaboration; section 7.3 introduces the knowledge recipients' profile from the perspective of its identity, organisational structure, location, and ISD background; section 7.4 discusses the structure of NISP-TEDA collaboration; section 7.5 categorises the types of KT initiatives in the collaboration; section 7.6 describes the current progress of the Chinese programme; section 7.7 gives a summary.

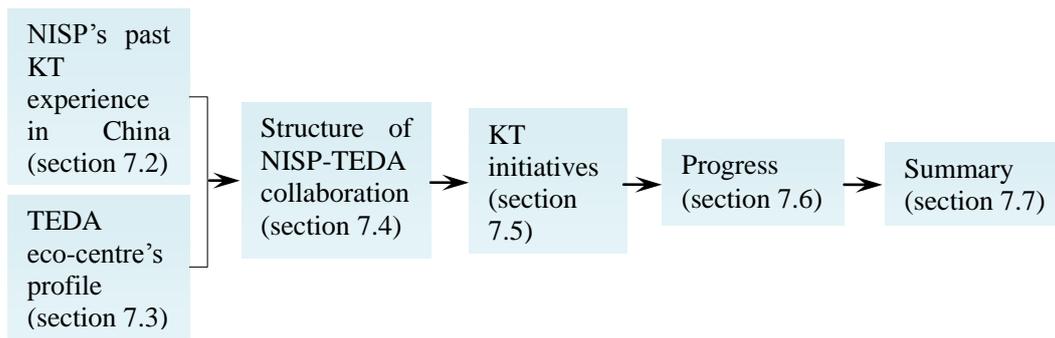


Figure 7.1 The structure of chapter 7

## 7.2 The knowledge provider's previous KT experience in China

Chapter 6 discusses KT within NISP in the UK. This section focuses on NISP's practices on transnational KT. Seeking international collaboration has been NISP's roadmap for the development of a worldwide network targeting the promotion of the transfer of knowledge, expertise, and understanding of the benefits of IS (Laybourn & Morrissey, 2009). International collaborations on replicating NISP's IS facilitation model have been based on NISP's organisational knowledge accumulated through implementing its national programme in the UK.

“The partnerships that we delivered and the projects that we delivered are very much based on the UK programme coz that was what people want [...]. They're very interested in the outputs (e.g. landfill diversion and CO<sub>2</sub> reduction) [...]. Adaptations take place [...].”

--- Interviewee 13

“What happens is, honestly, we've run programmes in China (and other countries) [...], and each of those countries adapts what we do to make it fit

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their own in-country requirements [...].”

--- Interviewee 11

So, although the NISP’s IS facilitation has been disseminated to partners in other countries. In the process of programme replication, however, the transferred knowledge has to be adapted to the local geographical context. NISP’s international collaboration therefore can be treated as a KT process covering NISP’s attempts to share its IS facilitation methods and knowledge recipients’ activities to apply and adapt the transferred knowledge.

This chapter focuses on the NISP-TEDA collaboration to explore participants’ KT initiatives and factors affecting the transnational KT process. Before discussing the case study, NISP’s previous short-term collaboration with a provincial Environmental Protection Bureau (EPB) in Yunnan, China, is reviewed.

NISP-Yunnan collaboration was conducted between 2007 and 2008 with the funding support from DEFRA through its Sustainable Development Dialogue (SDD) Programme (ISL, 2011). SDD programme refers to a series of partnership between the UK and Chinese Governments to promote collaboration and good practice in sustainable development for mutual learning and understanding (DFID, 2009). The government supported programme thereby had provided a platform for KT between UK organisations (e.g. NISP) and a number of Chinese organisations. The impetus for

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the collaboration came from the UK partners. According to interviewee 11, a NISP international project coordinator, “They (a UK government department) chose Yunnan in that it was a province that was pretty rural but it’s got quite a lot of heavy industries in there that is changing the nature of the province in a development role.” Agencies providing technical assistance to the collaboration included the EA, NISP and other UK government funded resource efficiency promoters. From the Chinese perspective, Yunnan provincial EPB was the organisation responsible for learning from the UK organisations.

The SDD programme enables NISP to demonstrate how IS can contribute to sustainability by sharing its IS facilitation model to the Chinese EPB (ISL, 2011). The key activities included introducing and disseminating NISP’s experience on IS facilitation, training the EPB staff to conduct QWWs, visiting local businesses and identifying synergy opportunities (Yunnan EPB, 2008; ISL, 2011). The major achievements of the collaboration covered the delivery of a QWW with 30 companies within the National Economic and Technology Development Zone of Kunming<sup>29</sup> (KETDZ) by the local trained practitioners and the establishment of a database about the waste resources in KETDZ (Yunnan EPB, 2008). Although number of companies participating in the programme was limited, the achievements showed that the

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<sup>29</sup> Kunming is the capital of Yunnan province, in the South-western part of China.

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short-term collaboration had meets its previous target --- demonstration of a UK resource efficiency facilitation practice. However, this does not necessarily mean that it is a successful KT as there is no sign that the transferred knowledge is being applied --- there is no further funding to develop the IS programme in Yunnan.

Besides the lack of funding support, the discontinuity of the programme after the collaboration may be result from a number of factors. Firstly, the collaborative participants were selected by the UK government department instead of by either the knowledge provider or recipient. From NISP's perspective, EPB as an environmental regulator seems not to be an ideal partner.

“I think the main barrier is personnel. It was some EPB staff part-time doing the IS project. That project needed more investment on manpower, time and material resources [...].”

--- Interviewee 14

“It was EPB, a section of government. So, their knowledge of dealing with companies on a business footing was not that great [...].”

--- Interviewee 11

Based on the above comments, there is a lack of human resource and facilitation expertise to conduct the IS network facilitation programme within EPB. Although EPB may not be an idea partner to implement the programme, it could work on providing businesses with guidance to treat waste as a resource and to advise businesses about methods to obey certain resource efficiency regulations (see chapter 5). Therefore, it seems that there is a need to source another local organisation to collaboratively

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implement the programme. This organisation should not only possess networking facilitation expertise but also support by the EPB or the local government to conduct the programme.

Drawing upon the UK's performance-based devolution model for ISD (see chapter 5), a local qualified environmental consultancy could be commissioned by the EPB or the local government to deliver the programme. The UK's funding mechanism to sub-contract non-governmental organisations to facilitate business resource efficiency could be a good practice to learn from. However, no significant outputs could be generated immediately from the implementation a short-term programme in Yunnan province.. This programme is equivalent to the very early days of NISP --- when the data base was being developed, few synergies could be achieved at this time. Even though the facilitation strategy has been honed since in the UK, in a different national context, the 'teething' stages of IS cannot be by-passed. A similar policy context or a funding mechanism to further support the programme was therefore not developed in Yunnan.

Although an IS programme has not been further developed in Yunnan, the collaboration experience has assisted NISP to develop a market in China. In November 2008, NISP got a chance to market its IS programme and its Chinese experience at a national conference which was attended by a number of leading Chinese politicians and

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international NGOs (ISL, 2012). According to interviewee 11, “(On the conference,) people<sup>30</sup> who were aware of it said that ‘you know, I think you should talk to the people in TEDA [...]. So, November 2008, we visited TEDA and we started talking about the potential for put it in a Switch Asia grant, and then, we developed that, and there was in between February and May 2009. It got accepted and we started in November.” Therefore, through personal interactions on the platform of the Chinese national conference, NISP-TEDA collaboration was initiated.

Thus, through the short-term collaborative programme in China, a number of perspectives could be gained by NISP. Firstly, it accessed to the Chinese market and based on the collaboration, a new project (with TEDA) was initiated. Secondly, its knowledge disseminative capacity could be enhanced through the practice of demonstrating the IS network facilitation knowledge to the Chinese partner. As argued by Martin & Salomon (2003a), prior experience with successive projects may improve an organisation’s ability to transfer knowledge. Thirdly, it began to consider which type of organisation could be good collaborator in China. So, how had NISP applied the experiences into the newly around of collaboration and how different are there between the NISP-Yunnan and NISP-TEDA IS programmes? Before exploring these questions,

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<sup>30</sup> Based on the researcher’s informal communications with TEDA staff, the people recommended TEDA were from international NGOs who previously had projects in TEDA and was familiar with TEDA’s experiences in conducting internationally collaborative projects for sustainability.

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the following section introduces the TEDA's background.

## **7.3 The knowledge recipient's profile**

This section firstly introduces the identity and organisational structure of the knowledge recipient. Then, the location advantages and policy context for regional ISD are analysed. Finally, the limitations of current ISD strategies in TEDA are stressed to discuss the need for KT.

### **7.3.1 Organisational structure of the knowledge recipient**

The main knowledge recipient was TEDA eco-centre which was a non-profit organisation set up by the local government, TEDA Administrative Commission. Regarding the need to set up an eco-centre, the deputy director of the local government made the following comments to media:

"Information on low-carbon technology, expertise and experience are still not sufficient to enhance energy efficiency and protecting the environment in TEDA. That is where the centre can play a role. It is supposed to serve as a platform for information sharing and exchanging" (Wang, 2010)

The eco-centre was therefore treated as a KT platform to capture other organisations' technical and management knowledge or disseminate TEDA's good practices for energy and environmental targets. Established on the 23<sup>rd</sup> March 2010, the centre had been working on delivering the TEDA government's international cooperation projects and promoting the development of low carbon technologies and environmental

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consulting industries in TBNA and surrounding areas (see figure 7.2 for the map of the areas). International projects undertaken by the eco-centre included the TBNA IS programme which was also known as the EU Switch Asia Programme and a Japan-TEDA collaborative programme aiming to investigate the feasibility of environmental technology transfer from Japan to the industrial area (TEDA Eco-centre, 2012c).

Another reason to set up an eco-centre rather than to use a government department to deliver international projects was the restriction of personnel recruitment in government system.

“This is only a four year programme. As a government department, we can’t easily recruit persons. Personnel recruitment in the government is conducted through the annual national civil servant exam.”

--- Interviewee 15, TEDA government official

Also, as mentioned by Chan and Li (2007), jobs for civil servant are normally supposed to be permanent. Therefore, it was innovative for the local government to establish an eco-centre to undertake the programme delivery responsibility. Given the large opportunities of internationally collaborative projects participated by TEDA government (TEDA Eco-centre, 2012c), the eco-centre was not supposed to be temporarily established. The eco-centre would act as a “state-owned company”, according to interviewee 15, to deliver government’s project.

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TEDA government's setting up a state-owned eco-centre resolved the human resource problem which had also impacted on the Yunnan project (see section 7.2). According to interviewee 11, setting up the eco-centre was totally the idea of TEDA and the idea was described as providing "a very exciting prospect" for the development of the programme. This could be an indication of TEDA government's rich collaborative experiences in delivering international projects and the government's support to the TBNA IS programme. As mentioned in section 3.6.2-3.6.3, an organisation's past experiences in knowledge learning, top management commitment, local government support can largely promote knowledge recipient's knowledge learning process (Lane & Lubatkin, 1998; Lau, *et al.*, 2002; Buckley, *et al.*, 2006; Inkpen & Tsang, 2007; Matt *et al.*, 2011).

As a local government invested organisation, an EPB employee with years of experience working with local industries for environmental activities was appointed by the government to be the director of TEDA eco-centre. Another innovative measure on personnel recruitment was to collaborate with a number of local environmental consulting/services companies on sharing expertise.

"As we can't easily find staff who would like to full-time work here, we therefore want to cooperate with businesses. Each of them can provide some staff to support the programme. If one person has to leave, the person's company can send us another person to continue the work. [...] We just make contract with each company to make sure each company can keep sending us staff although the staff may be different[...]"

--- Interviewee 15

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Therefore, a number of local companies were approached by the TEDA government to discuss the possibility of collaboration. These businesses had a good relationship with the local government through actively participating in low carbon activities promoted by the local government. Eventually, four businesses comprising a legislative consultancy, two environmental consultancies and a waste treatment company agreed to second experienced staff to work in the eco-centre. The time of the seconded staff was paid for by the eco-centre. Through working with the eco-centre, the four companies can potentially get more customers from the members of the IS network potentially to be delivered by the eco-centre. Therefore, the desire to keep good relation with the local government and mutual benefits led to the collaboration on sharing human resources between the local government and private businesses.

Regarding the partnership with private organisations to deliver the programme, the advantage was saving time to establish an efficient team.

“I think the advantage (of working with private businesses) is that the eco-centre can be launched quickly because people despatched from different companies to work here are experienced staff. Another advantage is that each staff comes from different enterprises can bring various new ideas to the eco-centre.”

---Interview14, TBNA IS Network project practitioner, March 2010

Therefore, besides functioning as a platform of capturing other countries good practices through delivering international projects, the eco-centre can also act as an interface to collect individual knowledge (expertise) through the collaborative personnel

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recruitment model.

So, compared to NISP's previous Chinese programme partner (Yunnan EPB), TEDA government has provided more innovative solutions to enhance its programme delivery capacity --- working on establishing the eco-centre and personnel recruitment --- before they started the process of KT.

However, similar to the previous programme in Yunnan, EPB also have played a key role in NISP-TEDA collaboration. Does this show that NISP headquarters fail to learn partner selection knowledge from the previous collaboration? Is collaborating with an EPB still not a wise option for the IS programme? Through analysing the role of EPB in the TBNA IS Network programme in section 7.5, the questions can be addressed.

### **7.3.2 Knowledge recipient's geographical advantages for implementing internationally collaborative projects**

The major knowledge recipient is the eco-centre in TEDA, which is located 45 kilometres east of Tianjin downtown and 130 kilometres southeast of Beijing city with a coastal area of 33 km<sup>2</sup> facing the Bohai Bay as shown in Figure 7.2.

Founded in December 1984, TEDA is one of the first 14 national economic development zones in China (TEDA, 2011a). The establishment of the industrial is

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argued to be as a result of policy reform experimentation, and institutional innovation has built into the DNA of TEDA with a management model eager to learn and apply international best practices (Shi, *et al.*, 2010). By all standards, TEDA is a large and multi-faceted industrial area, which, like many other Chinese business developments, includes both industrial and commercial/residential areas. By 2007, the total built up area of TEDA had reached 45 square kilometres, of which the industrial zone had accounted for 34 square kilometres and the residential area for approximately 11 square kilometres (TEDA 2008).

As a leading economic development zone in China, TEDA government's environmental protection initiatives have received a range of funding support from various international donors. For example, between 2005 and 2008, Italian Ministry for the Environment, Land and Sea (IMELS) funded TEDA government to conduct feasibility study on potential Clean Development Mechanism (CDM) projects in the TEDA Area. Also, between 2003 and 2005, EC funded TEDA EPB to establish an industrial solid waste management system, to help local companies formulate solid waste management system, and to promote TEDA's experience to other industrial parks (TEDA AC, 2009). Besides getting international funding support to conduct projects, there were also collaborations with international partners. For example, between 2006 and 2007, the International Centre for Environmental Technology Transfer (ICETT) of Japan worked with TEDA AC to share knowledge on environmental protection and to

improve TEDA's environmental risk capability (TEDA AC, 2009). Thus, during these projects, TEDA AC, the local government, was responsible to deliver the internationally supported or collaborative projects. The collaborative project potentially provided TEDA AC knowledge learning experience.

Regarding the TBNA IS Network programme, TEDA AC is the main applicant for funding support to develop a IS programme within the TBNA, which is the upper-level area of TEDA and a number of industrial districts as shown in figure 7.2 (the darker area is TBNA). The key reason to implement the IS programme at the TBNA level rather than only at the TEDA level is that more industries and businesses can be involved in the IS networks (TEDA AC, 2009).

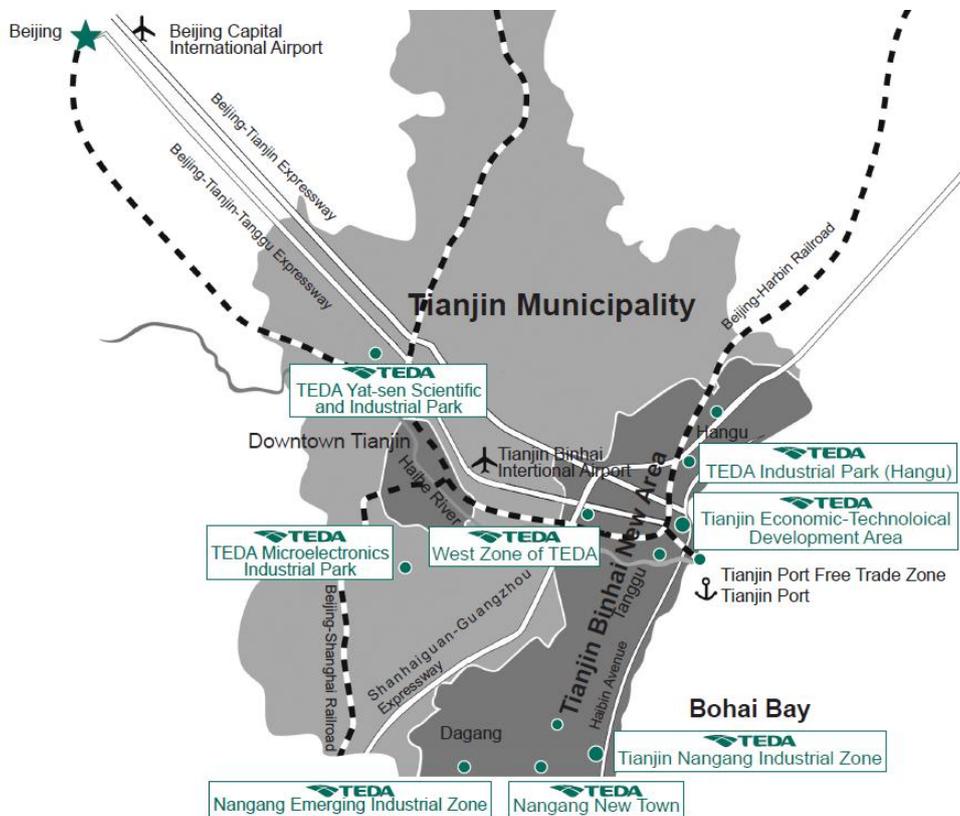


Figure 7.2 The Location of TEDA (TEDA, 2011b)

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The TBNA accommodates about 1800 active manufacturers, of which the majority are SMEs in addition to many top multinationals (TEDA AC, 2009). Industries operating in TBNA currently include electronics and information, automotive and machinery, petroleum and chemicals, modern metallurgy, biotechnology and pharmaceuticals, new energy and materials, and food processing. Industries which are currently entering include aviation, finance, and services (TEDA, 2011c).

### **7.3.3 ISD in TEDA and the surrounding industrial area**

Like the development model of most other Chinese industrial parks, the TEDA's is to provide low-priced, high quality infrastructure services to tenants subsidised by local tax revenues. This model has made it possible for TEDA's governing body government to invest environmentally friendly infrastructure such as the water reclamation system, a centralised electroplating wastewater treatment facility, and a sea water desalination facility in the field of public utilities. TEDA has attempted to implement the EIP concept in 2001 and was named as an EIP in 2003 (Shi *et al.*, 2010). Counting the IS linkages invested by TEDA government, Shi *et al.*'s (2010) two-year field work identified the total of 81 exchanges in TEDA with 62 material-based exchanges (e.g. aluminium, steel and rubber scraps), 12 water exchanges, and 7 energy exchanges. The formation of the complex IS networks started from 1984 since TEDA was developed.

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However, due to changing business and market circumstances such as adopting cleaner technologies, price rise, environmental liability concerns and bankruptcy, 11 IS exchanges of the 81 identified were discontinued recently (CIE, 2008; Shi *et al.*, 2010).

As mentioned in chapter 5, governmental funding support on pilot RCR technical innovations is a key policy instrument promoting resource efficiency and pollutants reduction in China. TEDA and its neighbour, the Tianjin Port Free Trade Zone have created an “Energy-Saving, Emission Reduction and Environmental Protection Fund” with an annual budget of 100 million RMB. The funding policy covers a catalogue of priority areas which qualify for subsidies. Currently, funding support has focused on businesses’ investments in renewable energy, end-of-pipe emission reduction solutions, and costs to certify for ISO14001 (TEDA AC, 2009). According to Shi *et al* (2010), pilot projects in the field of IS activities such as condensate reuse and composting of traditional Chinese medicine residues have been financially supported by the government’s funding. However, the priority areas to be supported have not yet covered identifying synergy opportunities, and many companies in the area are unaware of the funding opportunities (TEDA AC, 2009).

Problems confronted with the local ISD are a lack of effective pre-existing networks for SMEs to enable the identification of synergies for efficient resource management and insufficient expertise to support the implementation of such opportunities (TEDA AC,

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2009). With the awareness of the possibilities to remedy the deficiency of ISD through replicating the NISP model, TEDA government has attached great importance to the TBNA IS programme (Wang, 2010).

## **7.4 The structure of the NISP-TEDA collaboration**

As argued by scholars, organisations have to be in certain forms of alliance before significant flows of KT can occur (Inkpen & Pien, 2006; Ding *et al.*, 2009; Meier, 2011).

As mentioned in section 3.4, the structure of alliance (e.g. franchising, licensing, supply-chain partnerships and joint ventures) is viewed as an influential factor affecting KT within the alliance (Mowery *et al.*, 1996; Chen *et al.*, 2004; Jiang and Li, 2009).

However, empirical evidence for the relationship between each distinct type of alliance and the outcome of inter-organisational KT is largely missing (He, *et al.*, 2011).

Regarding this case study, the four-year collaborative programme has involved a total budget of 1.85 million Euros, among which 1.48 million Euros is funded by the EU and the other part is contributed by the TEDA government. The lead funding applicant is TEDA and the EU's funding is allocated to TEDA (Switch-Asia, 2012). The main purpose of the programme is to build a TBNA IS Network, recruit 800 member enterprises and launch 80 industrial symbiosis projects (TEDA AC, 2009). Also, through the programme implementation, the practical demand about environmental

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policy for CE development in TEDA and TBNA is pinpointed (TEDA IPB, 2010).

Based on the catalogues of inter-organisational alliances proposed by Contractor and Lorange (2002), the four-year programme can be viewed as a funded medium term alliance of KT for ISD. Two levels of KT were underpinned by the funded alliance for ISD --- programme operational KT and policy KT (see figure 7.3).

The first flow of KT occurred from NISP headquarters to TEDA eco-centre to implement the IS programme (see section 7.5.1-7.5.5). Based on documents received through internship with the eco-centre, the transferred information package primarily covered the structure of an IS programme delivery team, the roadmap of the programme, procedures to organise quick-win workshops, steps to use the database, approach to conduct company visits, and method to calculate synergy outputs. Two international programme coordinators from the NISP headquarters were responsible to teach programme operational knowledge to the programme delivery team of the TEDA eco-centre.

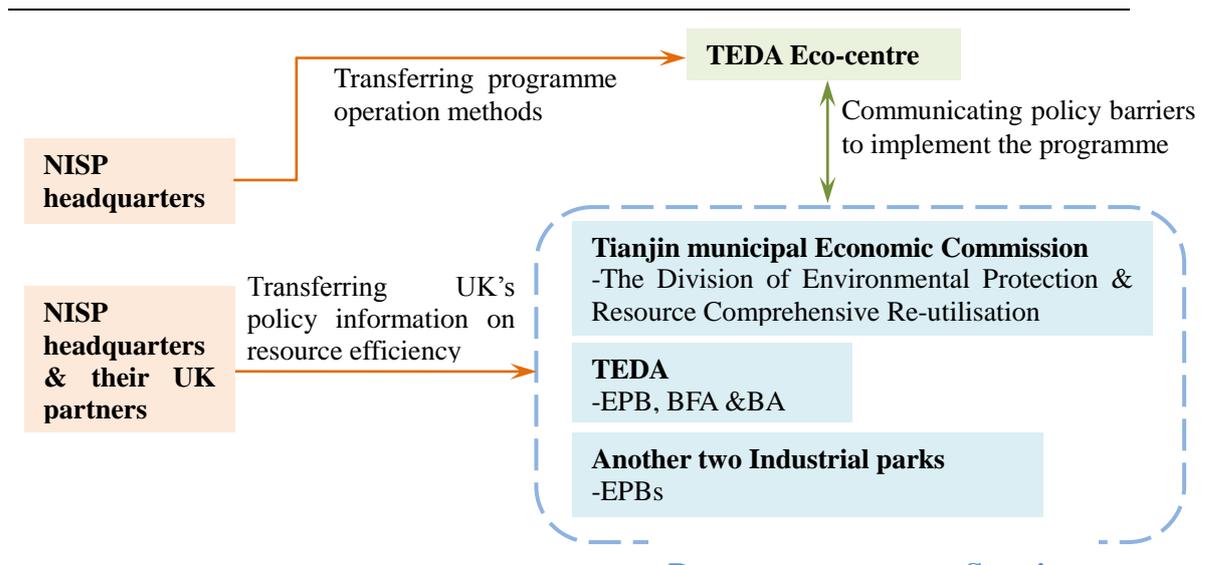


Figure 7.3 Two Levels of KT between NISP headquarters and its Chinese Partners  
Compiled from TEDA AC (2009) and TEDA Eco-centre (2010)

In addition to setting up the TEDA eco-centre, a project steering committee (PSC) was established, consisting of representatives from Tianjin municipal Economic Commission, TBNA Administrative Commission, TEDA, and other surrounding industrial parks. The PSC members are responsible to review the project progress and provide political support (TEDA Eco-centre, 2010).

The second flow of KT therefore occurred from NISP and their government/business partners to the PSC members to transfer UK's policy experiences on resource efficiency (see section 7.5.6).

Although the major target of the alliance was to transfer NISP's IS facilitation knowledge to TEDA, through the collaboration, NISP could also have the opportunity to understand businesses waste activities in TBNA, and Chinese cultural and policy

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factors accounting for these activities.

## **7.5 KT initiatives**

Through participant action and observation, the identified KT initiatives mainly occurred between March and April of 2010 when the NISP-TEDA collaboration was formally initiated. The researcher was also partially involved in the TBNA IS Network programme through facilitating the Chinese team's UK site visits between the October 2010 and June 2012. Overall, findings mentioned in this section are collected through in-depth interviews, participant action, observation and other forms of informal communication in the field work. Six types of major KT initiatives are identified (section 7.5.1-7.5.6).

### **7.5.1 Transferring knowledge on how to build a programme delivery team**

As mentioned in section 7.3.1, the set up of the eco-centre and the collaboration with private businesses on personnel recruitment were ideas of the TEDA government. However, the establishment of personnel recruitment criteria was agreed by discussion with NISP headquarters. TEDA government staff then worked on the team member recruitment. Establishing the TBNA IS Network delivery team was an attempt to apply the acquired information from the knowledge provider. So, at this stage, it seems that

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KT was a very one-way process from the provider to the recipient. There was no indication of an attempt by the recipient to obtain specific information package from the provider or of attempts by the provider to offer tailored IS network facilitation approach to TEDA. A personalisation strategy (see section 3.3.2.2) was not adopted in the KT process.

The plan to build a programme delivery team was recommended by NISP and was stated in the TBNA IS Network application proposal (TEDA AC, 2009). The proposed structure of the TBNA IS network delivery team is presented in figure 7.4.

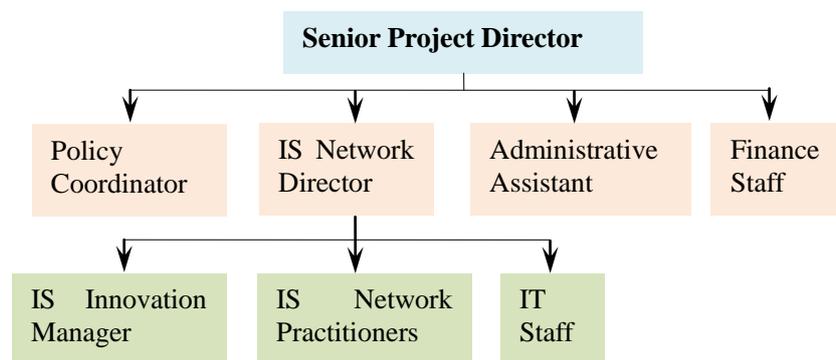


Figure 7.4 The proposed structure of the TBNA IS Network delivery team recommended by NISP  
Compiled from (TEDA AC, 2009)

The above figure presents the structure of the programme delivery team which was an output of NISP's work on codifying its organisational knowledge mentioned in section 6.4.2.2. The job description of each position was also developed by NISP. The knowledge on personnel recruitment appears to be tacit, as recruitment criteria vary from interviewer to interviewer.

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The knowledge was transferred to the (TBNA IS network) senior project director who was seconded from TEDA EPB and who was also the director of TEDA eco-centre. Transferring the information of job recruitment criteria was mainly based on constant communication between NISP international coordinators and the senior project director. The general criteria was to “recruit qualified staff with experience in business-to-business marketing/sales, proven skills in project management, knowledge of environmental legislation, technical and language skills” (TEDA AC, 2009, section 4.1). Salary rates were also designed to attract and retain the programme delivery team based on local norms.

In accordance with NISP’s guidance, a number of staff were recruited as mentioned in section 7.3.1. One staff member from an environmental consultancy took the responsibility of the IS network director, who was responsible to arrange the Chinese team to translate documents shared by NISP and to lead programme activities. An IT staff member from a waste treatment company came to assist the installation and maintenance of NISP’s database, SYNERGie. A lawyer from the local law company was dispatched to be the policy coordinator and at the early stage of the project, the person was also responsible to deal with contract-signing issues. In addition, the eco-centre itself recruited one staff with the environmental engineering background. Then, except the position for administrative assistant and innovative manager, other

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positions were filled based on NISP's guidance. A TBNA IS Network delivery team was generally established and began to learn and apply knowledge transferred from NISP (see section 7.5.3).

As regards the vacant position for administrative assistant, it was not urgent at that stage as the director of the eco-centre had planned to recruit a number of interns to take the responsibility. However, regarding the vacancy of an innovation manager, the director expressed concern at the difficulty of finding a qualified person.

The following section gives an example of how tacit knowledge on personnel recruitment was being transferred from NISP coordinators to the director through an internal meeting.

**Records for an internal meeting between NISP coordinators and TEDA  
eco-centre**

Date: March 2010

Venue: a meeting room of the TEDA government

Attendees: All eco-centre staff and NISP coordinators

("A" represents the director of the eco-centre; "B" and "C" represent NISP international project coordinators)

[...]

A: "It's so hard for us to find this person (innovation manager). (One NISP coordinator) has told that this person should have the ability to identify synergy opportunities and also can give good links with companies [...]."

B: "... you won't find anybody that can have technical knowledge on everything. It's impossible but if you got someone that's got good connections to R&D committee or to the knowledge management team or technical community, then they should be a first point of call [...]."

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A: “Do you mean for this innovation manager, this person only needs to have a very good relationship with some experts?”

B: “And they usually get technical background themselves. They may be a civil engineer, or they may be chemist or whatever, so that they know some science and they understand what the technical issue is, or what the potential technical solution might be [...].”

C: “I wouldn’t affirm the environmental background is particularly relevant for the job. More process background [...].”  
[...]

The knowledge of what to prioritise in looking for an innovation manager is tacit. Eco-centre staff gained an understanding of this via face-to-face communications with the NISP team, as above. Through a series of communications, the eco-centre director finally found two experts on chemical industries from the local academic institutions to work as innovation managers. Face-to-face communications like the above example provided a good platform for KT between the KT participants to sort out problems.

In the recruitment at the early stage, English languages skills<sup>31</sup> of all job applicants were required to ensure that the team members could communicate with the knowledge provider to learn knowledge. Also, as the eco-centre was supposed to deliver all internationally collaborative projects of the TEDA government, language skills were valued during recruitment process. However, there were insufficient considerations on other aspects of job recruitment. For example, the position for a policy coordinator was supposed to identify policy gaps and to recommend the policy instruments to encourage

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<sup>31</sup> Chinese education focuses more on written English than on spoken English. So, Well educated people may not bear the job responsibility to communicate/ negotiate with foreign collaborators.

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the uptake of IS synergies in China (TEDA AC, 2009). A lawyer was allocated to the position but a person with environmental management or environmental policy background might be more ideal for the position. Also, unlike practices in the UK (see part (1) of section 6.4.2.1), personnel recruitment at the early stage had less evaluation on staff's industrial background --- most staff's educational background in the eco-centre were in environmental science. This is probably because at the programme initiation stage, language and communications skills to learn NISP's transferred knowledge were much more valued than the skill to identify synergy opportunities. This potentially built up problems for delivering the project in future (see section 7.5.5.3). The consideration of the priority of skills in personnel recruitment is an example of adapting the provider's knowledge to the need to develop the programme beyond the initial stages.

The personnel recruitment process therefore was the eco-centre director's initiative to implement relevant information transferred from NISP. Based on the explicit guidance, part of the recruitment rule was acquired by the recipient (the senior project director). Then combined with the person's own experiences and social networks, the received information was applied in the subsequent personnel recruitment. Face-to-face communications with the knowledge provider were conducted to acquire tacit knowledge to sort out problems (e.g. difficulty to find innovation managers) in knowledge application. Then, the newly acquired information was applied to recruit the

staff.

### 7.5.2 Transferring the programme development strategy

The flowchart (figure 7.5) presents NISP’s IS programme development strategy. It can be viewed as an output of NISP headquarters’ knowledge codification work mentioned section 6.4.2.2.

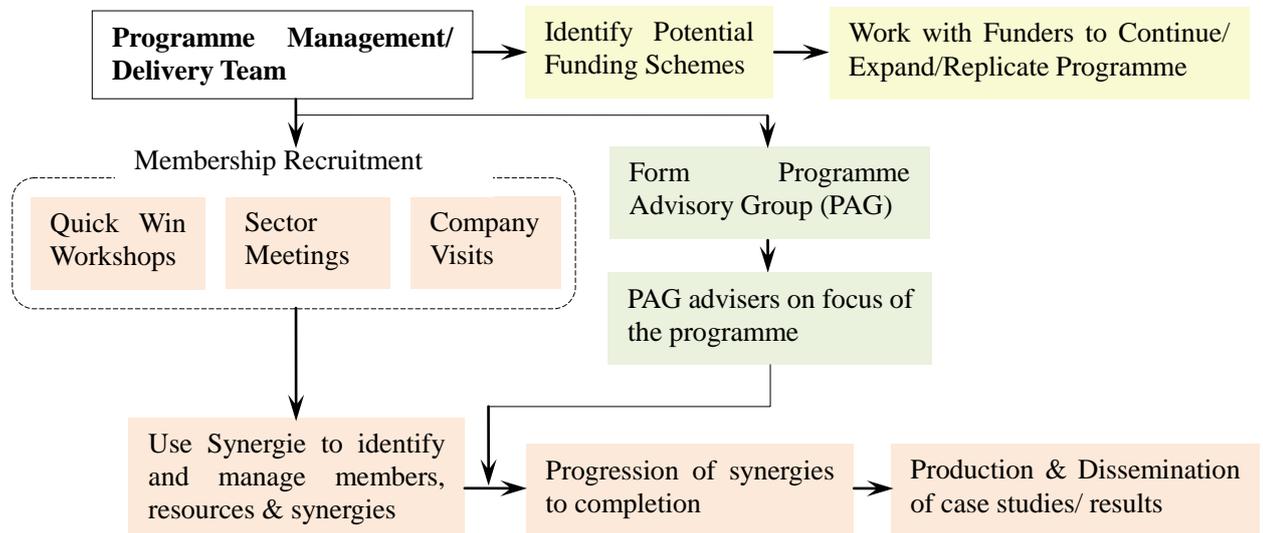


Figure 7.5 IS programme development strategy  
Source: compiled from (TEDA AC, 2009)

The programme development strategy covers two major tasks. The first one is to recruit business members to facilitate potential synergies with the assistance of the established PAG members; the other one is to identify and apply funding support to expand the programme to a larger area.

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Besides codifying the programme development strategy into the above flowchart, NISP headquarters also have worked on codifying each task in figure 7.5 into templates (e.g. in the form of a flowchart) (see section 6.4.2.2). The codified information on IS facilitation methods had been transferred to the Chinese team since the TEDA eco-centre was launched.

This type of strategic knowledge was transferred to the IS network director of TBNA IS Network through document sharing, face-to-face and Skype communications at the early stage of the collaboration. After acquiring the general strategy to develop the TBNA IS Network, the IS network director began to communicate with each team member about the general plan to conduct the programme. The communication process was valued by the IS network director, as mentioned by him, “through talking to different people about your idea and answering their questions, you can understand your task better, describe it clearer, and finally you can put it into practice”. The internal communication process can also assist knowledge dissemination within the knowledge recipient organisation.

Later, on the first PSC conference held in March 2010, the IS network director briefed the proposed first-year project plan to PSC members (see figure 7.3 for the structure of PSC) to receive high level support and advice for initiating the TBNA IS Network programme. On the conference, the PSC members expressed their support to the

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programme in terms of assisting to market the programme and recruit business members in areas governed by them.



Figure 7.6 The First Conference for the Steering Committee of the Switch Asia Project (The 2<sup>nd</sup> right is researcher who was responsible to record key points of the conference)

Copyright: TEDA eco-centre

At the conference, the key debate was whether there was a need to introduce policy support before or after the end of the programme. Two external experts in the field of international project coordination from United Nations Industrial Development Organisation (UNIDO) mentioned the lack of economic incentives (such as landfill tax) for businesses to participate in the programme in China and emphasised “the success of the project may largely rely on the improvement of policy work.” However, the local government representatives expressed their confidence in incentives as they have issued a number of innovative funding supports to promote resource and energy efficiency in the local area. Future policy support could be made based on the achievements of the programme --- “the space for further improve and enhancing

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policy is possible and after the successful application of this project, we can introduce more policies.”

The debate indicates the necessity for the Chinese policy makers to learn from the UK’s waste policy framework and the local government’s awareness of the necessity. Also, Chinese policy maker’s attitude in the debate implies that the outputs of the programme will determine if it can receive further funding and policy support from the local government. This will provide motivation for the local programme delivery team to work for the programme goal (table 7.2).

The above example shows that when the codified strategic information was received by the recipient, there were then intensive communications regarding how to apply the information. Dissimilating this type of acquired information within the recipient organisation helped each organisational member to understand one’s role in applying the knowledge. Dissimilating the acquired information to high level policy makers who were either a steering committee or advisory group helped to gain support and advice.

### **7.5.3 Transferring programme operational methods**

Detailed programme operation manuals were also sent to TEDA eco-centre in terms of a range of word, excel and PowerPoint templates. These templates covered a QWW flow chart, workshop flyers, synergy cards, presentation PowerPoint, business

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feedback forms, data capture forms<sup>32</sup> and other tools adopted to facilitate business IS activities. This information package was predominantly an explicit form of NISP organisational knowledge compiled as an output of NISP organisational knowledge management activities mentioned in section 6.4.4.2.

When the information package was received by TEDA IS team, there was a four-day training session arranged by the NISP international project coordinators. They visited TEDA to train the local practitioners to understand the concept of IS, the history and outputs of NISP, and the detailed information of IS facilitation procedures.

The subsequent work was intensive ‘Chinafication’ of the English version of information package. As IS practitioners in TEDA mastered English language skills, they worked on translating all the documents at first. Then, arranged by the IS network director, translated documents were exchanged within the team for proofreading. The team also invited a number of local business representatives or others with little understanding of the IS concept to read the translation to check if the expression was explicit. Finally, the finalised Chinese version of information package was formed and part of key documents which would be read by business customers on synergy events were sent to re-design and beautify with the logo of TBNA IS Network being added.

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<sup>32</sup> Data capture form is an information collection form used by NISP practitioners to record business members’ resource details (e.g. name, SCI code, quantity and condition of their waste resource).

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The above case shows that explicit information could be transferred at the early stage of a KT collaboration, and when explicit information was received by the foreign knowledge recipient organisation, there was an intensive translation and communication to acquire the transferred information. Communication could occur between the knowledge provider and recipient, or within team members of the recipient, or between the recipient and other organisations. During the translation and communication, team members of the recipient began to become familiar with the acquired information package and could prepare for the subsequent application of the knowledge.

#### **7.5.4 Transferring software**

As mentioned in section 6.4.1.1, NISP software, CRISP, used by all NISP UK regional teams was used to record resource ‘haves’ and ‘wants’ of local business members, identify potential synergies, record the progress of each synergy, and document synergy outcomes. Slightly differently, the software TEDA eco-centre received was an upgraded version, called SYNERGie which was an upgraded version of CRISP (mentioned in section 6.4.1.2) and was being used by all NISP international teams.

After the software was shared, training courses were given to Chinese IS network practitioners to learn software operation. There were also discussions between the two

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partners to ‘Chinalise’ part of the elements in the software, such as transforming British date description format (day-month-year) into Chinese style (year-month-day) and using Chinese style of address description. In contrast to the ‘Chinafication’ process mentioned in section 7.5.4, this transforming required the assistance of NISP IT team who had the right to revise the programme.

In addition, waste ‘haves’ and ‘wants’ recorded in the UK database (CRISP) were not shared to the Chinese team but detailed information recorded in the Chinese database was visible to NISP. This was probably because, firstly, information recorded in the database is core NISP organisational knowledge which can only be selectively transferred to a recipient in the contracted period. For example, relevant synergy case studies generated in the database can be transferred to international partners when it is necessary; secondly, even the database is transferred to China, seldom synergy opportunities can be identified as IS activities are highly restricted by geographical distance (Chertow, 2000; Sterr & Ott, 2004)

The case of transferring software management knowledge also presents a process of KT covering both the technology itself (i.e., the software) and the skills required to operate it. The interactions occurred between the two parties to identify ‘problems’. Then, there was communications between the international coordinators and NISP IT team to revise the transferred information (e.g. software) to meet the requirement of the recipient as

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the Chinese side was not authorised to revise the transferred software.

### **7.5.5 Learning by doing**

KT practices described in section 7.5.2-7.5.4 cover only the tools for IS network facilitation (information package sharing by the provider, information translation or interpretation, and acquiring the transferred information by the recipient). No concrete application activities were carried out at that stage. When the entire transferred information package was acquired by the practitioners of the TBNA IS Network, the team began to apply the information. The process was motivated by the need to meet the first year programme target set up by all programme participants and future funding status as mentioned in section 7.5.2. The following sections describe the TEDA teams' attempts to apply and adapt the acquired information.

#### **7.5.5.1 Organising the first CEO Dinner Meeting**

Instead of fully following NISP's IS network facilitation approach (see figure 7.5), TEDA eco-centre added a CEO Dinner Meeting session to NISP's method. A CEO Dinner Meeting was planned for a week before every QWW event. The objective was to gain high-level programme support, such as to ensure the invited CEOs and environmental managers to dispatch correct staff who understood production process flows to attend the following QWW event, and to provide support to put IS

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opportunities into practice.

An internal meeting within the Chinese delivery team was held in the April 2010 to discuss who should be invited to the following CEO Dinner Meeting. According to the meeting notes, the number of invited businesses was planned to be around 50. The basic rule was to invite businesses which had willingly been involved in a number of environmental events organised by the local government and which might have large volumes of waste resources. Finally, it was decided to invite active members of the local environmental protection association and the local waste incineration, hazardous waste disposal, landfill and cement plants. This type of internal meeting before formally holding the first event is a form of internal communication before attempting to apply the acquired knowledge.

Personal contacts of those invited CEOs and environmental managers were shared by the local environmental protection association which is governed by the local EPB covering more than 150 local businesses aiming to engage with environmentally friendly activities (TEDA EPA, 2012). Based on the researcher's observation, when inviting business representatives, the IS network team needed to mention that the TBNA IS network programme or TEDA eco-centre was supported by the local EPB. Otherwise, businesses were not interested to know more about the CEO dinner meeting event. The EPB is the local regulator who is responsible to charge sewage discharge fee,

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for example. Also, the EPB can be involved in assessing which businesses can receive funding support on energy conservation and pollutants reduction, a reward which can also help a company to market a its environmentally friendly image. Therefore, the local industries have tried to support events organised by the EPB to make good relationship with the environmental regulator. Thus EPB's involvement in the TBNA IS Network provided the eco-centre resources and support to organise events

On the day of the CEO Dinner Meeting in April 2010, around 100 CEOs and environmental managers of 50 enterprises attended.



Figure 7.7 The first CEO Dinner Meeting in the April 2010

Copy right: TEDA eco-centre

A table plan had pre-set each business representative's seat. CEOs were arranged to sit around VIP tables with TEDA government leaders, and environmental managers were

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arranged to sit around general ones with TEDA IS programme practitioners. TEDA government showed high attention to the programme as the host of the meeting was the vice director of TEDA EPB. The table plan process embodied the Chinese culture of respecting leaders such as higher-level government officials or business managers. It is a courtesy to consider the elements in a table plan in any formal occasion as who is sitting to whom and talking to who is so important in China. Wagner (2012) describes this type of hierarchy as power distance and comments that a table plan is a way to show the highest member of a group the most respect.

The agenda of the meeting included the TEDA administrative committee deputy director's speech to encourage businesses' engagement in the programme, NISP representative's illustration of the achievements of the UK NISP, TEDA IS programme director's introduction of the TBNA IS Network programme, a local business presentation on the benefits of implementing the concept of IS in his company and the informal communication during the main meal.

During the process of dinner, a group of government and programme representatives visited every table to toast attendees with wine and encouraged them to participate in the programme. Under the cheerful atmosphere, attendees expressed their support and trust to the programme and willingness to dispatch staff to attend the subsequent QWW. The dinner meeting lasted about three hours and attendees chatted joyfully with people

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at their tables.

The meeting therefore provided a platform for the IS team to market its programme and the eco-centre backed by government's support. Government leaders' attendance showed the importance of the programme; programme representatives' speech attempted to transfer programme objectives and IS thinking to attendees; the dinner process provided an atmosphere for informal communication to foster networking and trust.

Delivering the CEO dinner meeting before a QWW was the idea of the Chinese programme delivery team. The implementation of the idea was a trial to revise NISP's IS network facilitation methods in the Chinese context at the very beginning of the programme when no one knew the background of the TBNA IS network programme. So, the knowledge application process implemented both the information package acquired from NISP and knowledge situated in members of the Chinese programme delivery team. The source of the situated knowledge was from the understanding of Chinese culture. Holding a CEO dinner meeting before a QWW can therefore be viewed as the knowledge recipient's attempt to adapt the provider's IS network facilitation approach in the Chinese culture.

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### 7.5.5.2 Holding the first QWW

Two days after the CEO dinner meeting, the Chinese programme delivery team began to contact the enterprises again to confirm the name and contacts of their staff who would attend the subsequent QWW. Other work had focused on the preparation of attendees' name list, table plan, the team's PowerPoint presentation, and the synergy workshop session (a session to collect and swap waste information). All tools utilised during the preparation process were originally from NISP and were translated and processed as mentioned in section 7.5.3.

The day before the workshop, the Chinese programme team received a training course from NISP's coordinators who visited TEDA during the first CEO dinner meeting and QWW. Role play was used to help familiarise the Chinese team with how to complete the NISP's synergy cards that were used to collect waste 'haves' and 'wants'. The following part presents the process of the training:

#### **Meeting records: Training for the synergy workshop session on the QWW**

Date: April 2010

Venue: a room of TEDA eco-centre

Attendees: All TBNA IS Network delivery team and the two NISP coordinators

"A" and "B" represent NISP international project coordinators

[...]

A: "At first you say 'hello, welcome to the workshop and you're the table facilitator' and you just introduce yourself, what's your role in your project

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and then you ask each person to introduce themselves one by one with maximum one minute. [...] and you can also ask them questions.

**B:** “Make sure they don’t fill their products on the ‘what we have’ sheet (green sheet) [...]. You need to explain to them as one material per slip and make sure you can read as we will diagnose [...]. After they fill the green sheet, you get them to fill the yellow, ‘material they want’. Control the time within 20 minutes and then you ask them to give the green slips back. So, you ask everyone to hand over the green slips to you and you take the first green slip and read out [...]. Also, you can encourage that company to tell us more information about the resource they have.”

One Chinese practitioner asked if there was a need to demonstrate to businesses how to fill the forms.

**B:** “I’m a delegate here. My experience of this has to be driven by you guys [...]. You told me what to do and my understanding is this. I get my slip, I write it, I write my more slips, I pass them back and he is going to drive what goes on from now on [...]. I’m doing what I’m told.”

Led by B, A began to cooperate with B to act as a table facilitator to guide B to fill a form.  
[...].

The above example is a typical training session provided by NISP coordinators with the method of role play. Unlike the one-off dissemination of all programme operation manuals (section 7.5.3), informal training sessions were provided constantly where there was a need. Although steps to organise the synergy workshop session were given in materials shared by NISP headquarters, the training helped practitioners to become familiar with the steps. Face-to-face communication within the training sessions assisted the transfer of tacit knowledge, such as creating atmosphere to encourage businesses to communicate.

On the day of the QWW, more than 40 representatives of local companies attended. As

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data capture forms were previously sent to them, most of them came with the prepared information about excess or required resources of their companies. The general procedures of the QWW were similar to those the researcher experienced in the UK. Attended by the researcher in the UK, the synergy workshop session (for data collection) was the major part of the workshop, lasting for 2 hours. Besides data collection, a number of presentations were given to share business attendees' information on IS thinking and successful synergy practices facilitated by NISP. However, as the TBNA IS Network programme just started, there was no successful local synergy case to present on the workshop. NISP's case studies were therefore presented. Attendees seemed not to be very interested by the case studies as no one asked questions about how the synergies had been implemented and how the synergy outcomes (e.g. increased sales, saved cost and CO<sub>2</sub> reduction) were calculated.

After the presentation session focusing on IS thinking transfer to attendees, it was the synergy workshop part targeting information collection. On the synergy workshop session as shown in figure 7.8, synergy cards were given to each attendee by the table facilitators from TEDA eco-centre. Business members were facilitated to fill in excess or required waste information on the cards. Then, with the assistance of NISP international coordinators, the completed cards were swapped between each table to share all waste information to all attendees.



Figure 7.8 The synergy workshop session of the first QWW in TEDA in the April 2010  
(The researcher was one of the table facilitators)

Copyright: TEDA eco-centre

As the eco-centre needed hands to facilitate the synergy session, the researcher was invited to facilitate a table as shown in Figure 7.8. People sitting around the table were from manufacturing and waste recycling companies. During the session, the researcher encouraged them to provide as much information/details as they could and told them my experiences of QWWs that I attended in the UK to generate their interest to attend the programme. Most of them were very interested in the stories and told me waste re-utilisation activities in their enterprises. Also, the researcher asked two active persons in my table to help to read the data capture forms swapped from other tables and they readily took the responsibility (the method was used in one UK QWW to create active atmosphere of this session). However, two representatives from recycling companies were not very active during the whole synergy session. Reasons were found out later at the event.

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Most attendees wanted to find cheap outlets for (hazardous) waste materials. According to people on my table, their enterprises had to pay high disposal fee to have electronic or other hazardous waste disposed. So, they would be quite happy if some enterprises could utilise their waste or if more waste disposal competitors could be introduced into TEDA to reduce waste disposal cost.

As two inactive attendees of the researcher's table were from the largest local waste disposal companies, they were a little bit unhappy to hear the attitudes. One of the recycling company representatives reminded people to be aware of the Hazardous Waste Regulations which require hazardous wastes to be sent to local hazardous waste disposal companies for incineration as it was illegal to transport hazardous waste to other area for re-utilisation. Through checking with relevant hazardous regulations<sup>33</sup>, although utilising (hazardous) waste has been encouraged and there have been attempts to collect and compile good practices on utilising industrial waste by the MIIT, systematic technical norms are lacking to guide the cross-organisational or cross-regional RCU from the enterprises perspective. Similarly, Li and Yu (2011) argue that in waste management, there are insufficient technical regulations such as

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<sup>33</sup> Chinese hazardous waste regulations cover List of Hazardous Waste (HW) 1998 & 2008, Measures for Administrating the HW Manifest System 1999, and Measures for Administrating the Permit for Operation of HW 2004

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mandatory standards and implementation details, and therefore, it lacks strength in its operational and implementation aspects.

Communication with the attendees helped the programme deliver team to identify policy barriers to resource re-utilisation. The type of information was recorded and was later reported to the PSC members for policy support.

At the end of the QWW, a number of potential synergy opportunities were identified by NISP international project coordinators as no Chinese programme delivery team members possessed the technical knowledge at that time. The number of potential synergies, cost savings and the quantity of landfill/CO<sub>2</sub> reduction were then announced to all attendees to market the significance of the half-day event.

After the workshop, feedback forms were distributed to collect attendees' opinions towards *planning and organisation* (average mark: 4.4/5), *meeting your expectations of the event from the flyer* (3.8/5), *venue and location* (4.2/5), *convenience of the time of day* (3.9/5) and *networking opportunities* (4.1/5). The feedback outcome shows a higher evaluation on the event organisation, venue selection and networking. However, the timing control and personal achievements were not marked as highly.

Time to run the workshop was longer than expected as it was the first event and

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practitioners lacked of experience on time organisation. Low personal achievements might be resulted from three reasons. Firstly, at the beginning of the programme, no local synergies had been successfully facilitated by programme, and no local case study could be provided to show actual benefits of joining the TBNA IS network; secondly, legislative barriers to re-utilising hazardous waste was the key concern of most businesses but the problem could not be resolved at that time; thirdly, representatives from the local large recycling companies might not prefer the idea of IS which would potentially deprive their market; finally, attendees might not be interested in the potential achievements of the events such as the quantity of landfill and CO<sub>2</sub> reduction as unlike in the UK, landfill in China is cheap (see Zhang, Li, Hu, & Song, 2012). Also, CO<sub>2</sub> emission is not regulated at the moment.

The feedback and practitioners' performance were discussed on the internal brief meeting after the QWW. The NISP coordinators observed the QWW and thought that the preparation was not sufficient and the Chinese team did not fully utilise the expertise from NISP to prepare for the event (such as printing leaflets and putting materials into a package). The Chinese team agreed with coordinators' comments and planned to preparation next time. The internal meeting provided a platform for communication between the knowledge provider and recipient to reflect the knowledge application process (such as the need to pay more attention to interact with NISP's coordinators) and how to improve in future.

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### **7.5.5.3 Site visits at the early stage**

Conducting site visits is one of key methods to collect detailed and high quality data on excess and required resources from companies. NISP's guidance on conducting site visits was transferred to the Chinese team but it just covered using data capture form to calculate input and output of material/energy flows to identify generated waste in every production process. This work requires practitioners understand waste types and potential outlets. This knowledge can be accumulated from a person's education background or industrial experiences but it can hardly be transferred from NISP's coordinators to the Chinese team.

As mentioned in section 7.5.1, there was less consideration of recruiting practitioners with profound industrial background and no practitioner in the Chinese team could bear the responsibility of identifying potential synergies at the early stage. The next round personnel recruitment for innovation managers started and it was also another chance for the eco-centre director to apply experiences shared by NISP practitioners (meeting records in section 7.5.5.1 describes the process of transferring experiences on recruiting innovation managers).

Shortly after the first QWW, two industrial experts from the local academic institution

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were invited to TEDA eco-centre to discuss collaboration by the eco-centre director. Finally, the two experts agreed to join the programme. According to interviewee 16, role of the two experts' was to "set up meetings with companies and visit the companies and identify the synergies."

By the August 2010, ten site visit reports were completed by the Chinese programme delivery team. The visited companies were from chemical, bio-technical, steel, automatic and electronic sectors. Each report covered details on company's location, sector, background, major problems with waste resources and innovation managers' suggestions on re-utilisation options. The site reports were outputs of the knowledge recipient to utilise NISP's guidance and the team members' own industrial background knowledge.

Information collected from site visits were input into SYNERGie. One problem regarding data recording was the unavailability of waste codes for general industrial waste in China. In NISP's waste data management method, EWC codes are used to describe waste type for data management. Finally, EWC coding system was transferred to the eco-centre describe waste in TBNA business members. Inputting the collected data into the software for synergy management was a case to apply the transferred software operation manual mentioned in section 7.5.4. In the application process, consistent communication occurred between the KT participants to either 'Chinalise' or

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sort out problems to ensure the recipient adapt to the software operation. So this was technical information being exchanged (e.g. how to classify the wastes) and also an informal policy transfer, i.e. the adoption of the EWC.

### **7.5.6 UK policy tour to learn knowledge of policy and practice**

Developing preferential policy fostering ISD is one mission of the TBNA IS Network programme. According to the TBNA IS network programme application proposal (TEDA AC, 2009), the Chinese programme delivery team is required to identify policy barriers during the programme implementation process, and make policy recommendations to formulate local and national resource/waste policies to broaden the programme. Also, as mentioned in section 7.5.2, on the First Conference for the Steering Committee of the Switch Asia Project, external international projects experts mentioned the problem of policy gap that could be the key barrier to replicate the UK's programme in China, and stressed the importance of policy learning.

The key method adopted to learn UK policy knowledge was conducting fact-finding mission tours to the UK on average twice per year. Each time, different group of Chinese representatives join the tour. From the perspective of KT media selection mentioned in table 3.2, face-to-face interactions with NISP business members and policy makers is better for KT than listening to NISP coordinators' description.

Arranged by NISP, a number of people from TBNA IS Network delivery team and PSC members have visited UK for a week. During the tours, a range of NISP business members were visited including aggregates/plastics recyclers, anaerobic digestion (AD) plants, and waste management facilities.

A number of policy related factors were observed during the visits. The following part gives a description of the shared UK waste policy knowledge received from the Chinese team's one UK site visit in September 2011. Although there were also technological factors affecting the visited UK businesses' resource efficiency activities, technological elements are not summarised particularly as the major objective for TBNA IS Network delivery team and PSC members was to learn policy knowledge.

Table 7.1 Policy factors learned from site visits

<b>Visited Sites</b>	<b>Specific policy related activities</b>	<b>Related policies/regulations</b>
An aggregates recycler	Motives to recycle construction waste	Landfill tax
	Market of the recycled products	Quality protocol
	Inspecting incoming C&D waste skip	Consignment note & EWC code
	Collaborating with NISP and other organisations for advice and guidance	Government funded resource efficiency programmes
An anaerobic digestion plant	Motives to treat food waste	Landfill tax
	Motives to construct the plant	AD loan fund scheme
	Food waste collection	Household waste segregation

The researcher was involved in the site visits as an interpreter for the Chinese teams. During the process, site visit notes were taken. Parts of the notes are presented as follows to give a background of the UK lesson learning tours.

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### **Visiting an aggregates recycler**

Recycled aggregates are key products of the visited aggregates recycler, which is a supplier of aggregates for the construction and landscaping industries. The manager of the company showed us their construction and demolition (C&D) recycling facility. From the C&D waste, recycled asphalt and other mixes of materials can be produced to replace quarried materials. According to him, the plant could handle 1,500 tonnes of C&D waste per day and divert 350,000 tonnes of C&D waste from landfill per year. NISP and other promoters of resource efficiency had been working with the aggregates recycler to provide advice to find feedstocks and to develop the market for recycled construction materials.

The manager explained that their recycling process was guided by the *Quality Protocol for the Production of Aggregates from Inert Waste*, published by WRAP. We were also showed the process of how a contracted truck could transport C&D waste into the plant. The truck was weighed at the entrance. After receiving the consignment note provided by the driver, waste description (EWC code) on the consignment note was checked by staff at the gatehouse. Also, the content of the load was inspected through a camera.

--- The researcher's site visit notes (2011 September)

### **Visiting an anaerobic digestion (AD) plant**

It is a small-size farm based AD plant running by a family business. One tanker truck loading soup-like food waste just arrived to supply feedstock to the AD facility. The manager told us that the feedstock came from the local waste management facility and supermarket. According to the manager, they could treat up to 30,000 tonnes of organic waste per year including packaged food waste, milk, vegetables waste, crop residues. The generated biogas (methane) from the AD facility is burnt through a combined heat and power plant to generate electricity with the outputs of 1.3 MWe. The electricity is supplied back into the national grid every year and the farm uses the self-produced electricity.

The manager also showed us the solid residues of the AD process. The residues were treated into fertiliser and could be used for landfill capping. The Chinese team concerned that the plastic contents in the residues could affect the quality of the fertiliser. The manager explained that they were trying to invest new technologies to reduce the plastic contents to produce quality fertilisers in future.

According to NISP practitioners, WRAP granted £750,000 to the £3 million project. The funding mechanism belongs to the AD Loan Fund scheme to finance the instalment of energy-from-food-waste bio-processing plants for

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councils and businesses.

The Chinese team were interested in the AD facility but according to them, it is impossible to introduce the type of technology because there was no house waste segregation in China. It would be difficult to source feedstock for the technology. Through communicating with the owner of the plant, the Chinese team learned that providing different colours of waste bins or bags to each household and education might be a way to encourage waste segregation but it required a lot investment.

--- The researcher's site visit notes (2011 September)

In addition to the site visit to NISP business members, a number of municipal and national levels of government officials met with the Chinese team to exchange experiences on promoting resource efficiency. For example, in the November of 2010, the Chinese team constituted by people from the local EPB, economic and information technology commission, development bureau and the TEDA eco-centre visited the Birmingham city council to learn the council's experiences in promoting energy conservation through developing combined heat and power facilities and electronic vehicles. Also, the team visited officials in DEFRA to learn the government's experiences in introducing landfill tax and funding a range of resource efficiency programmes. The key to have the programme funding mechanism is the stress of landfill diversion and resource efficiency in the UK waste policy shaped by the European waste directives.

The lesson learning tours provided a platform for the Chinese team especially the programme PSC members to understand the UK's policy context supporting the IS

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programme. The PSC members are various government officials. Through assisting their UK visits, the researcher had chances to communicate with PSC members and staff from the eco-centre about the differences of waste policies between the UK and China.

The PSC members told the researcher that in China, much more attention was paid to regulating water pollutants rather than industrial solid waste and land-filling general solid waste was cheap in China. They also expressed the difficulty in enhancing environmental regulations in China; although possessing a permit to collect waste is required, there were still a lot of un-certificated scavengers to collect all valuable waste.

Also, according to TEDA eco-centre (2011), certified recycling companies could hardly compete with the un-certificated who could always pay more than legal recyclers to get valuable waste resources. The un-certificated scavengers were seen to take the valuable part of waste and just threw the other part away but the certificated recyclers would treat the no-value parts before landfilling them. Enhancing environmental regulations could be difficult as the scavengers were normally the poor people. Due to insufficient financial allowance for the poor, forbidding their behaviours would deprive their only surviving methods and could cause further social problems. Chen *et al* (2010) also find illegal waste handling activities conducted by junk-buyers and scavengers in a Chinese city, Dalian. Due to the unbalanced economic development

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in urban and rural areas, a group of uneducated and unskilled people were attracted to migrate into large cities. However, the only means for them to survive is collecting and selling recyclables.

Therefore, the policy tour has provided a platform for observing UK's waste activities affected by its waste policies. However, it seems that the PSC members could hardly make changes to the regional environmental policies directly. This may relate to the objective of the proposed policy learning task --- recommending some policies at the end of the programme rather than implementing certain policies as mentioned in the TBNA IS network programme application proposal (see TEDA AC, 2009). So, the policy learning tour is more to do with obtaining new policy ideas rather than targeting on introducing UK's policy framework to promote the development of IS activities. Whether or not to apply the received information in TBNA will rely on the effectiveness of the TBNA IS programme (see Chinese policy makers' plan policy application during the conference in section 7.5.2).

Overall, it seems that replicating the UK's landfill tax or other waste management policies directly to support the development of the TBNA IS Network programme seemed not feasible to the TBNA representatives. Mobilising businesses waste diversion activities can be affected by a series of Chinese social and economic problems. Given the impact of policy gap on the outcome of KT in this research and

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drawing upon the personalisation strategy mentioned in section 3.3.2.2, an argument can be proposed --- NISP headquarters may need to provide tailored IS network facilitation solution (personalisation strategy) to make the knowledge fit the Chinese policy context? For example, their international coordinators could communicate with its Chinese collaborators to study the Chinese waste or resource policy context, understand which policy goals are core to the local government, and transfer specific programme delivering knowledge to meet the policy goals. Similarly, as mentioned by Hansen *et al.*, (1999), Shankar & Gupta ( 2005), Bettiol, *et al.* (2012), KIBS can actually deploy a combination of the codification and personalisation strategies with predominantly pursuing one and using the other as a support function (Hansen, *et al.*, 1999; Shankar & Gupta, 2005; Bettiol, *et al.*, 2012).

## **7.6 The Progress of KT --- So far so good?**

Based on the early initiatives to ‘Chinalise’, implement and revise NISP’s methodology on IS facilitation, TEDA team’s own programme delivery method has been developed. Figure 7.9 illustrates the latest flow chart of the operation strategy of the TBNA IS network programme.

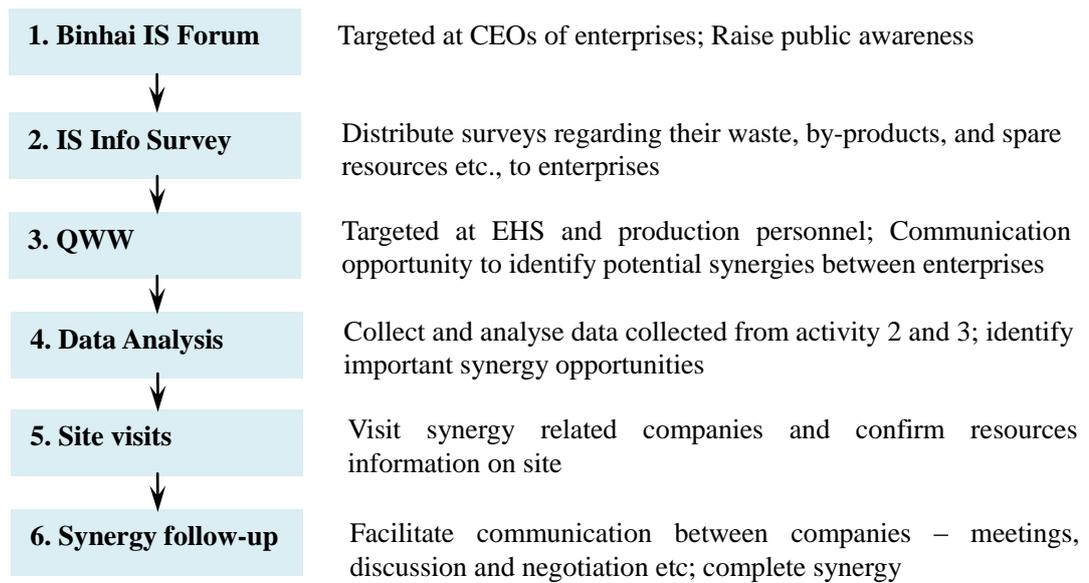


Figure 7.9 IS activity flow chart in TBNA IS programme  
Source: (TEDA eco-centre, 2012a)

The established methodology of the TBNA IS Network Programme has been developed from the transferred information package from NISP headquarters, NISP coordinators' training and the local IS delivery team's attempts to implement and adapt the transferred knowledge. The methodology can be viewed as a routinisation of the transferred knowledge after a series of application and adaptation of the knowledge transferred from NISP headquarters in the Chinese cultural and policy context.

Compared to programme operation strategy adopted at the early stage, an information survey has been added. The survey form covers four major parts: basic enterprise information, energy and resource consumption, raw material consumption for each product, and the generation of packing waste, sludge, dust, food waste and construction waste. According to interview 17 who is the practitioner of the TBNA IS network,

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“since the August 2010, the survey forms have been distributed to 423 local enterprises. 210 of them have returned the form and 110 have been visited.”

Sending waste survey forms to local businesses has been supported by the local EPB, given that collecting waste discharge information is one responsibility of the environmental regulator. Previously, the collected waste generation data was very rough --- detail contents constituted industrial waste were not collected. The new waste survey forms have combined waste types learned from NISP’s waste data capture form and can give a better description of waste discharge information.

The prospective method raised some concerns for NISP coordinators as in their previous Chinese programme with Yunnan EPB, businesses were found reluctant to provide waste data to the local environmental regulator. However, TBNA IS Network delivery team thought that EPB could help to market the programme and data collection. A NISP coordinator referred to the Chinese team’s attitudes towards the collaboration with the local EPB, “when the companies see that’s from EPB, ‘they must be important. We must then fill it out.’ If you just had TEDA eco-centre, they look at it and then throw it in a bin because no one knows TEDA eco-centre.” So, it seems that the involvement of an environmental regulator in the IS network facilitation programme can be a ‘double-edged sword’. On one side, it may reduce trust between the programme delivery team and business members as the environmental regulator can be shared with

the waste information; on the other side, it could add ‘credits’ to the programme (see similar discussions in section 7.5.5.1).

By June 2012, 635 business members have been recruited through conducting survey and organising conferences and QWW events. 38 synergies have been facilitated and completed covering utilising packaging waste, waste plastics, metals, oil, sludge and other resources. The recent outputs of the programme are presented in figure 7.10 and table 7.2.

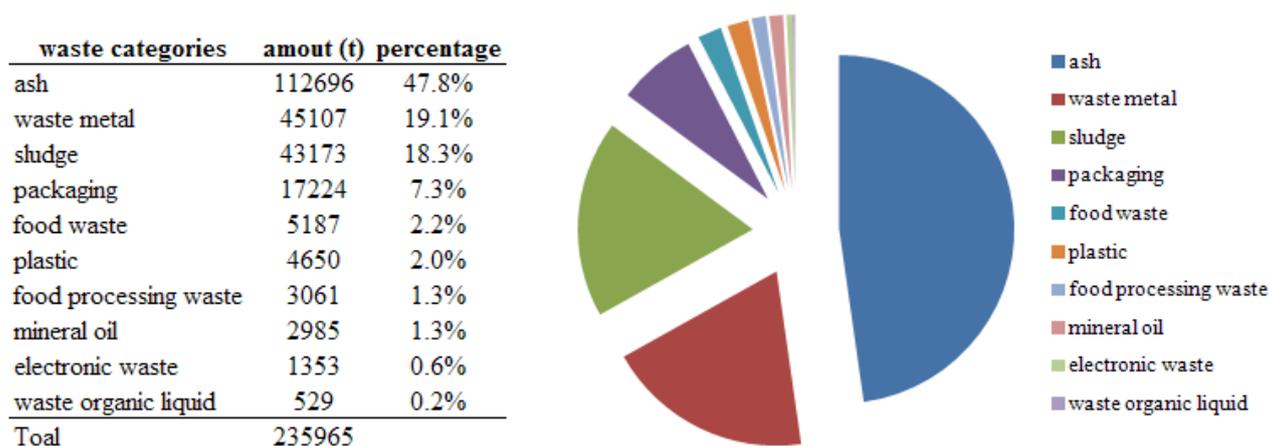


Figure 7.10 Achievements of completed synergies facilitated by the TBNA IS network  
Source: compiled from (TEDA eco-centre, 2012a)

Table 7.2 TBNA IS network outputs by June 2012 vs. planned goals by November 2013

Categories	4-year programme goal (Mar. 2010- Nov. 2013)	Achievements by Jun. 2012
Recruited business members	800	635
Completed synergies	80	38
CO <sub>2</sub> reduction (tons)	9,900	30,000
Landfill diversion (tons)	16,500	17,000
Hazardous waste reduction (tons)	3,000	318
Cost savings (¥) (£1~¥10)	50million	11.8million

Source: compiled from TEDA eco-centre (2012a) and TEDA AC (2009)

According to TEDA eco-centre (2012a), the outputs of the programme were verified by

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a local environmental consulting company. The company accepted training from the UK auditing company who has been verifying NISP's outputs. As this KT was not a direct KT activities of the TBNA IS network programme, the KT exercise is not explored in this research. From table 7.2, the TBNA IS network has met its CO<sub>2</sub> reduction and landfill diversion targets. In the final year, they still need to work on recruiting more business members, and facilitating more synergies involving utilising hazardous waste to meet the programme goal.

After the EU funding is ended in November 2013, the TBNA IS Network is proposed to be developed into Tianjin IS innovative Technical Alliance with Tianjin municipal government funding support (TEDA eco-centre, 2012a). The structure of the planned alliance is presented as follows:

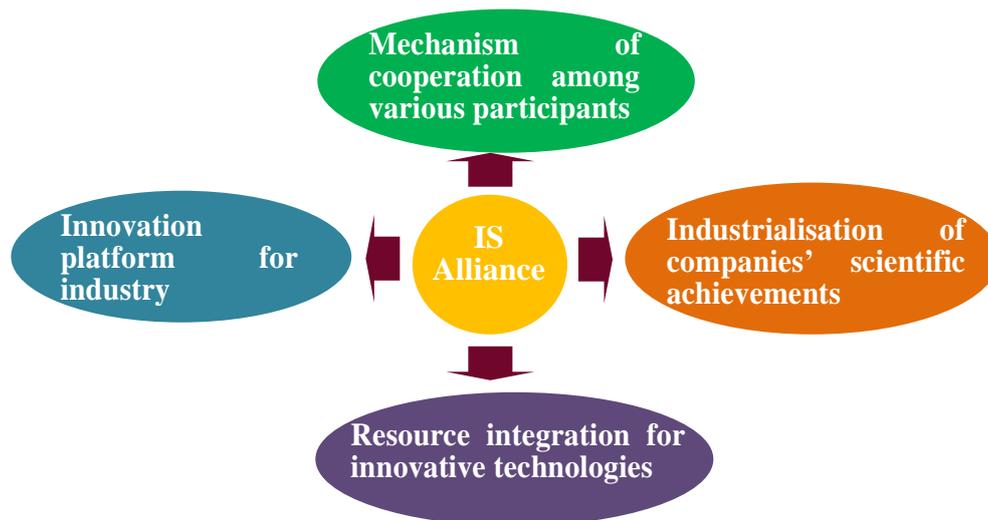


Figure 7.11 The structure of the planned Tianjin IS innovative technology alliance  
Source: TEDA eco-centre (2012a)

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The planned alliance is based on the industrial networks developed by the TBNA IS Network programme. Further recruitment of a ‘think-tank’ group, research institutions and industrial associations into the IS networks can provide resources (e.g. advice/expertise) to solve technological problems in IS activities. The alliance will be governed and funded by the local government to promote industrial technological development at the regional scale (TEDA eco-centre, 2012d). The securing of further funding support indicates that the IS network facilitation approach and its role for promoting regional resource efficiency has been recognised by the local government. The prospect of the TBNA IS Network shows that the programme will be expanded and this probably indicates the temporary success of KT between NISP headquarters and the TEDA eco-centre because it still needs time to test whether the type of facilitation programme can be sustainably developed in future or not, for example, if new waste polices can be introduced to stimulate businesses to engage with resource efficiency activities.

## **7.7 Summary**

This chapter began with a review of NISP’s previous knowledge disseminative practices with Yunnan EPB funded by the UK government. The transferred knowledge (IS network facilitation approach) has not be utilised by the recipient, it may be caused by various factors such as the lack of human resource in the recipient, the Chinese

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policy context lacking of funding mechanism, insufficient term of collaboration. However, the collaborative programme provided an opportunity for ISL (NISP headquarters) to access to the Chinese market, practice its knowledge disseminative capacity could be enhanced, and consider collaborating with suitable partners in China.

In the NISP-TEDA collaborative project, TBNA IS Network programme, TEDA eco-centre which was established by the local government as a knowledge recipient to learn NISP's IS network facilitation approach. Representatives from the local and regional government authorities acted as PSC members to provide policy and resource support to the eco-centre. At the early stage of the project, the local government innovatively collaborated with local consultancies on expertise sharing to work in the eco-centre to deliver the government's all internationally collaborative projects. TEDA government's programme delivery method could resolve the inflexibility of personal recruitment in government system and save time to establish an efficient programme delivery team. In addition, the accommodation of large quantities manufacturers from various industries in the local area and the government's support of business resource efficiency activities could promote the delivery of the TBNA IS Network programme.

KT activities conducted during the early and middle stage of the programme are discussed in this chapter. Generally, NISP headquarters adopted a codification strategy for KT. The transferred knowledge covered how to build a programme delivery team,

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programme development strategy, operation methods and software was disseminated to the recipient through documents sharing, NISP's international coordinators' periodically Chinese visit and training sessions. In this chapter, the content of each type of knowledge is analysed to provide

When the information was received, the TEDA IS practitioners began to Chinalise the elements of the transferred knowledge and put it into practice based on either internal or external communications (e.g. with the knowledge provider or PSC members). Given the Chinese culture stressing hierarchy (see Wagner, 2012), CEO dinner meetings were arranged in addition to NISP's traditional QWWs to gain high level support to the programme.

Key problems confronted with the TBNA IS Network programme included the lack of policy stimulus (e.g. landfill tax and specific CO<sub>2</sub> reduction requirement) and social problems related illegal waste collection activities. Periodical fact-finding mission tours to the UK were arranged to the Chinese IS practitioners and PSC members to learn UK policy knowledge. During the tours, a range of NISP business members were visited including aggregates/plastics recyclers, anaerobic digestion (AD) plants, and waste management facilities. The policy learning tour was more to do with obtaining new policy ideas as it was not viable to replicate the UK's policy framework to the Chinese context. From the perspective of knowledge dissemination, this research

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suggests that rather than adopting a pure codification strategy, NISP headquarters may need to communicate with its partner to provide tailored IS network facilitation solution (personalisation strategy) to fit the Chinese policy context.

With 2-year programme delivery practice, the TEDA eco-centre had built its own strategy to implement the local IS programme. As an environmental regulator, the local EPB's involvement could potentially add credits to the programme through raising business awareness of the problem but it might also increase businesses' concern on providing accurate waste generation information. With the local government's support, the TBNA IS Network is proposed to be developed into Tianjin IS innovative Technical Alliance with Tianjin municipal government funding support (TEDA eco-centre, 2012a). The securing of further funding support indicates that the IS network facilitation approach and its role for promoting regional resource efficiency has been recognised by the local government. However, it still needs time to test whether the programme can be sustainably developed in future or not. Also, the strategy to build a sustainable funding mechanism to support various resource efficiency programmes still needs to be explored.

The next chapter presents discussions on all major research findings relating to KM activities within NISP, differences and similarities of KT within NISP's UK franchising and KT between NISP and TEDA eco-centre.

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## **VIII. Discussion**

### **8.1 Introduction**

This chapter provides an in-depth analysis and discussion of KM and KT within NISP's franchising system (see section 8.2) and KT between NISP headquarters and TEDA eco-centre (see section 8.3). In addition, the differences and similarities of the two types of KT activities are compared (see section 8.4). Through discussing these perspectives, characteristics of the studied cases are identified and theories in KM and KT are revised.

### **8.2 KM and KT within NISP's franchising system**

#### **8.2.1A KM and KT model primarily driven by a franchisor**

In a franchise system, franchisees are granted the right to use a business model devised by a franchisor, comply with certain quality standards, deliver products with a recognisable brand name, and report relevant data to the franchisor (Hoy, 2008; Minguela-Rata, 2010; Gorovaia & Windsperger, 2010). The franchising process inevitably covers KT between the franchisor and franchisees to disseminate a business model (Minguela-Rata, 2010; Gorovaia & Windsperger, 2010). Also, KM within the franchise alliance is core due to its contribution to franchise system success through developing, perfecting, disseminating and improving an intangible resource,

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knowledge (Paswan & Wittmann, 2009). However, it lacks in-depth exploration of KT and KM in a franchise arrangement (see Paswan & Wittmann, 2009; He, *et al.*, 2011).

NISP's early development history (analysed in section 6.2.1 and 6.2.2) comprised a process of acquiring IS programme delivery knowledge from other knowledge sources (e.g. the BCSD-UK and IIIIEE) through formal and informal collaborations, and amplifying acquired knowledge into organisational level through repeated practice. Also, through identifying and resolving barriers to the knowledge implementation process, organisational knowledge could be revised (see section 6.2.2 and 6.2.3).

NISP's headquarters had taken responsibility to collect and codify the organisational knowledge (covering programme operation and synergy facilitation knowledge) in its franchise network, and to disseminate the organisational core database operation methods to ensure the operation of an integrated database in all franchisees (see section 6.4.2.3 and section 6.5.1). These activities have utilised the contractual relationship between the headquarters and branches as a platform for KM.

Besides the contracted KT activities (disseminating database operation knowledge), there was horizontal KT between the newly recruited and experienced NISP regional teams (see section 6.5.2). This type of KT was informal and based on personal relationships of the participant organisations rather than contracted liability. Also, there

were various national and sub-national networking events and the common database, CRISP, which could be channels for informal KT among individual staff of NISP. Informal KT shows that given all the NISP regional teams share the same language and similar cultural elements brought by geographical proximity, this removes potential barriers to interaction (see language and cultural barriers mentioned in Duan *et al.*, 2010). Thus, geographical and cultural proximity has the potential to provide substantial opportunities of networking for informal KT.

Based on the above analysis of KM and KT initiatives within NISP, a model describing KM and KT within NISP is presented in figure 8.1:

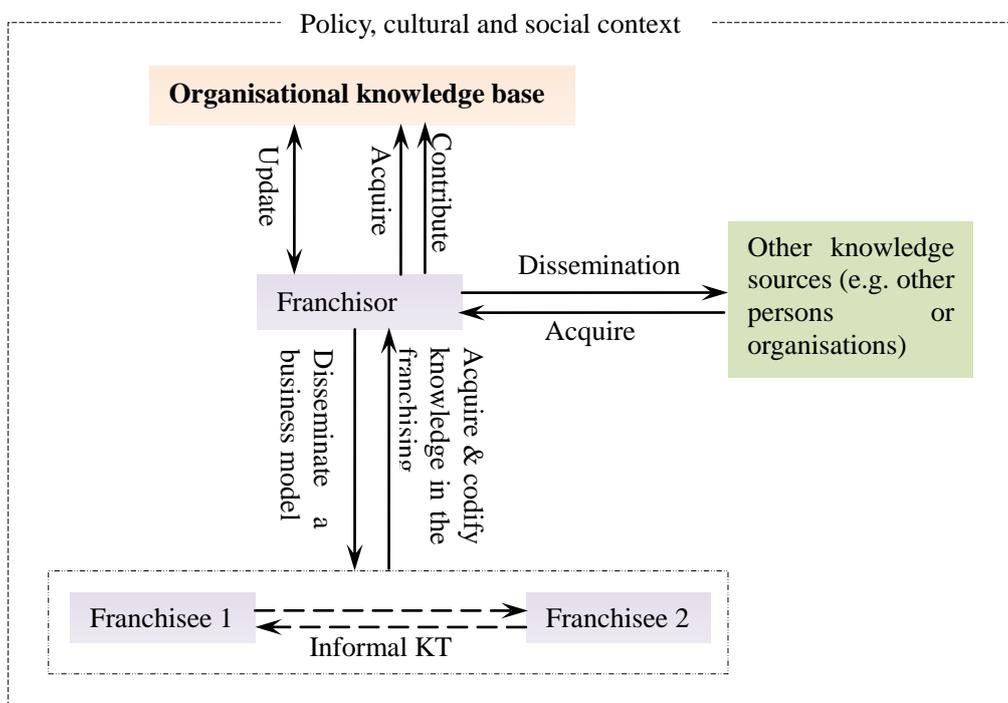


Figure 8.1 KM and KT with franchising derived from NISP's case study

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Figure 8.1 illustrates vertical KT between a franchisor and its franchisees, KT between a franchisor and other knowledge sources collaborating with the organisation, and horizontal or informal KT between franchisees as members of the same group (franchising system). In this model, the franchisor is involved in exchanging different types of knowledge with various partners. For a franchisor, through conducting KM work in its franchise network, a core organisational knowledge product (e.g. IS network facilitation knowledge in NISP's franchising) could be developed. This supported the transfer of the compiled knowledge product to new "markets" (e.g. NISP headquarters transferred synergy facilitation model to various countries).

Also, NISP's development indicates the importance of (policy) contextual factors in fostering its organisational knowledge development. The relevant policy context can be summarised as a performance-based devolution model for ISD (see section 5.3). Similarly, Hsiao *et al.* (2006) and Thompson *et al.* (2009) argue that organisational knowledge is highly context-specific. However, what these authors emphasise is the possibility of losing context information when codifying organisational knowledge. Here, it is argued that when exploring the potential of replicating an organisation's knowledge, it is probably necessary to understand how the knowledge has been developed under the specific policy, cultural and social context. Then, primary contextual factors can be identified and its potential impact upon the knowledge replication process can be assessed.

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## 8.2.2 Verifying the SECI model

NISP's organisational knowledge covered strategic knowledge (e.g. know-how to conduct funding application and team construction) and operational knowledge (e.g. know-how to deliver an IS network facilitation programme) (see section 6.4.2.1). To efficiently replicate regional IS programmes to more regions, a non-profit franchise relationship was formed with government funding support for business resource efficiency. KM activities within the funded franchise network led by NISP headquarters potentially resulted in the creation and development of its organisational knowledge.

As mentioned in section 3.3.1, the knowledge creation process covers four inter-related modes --- socialisation, externalisation, combination and internalisation (SECI) (see Nonaka & Takeuchi, 1995; Lopez-Nicolas & Soto-Acosta, 2010; Esterhuizen, *et al.*, 2012). Socialisation is a process of creating tacit knowledge through sharing tacit knowledge among individuals; externalisation is a process of articulating tacit knowledge into explicit concepts; combination is a process of re-arranging, categorising, re-classifying, and synthesising explicit knowledge to form more systematic sets; internalisation is a process of converting created explicit knowledge into tacit knowledge (Nonaka & Takeuchi, 1995).

Figure 8.2 lists the process of developing three streams of knowledge (K1 refers to

synergy facilitation knowledge, K2 refers to workshop delivery knowledge and K3 refers to software operation knowledge).

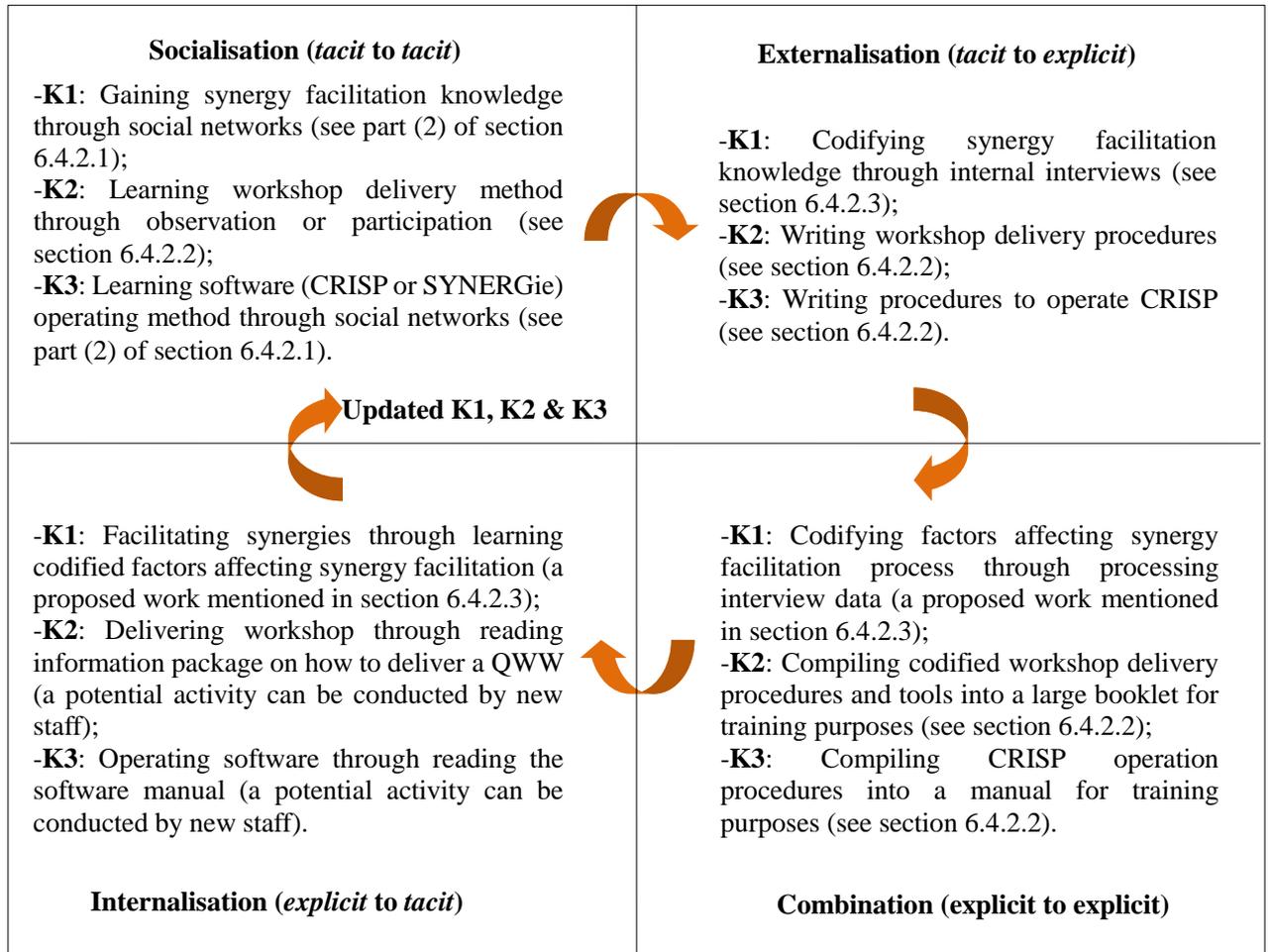


Figure 8.2 Typical knowledge creation activities in NISP (“K” refers to “Knowledge”)

For example, for K1, besides the need to possess a certain level of industrial knowledge, there was a socialisation process for practitioners to gain the knowledge (see part (2) of section 6.4.2.1). Also, a planned externalisation process was conducted to have practitioners’ synergy facilitation knowledge codified through targeted interviews conducted by KM experts in NISP (see section 6.4.2.3). Then, potentially, there could

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be a socialisation process (e.g. inter-person communications) to gain new tacit knowledge of synergy facilitation. So, for a competitive company, SECI activities are supposed to be conducted in a dynamic cyclic process. As argued by Nonaka & Toyama (2003), through the conversion process between modes of SECI, tacit and explicit knowledge expand in both quality and quantity. Also, personal know-how is amplified so the knowledge belongs to a group of people at an organisational level (Hislop, 2009).

Tools (e.g., ICT utilisation and other strategies) utilised in the above knowledge creation process varied in different knowledge creation modes. Knowledge creation activities in the internalisation mode were only in the planning stage at the time when the research data were collected. However, initiatives in other modes were observed during the researcher's internship period.

In the socialisation process (see figure 8.2), the main knowledge creation approach was face-to-face communication or training which could be assisted by email or phone calls. For example, at the early stage of the programme, engagement companies were invited to discuss and demonstrate how to organise workshops and K2 was therefore learned by a number of NISP practitioners through communication (see section 6.4.2.2). Also, chatting with colleagues was mentioned as a way to master K3 (see part (a) of section 6.4.2.1). Similarly, as mentioned by Flanagin (2002), Nonaka & Toyama (2003), and Lopez-Nicolas and Soto-Acosta's (2010), face-to-face interaction is a promising

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avenue for socialisation, and ICTs in the form of social network software can assist, but cannot achieve the effect of the former approach.

In the externalisation process (see figure 8.2), a word editor can assist presenting tacit knowledge into explicit forms efficiently. Collecting and codifying K2 was undertaken by IS practitioners who had experience of organising workshops, conferences and other programme promotional activities. Through repeated practices and communicating with others, programme running procedures were codified into templates (e.g. flow charts, PowerPoint, etc) with the assistance of basic ICT support (e.g. Microsoft). However, during the process, if the tacit knowledge is too complicated (e.g. K1 can be affected by many factors as shown in the interview draft of the “Blueprint” project in section 6.4.2.3), the externalisation process can be highly time and human resource consuming, and can only be conducted by skilled KM experts. Therefore, externalising a company’s core knowledge needs strategic investment. The lack of funding support can heavily impact staff’s motivation to conduct the work. As mentioned by Awad and Ghaziri (2004), codifying tacit knowledge can be hard and relies heavily on a willing expert with the knowledge and a knowledge developer to capture such knowledge.

In the combination process (see figure 8.2), it seems that the major objective was to compile documents for training or learning purposes (see section 6.4.2.2 and section 6.4.2.3). ICTs such as word editor, GIS and data analysis software were found to play a

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big role in NISP's case. As argued by Vaccaro, *et al.* (2008), compared to traditional working tools, such as paper-based documents, ICTs have dramatically improved the combination process.

So, through using the SECI model to analyse the conversion process of the three streams of knowledge, how an external organisation's knowledge had been implemented and amplified within an organisation is clear. Therefore, it is argued that the SECI model can be used to guide the understanding of how a specific type of knowledge has been developed. Based on this understanding, KM staff can potentially find the orientation and allocate resources (e.g. ICTs) to further facilitate the development of the knowledge. Therefore, it shows that KT theories devised based on studies of different organisational arrangements work reasonably well in a franchise setting.

### **8.3 KT between NISP headquarters and TEDA eco-centre**

KT between the NISP headquarters and the Chinese recipient can be understood as a process of disseminating an explicit information package and tacit information (expertise) by the knowledge provider and information learning within the recipient organisation.

Figure 8.3 presents a model covering KM and transnational KT derived from NISP's KM case and the case of KT between NISP headquarters and the TEDA eco-centre.

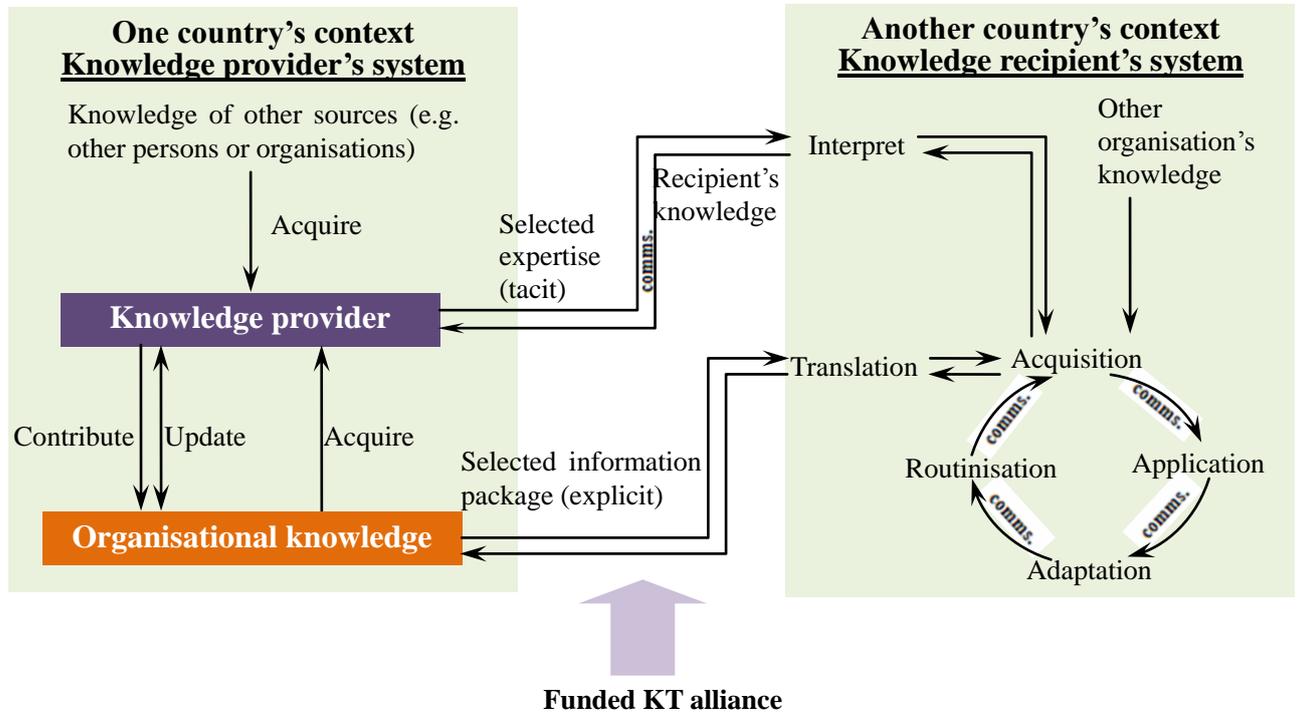


Figure 8.3 KM and transnational KT derived from this case study ('comms' means a communication channel exists)

The model of KM activities in the knowledge provider's system is drawn in figure 8.1. Regarding trans-nationally inter-organisational KT, especially KT between organisations having different languages, the transferred information first needs to be *translated* or *interpreted*. Also, the transferred information could come from the provider's organisational knowledge base or experts' personal and tacit knowledge. Besides *acquiring* knowledge from a specific knowledge provider, information from other organisations can be *acquired* by a recipient through building different levels of collaboration with other organisations to get advice and guidance (e.g. advice from the

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PSC members). Then, through internal communication, the acquired information can be *implemented* for a trial. Changes can be constantly made to ensure that the knowledge is *adapted* to the social, cultural and policy context where the recipient is situated. Finally, the knowledge can be *routinised* to (or embedded into) the recipient's own organisational knowledge which could be repeatedly utilised. Besides KT from the provider to the recipient, the recipient's knowledge, such as policy, cultural and social factors relating to the transferred knowledge could be acquired by the provider (see section 7.5). In addition the recipient needs to know how to filter the acquired knowledge through their own cultural context. This implies other skills entirely to those being transferred.

The KT model presented in figure 8.3 possesses four characteristics. Firstly, the model covers both KM in the knowledge provider and KT between the provider and the recipient. The KT model proposed by Albino *et al.* (1999) only stresses the knowledge recipient's learning process, overlooking the knowledge provider's attempts to process knowledge for dissemination; Jasimuddi *et al.*'s (2012) KT model only describes the provider's strategy to disseminate knowledge. Thompson *et al.*'s (2009) model emphasises both participants' engagement in KT, but there is insufficient discussion on what KT actions they should take. My research argues that when studying inter-organisational KT, it is necessary to trace a knowledge provider's strategy to create, process and disseminate knowledge as well as a recipient's initiatives to learn

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and utilise the transferred knowledge. The “knowledge-based strategy” for conducting a KT case study could assist understanding of the how a specific type of knowledge, which emerged in one organisation’s context, can be transferred, applied and evolved in another’s. This strategy has the potential to explore more in-depth factors affecting a KT process.

Secondly, the model describes a two way KT as the knowledge provider can also learn context knowledge (e.g. business culture and policy requirement) about the recipient’s location. The knowledge can potentially enhance the provider’s capacity to collaborate with other partners in the recipient’s country. As argued by Lee (1999) and Miesing *et al.* (2007), a knowledge provider could learn local knowledge (such as local trading and corporation policies) from their recipients. However, in this case, there is no evidence that any new IS network facilitation knowledge was transferred from TEDA eco-centre to NISP’s headquarters. This is probably because the recipient’s application of the transferred knowledge was still at an early stage.

Thirdly, the model highlights the importance of communication in a KT process. For example, intensive (e.g. face-to-face) communication in terms of training sessions and meetings acted as a channel to disseminate or share tacit knowledge (e.g. how to facilitate QWWs) in NISP-TEDA collaboration. Sveiby (1997) argues that knowledge is supposed to emerge within a certain context through social interaction. Also, as

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observed by Bettiol *et al.* (2012), face-to-face communication with clients (knowledge recipient) is a crucial way for experts of Design and Communication Services companies to create tacit knowledge (e.g. ideas on how to re-fresh a client's corporate identity) and transfer the knowledge product to clients.

Fourthly, the model illustrates a cyclic knowledge learning process in the recipient system. A recipient's key knowledge learning actions can cover knowledge acquisition, application, adaptation, and routinisation (or embeddedness or assimilation). It should be a cyclic process; when every new stream of knowledge object is acquired by the recipient, the knowledge learning process should be initiated to incorporate the new knowledge throughout relevant practice.

Although the model is abstracted from studying the specific case of KT between NISP headquarters and the TEDA eco-centre, it has the potential to describe the more general process of international collaboration adopting a codification strategy to transfer one organisation's management/technological knowledge to another.

However, it was found that NISP's KT process covered insufficient personalisation (customisation) elements. As mentioned in section 7.5.1, at the beginning of the process, KT was conducted in a very one-way fashion from the provider to the recipient without the recipient's attempt to require specific information package or the provider's

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attempts to provide tailored IS network facilitation approach. During the process of programme implementation, the policy gap between the two countries was always a barrier to implementing the transferred knowledge. Therefore, the need to incorporate a personalisation strategy at the beginning of the collaboration is proposed (see section 7.5.6). Similarly, as argued by a number of researchers, instead of relying on only one type of strategy, KIBS can actually deploy a combination of the codification and personalisation strategies, for example predominantly pursuing one and using the other as a support function (Hansen, *et al.*, 1999; Shankar & Gupta, 2005; Bettiol, *et al.*, 2012). This research therefore provides an analysis of the problems of KT strategy without personalisation elements and stresses the necessity and potential to combine codification and personalisation.

### **8.3 Factors affecting transnational KT for ISD**

Based on analysing the knowledge development process within NISP and the KT process between NISP headquarters and the TEDA eco-centre, a number of factors affecting the KT process can be summarised (see figure 8.4).

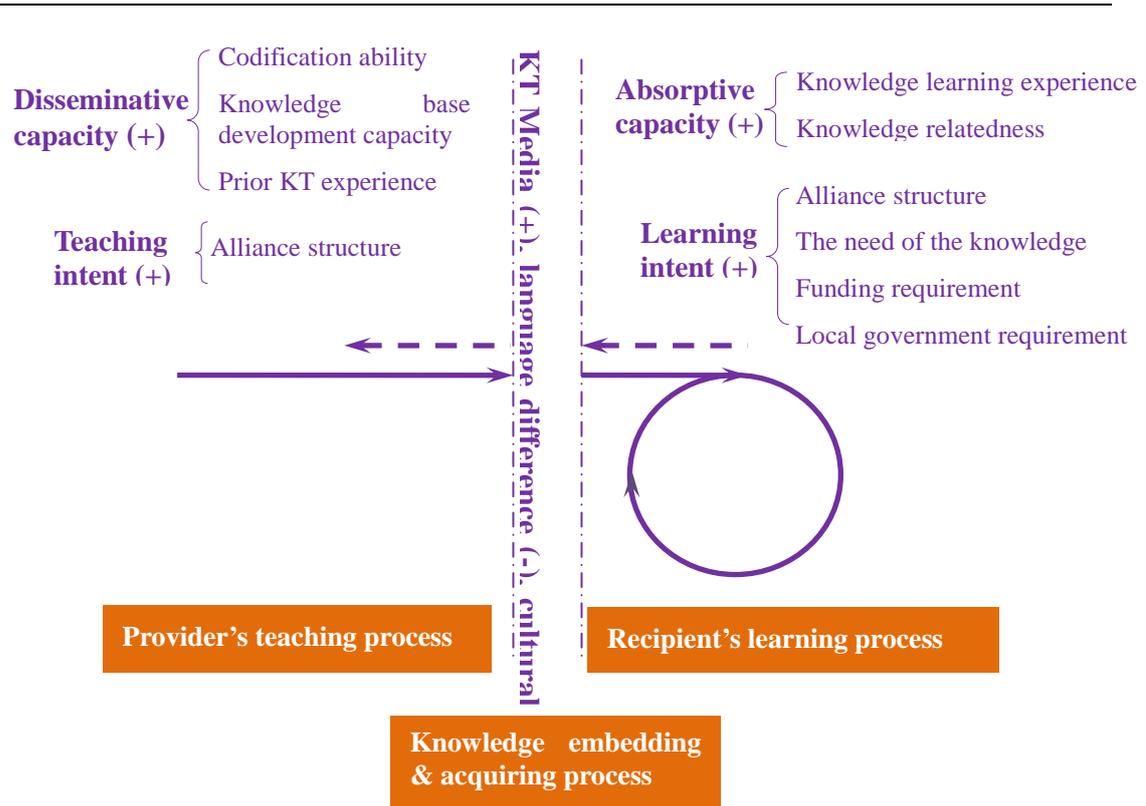


Figure 8.4 Key factors affecting a KT process derived from KT within NISP-TEDA funded licensing

In this case study, core KT factors cover the provider’s disseminative capacity, the recipient’s absorptive capacity, KT media, alliance structure and geographical contexts. The following sections analyse each factor’s role and relationship that has been found in this case study.

### 8.3.1 Disseminative capacity

Disseminative capacity is argued to be a core factor affecting a knowledge provider’s dissemination process (Martin & Salomon, 2003a; Tang, *et al.*, 2010; Park, 2011) but this concept has received limited attention in the KT literature. Disseminative capacity

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can be affected by an organisation's possession of relevant knowledge and prior collaborative experience (Park, 2011; see 3.6.1). As argued in section 3.6.1, when a codification strategy is adopted to transfer knowledge, the capacity for KT is associated with the knowledge provider's knowledge codification ability and knowledge base development capacity. Conversely, when a personalisation strategy is adopted by the knowledge provider, disseminative capacity can be affected by its staff's communication skills (see Jasimuddin, *et al.*, 2012; Bettiol, *et al.*, 2012).

Studying KM within NISP as a whole and KT between ISL (NISP headquarters) and its collaborators (national franchisees and international customers) potentially provides an in-depth understanding of factors affecting an organisation's disseminative capacity. This research proposes that a codification-based organisation's disseminative capacity could be affected by its codification ability (which could be enhanced by KM expert recruitment), knowledge base development capacity (which could be enhanced by ICTs), and its prior knowledge disseminative experience.

- On the one side, ISL's codification ability was judged through exploring practitioners' ability to codify programme delivery procedures and tools based on their own and other colleagues' programme delivery experiences (see section 6.4.2.2). On the other side, the ability was discussed through observing KM experts' approach to use structured survey techniques to collect IS practitioners' knowledge on synergy facilitation and to have the tacit knowledge codified (see section 6.4.2.3). Synergy facilitation knowledge primarily covers know-how to identify synergy opportunities which was NISP's core knowledge and also a type of personal and tacit knowledge. Codifying the type of knowledge could upgrade the

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organisation's service products. Therefore, it is argued that KM experts who master tacit knowledge collection and analysis skills are important to codification-based organisations. Jasimuddi *et al.*'s (2012) also stress the importance of KM experts, arguing that a KM team could ensure the relevancy and currency of the stored knowledge and could guide others to find the stored knowledge efficiently. However, there have not been intensive discussions on a KM team's role in improving the form of the organisation's knowledge. So, this research identifies the role of an organisation's codification ability in its knowledge disseminative capacity, and argues that an organisation's staff and professional KM team could work on enhancing their organisation's codification ability.

- NISP's knowledge base development capacity could be enhanced through the construction of a centralised database managed through CRISP and later by SYNERGie. As IS practitioners were required to input all synergy facilitation details into the database, the ICT supported database functioned as a knowledge base storing synergy facilitation knowledge (see section 6.4.1). Therefore, when there was a need to disseminate the knowledge, practitioners could access the database to acquire relevant knowledge for learning and dissemination. So, an organisation's ICT supported knowledge base could have the organisation's knowledge stored and therefore save time required for dissemination. This characteristic of knowledge base has been also stressed by a number of KT researchers (see Awad & Ghaziri, 2004; Xu, *et al.*, 2011; Chai & Nebus, 2012). A further investigation of NISP practitioners' habit of using CRISP in future may need to help to clarify the role of knowledge base development capacity in codification capacity.

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- NISP's prior knowledge disseminative experience in Yunnan with the local EPB was meaningful to its KT collaboration with TEDA. On the one hand, NISP practised how to demonstrate its IS network facilitation knowledge to others; on the other hand, NISP gained knowledge on how to collaborate with Chinese partners (see section 7.2). An organisation's prior knowledge disseminative experience (or prior collaborative experience) has been widely believed to be core to a KT process (see Martin & Salomon, 2003a; Tang, *et al.*, 2010; Park, 2011). The research finding in this case study also supports this conclusion.

### **8.3.2 Absorptive capacity**

Absorptive capacity has been widely accepted as the most significant determinant of a recipient's knowledge learning process (Park, 2011). Absorptive capacity can be affected by an organisation's past experiences in knowledge learning and its business relatedness<sup>34</sup> to the provider (Lane & Lubatkin, 1998; Lau, *et al.*, 2002; van Wijk *et al.*, 2008; see section 3.6.2).

This research finding supports the above opinions and provides in-depth understanding on how the proposed factors could affect an organisation's absorptive capacity.

- As mentioned in section 7.5.1, TEDA eco-centre was established and managed by

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<sup>34</sup> Business relatedness refers to possessing similar knowledge processing system and norms to those of the knowledge provider (Park, *et al.*, 2009).

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the local government to deliver collaborative projects. Therefore, TEDA government's previous collaboration with international partners could be treated as TEDA eco-centre's past experiences in knowledge learning. Section 7.3.2 briefly reviews the TEDA government's international collaboration on environmental protection. For example, the government collaborated with ICETT of Japan to learn knowledge on environmental protection between 2006 and 2007. During this collaboration, the Japanese partner provided training sessions for staff of the TEDA government on environmental management. Also, they jointly conducted environmental risk management analysis within TEDA's Chemical Park (TEDA AC, 2009). During that time, it was TEDA government staff who participated in the collaborative projects as the TEDA eco-centre had not been established. The collaborative experiences potentially stimulated TEDA government to consider a more feasible way to deliver government projects. This may have informed the decision to form a government-owned non-profit company with flexible job recruitment policy (see section 7.3.1).

- Regarding business relatedness, in the collaboration between NISP headquarters and TEDA eco-centre, both participants could be classified as resource efficiency promoters. However, based on analysis in chapter 6 and 7, it seems that NISP's organisational knowledge was more focused on identifying resource re-utilising solutions. At the early stage of the TBNA IS Network programme, TEDA eco-centre's staff were from environmental management or engineering fields with limited knowledge of identifying resource reuse opportunities (see section 7.5.1). The lack of relevant knowledge was later offset by using NISP's international coordinators to identify synergy opportunities on QWWs (see section 7.5.5.2) and

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further recruitment of innovation managers from an experienced industrial background (see section 7.5.5.3). So, it is argued that using “knowledge relatedness” may be more accurate than the term of “business relatedness”. Also, a recipient’s knowledge relatedness to the provider could be enhanced by recruiting personnel with specific skills.

Therefore, this research argues that an organisation’s absorptive capacity could be enhanced by its previous knowledge learning experience and knowledge relatedness to the provider. Also, through previous knowledge learning experiences, an organisation could consider how to organise resources for future knowledge learning collaboration and therefore enhance its absorptive capacity; recruiting personnel with specific knowledge could enhance the recipient’s knowledge relatedness to the provider and then increase the recipient’s absorptive capacity.

### **8.3.3 Alliance structure and teaching/learning intent**

As mentioned in section 3.4, alliance structure is an important factor affecting the outcome of KT, but in-depth understanding on how a specific alliance type can affect KT is largely missing ( see Mowery *et al.*, 1996; Chen *et al.*, 2004; Jiang and Li; 2009; He, *et al.*, 2011).

In the transnational case study, TEDA eco-centre was required to learn from NISP’s IS

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network facilitation approach to set up the TBNA IS Network in the funded collaboration (Switch-Asia, 2012). However, the collaboration was more flexible than a franchising partnership in which franchisees are obligated to follow the franchisor's business model and adopt a recognisable brand name or logo (Gorovaia & Windsperger, 2010). In contrast, TEDA eco-centre was allowed to design and use its own programme logo to deliver the programme (see section 7.5.3). Also, the eco-centre shared NISP's software (SYNERGie), but NISP's database<sup>35</sup> managed by the software was not shared (see section 7.5.4). Without access to a common database, the two organisations could not be viewed as a single integrated one. It seems that the alliance structure between NISP headquarters and TEDA eco-centre was more like licensing rather than franchising (see differences of the two alliances in section 3.4).

In addition, in the NISP-TEDA alliance, it was the TEDA government who paid ISL (NISP headquarters) to disseminate NISP IS network facilitation experience to TEDA as the government was the main funding applicant (TEDA AC, 2009). Therefore, TEDA eco-centre (delegating TEDA AC to deliver the programme) and ISL were in a client-supplier relationship. However, the role of the licensing structure in affecting TEDA eco-centre's learning process has not been found in this research. It seems that the objective to form an alliance instead of the structure of an alliance can affect a KT

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<sup>35</sup> NISP's database refers to NISP practitioners' inputted resource "haves", "wants" and synergy details (see section 6.4.1).

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process through directly affecting participants' teaching and learning intent.

In this research, the provider's (ISL's) teaching intent were enhanced by the motivation to sell its service product, IS network facilitation knowledge. Strong teaching intent is valued as a key factor promoting knowledge dissemination process (Easterby-Smith, 2008; Duan 2010; Park 2011).

The recipient's (TEDA eco-centre) learning intent was found to be driven by the need to use the specific knowledge to resolve practical problems (e.g. the lack of a networking facilitation approach for resource efficiency in TBNA mentioned in section 7.3.3). The finding is consistent with factors affecting learning intent proposed by other researchers (see Hamel, 1991; Easterby-Smith, *et al.*, 2008; Park, 2011). Also, as an internationally funded programme, the learning intent was also found to be driven by funding requirements (e.g. the need to meet the timeline and targets supervised by the funding body mentioned in section 7.4). In addition, as the eco-centre was a state-owned non-profit organisation, its learning intent was also mobilised by the local government's commitment (e.g. government leaders led the CEO dinner meeting to mobilise local businesses to engage in the programme mentioned in section 7.5.5.1).

#### **8.3.4 KT Media**

Section 3.6.1 summarises various forms of KT media covering face-to-face, telephone,

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electronic, written and numeric means, and the former ones are believed to be more efficient than the latter (Vickery & Droge, 2004). Various forms of KT media were adopted at different stages of the programme to transfer different types of knowledge in this transnational KT case.

Before the programme was formally launched, the general structure of a recruited programme delivery team was presented in the funding proposal, representing a type of written means to transfer codified knowledge. When the funding was received, details on know-how to build a programme delivery team (tacit knowledge) were transferred to the TEDA government representative through the medium of a face-to-face approach (see section 7.5.1). As argued by Lopez-Nicolas and Soto-Acosta's (2010), a face-to-face approach is a promising avenue to transfer tacit knowledge.

At the beginning of the programme, codified knowledge relating to programme delivery procedures was transferred from ISL to TEDA eco-centre via electronic. In this manner, large volumes of information could be disseminated quickly. The information package shared at the time covered the structure of an IS programme delivery team, the roadmap of the programme, procedures to organise quick-win workshops, steps to use the database, the approach to conduct company visits, and the method by which to calculate synergy outputs. So, it seems that electronic means could disseminate a large volume of information efficiently.

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Subsequently, the face-to-face approach (in the form of training) was intensively used for facilitating knowledge dissemination, learning and application. A number of ISL's international coordinators visited TEDA to teach the content of the transferred information package. As argued by Apostolou (2007), Thompson, *et al.* (2009) and Minguela-Rata (2010), it is necessary for a knowledge provider to assist a recipient (through face-to-face communications) to apply the transferred decontextualised knowledge.

Also, when the recipient delivered the first series of programme events (e.g. the first CEO dinner meeting, the QWW and visiting business members), the face-to-face approach (in the form of coordinators' on-site guidance) was utilised. Transferring expatriate experts (top managers and technicians) can play a key role in injecting tacit knowledge into overseas' collaborators (Awad & Ghaziri, 2004; Inkpen & Pien, 2006; Park, 2011).

With the progress of the programme, when a number of events had been held by TEDA practitioners, the frequency of using a face-to-face approach to disseminate knowledge was reduced and replaced by periodic on-line video meetings. ICTs, such as on-line video communications, could assist the process of sharing tacit knowledge (Avram, 2006; Felzensztein, *et al.*, 2010) overcoming geographical distance.

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Media adoption in this KT case shows that when disseminating each type of programme delivery knowledge, electronic or written means was used at first to provide general codified information; a face-to-face approach was then utilised to help the recipient to master the tacit part of the knowledge; whilst on-line video communications were adopted to enhance the recipient's knowledge learning process at a later stage. The changing media utilisation strategy in transferring a type of knowledge in this case shows that with the process of KT, the intensity of KT between the participants could reduce. As mentioned by Esterby-Smith *et al.* (2008), the pace of KT can be affected when there is little additional information that can be transferred.

In addition to transferring strategic knowledge on constructing a programme delivery team and programme delivery knowledge, TEDA representatives visited the UK for policy tours, getting ideas from the UK waste policy, and learning how synergies had been implemented (see section 7.5.6). However, the significance of using a face-to-face approach to learn policy knowledge was uncertain as it was still too early to know whether policy tours could lead to policy innovation in TEDA. The benefits of face-to-face contact are less clear for this type of situation, which involves matters beyond the control of those involved (i.e., changing national regulations) compared to KT relating to a business practice (e.g. running a QWW).

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### 8.3.5 Language difference

Language difference has been found to be a key factor affecting transnational collaborative projects (see EC, 2006b; Duan *et al.*, 2010).

At the beginning of KT in the TBNA IS Network programme, substantial staff time was devoted on translating (or ‘Chinalising’) the transferred information package from NISP headquarters. Besides document translation, interpretation also played a key role in facilitating training courses provided by NISP coordinators and UK lesson study tours. Instead of recruiting language expertise to undertake interpretation and translation tasks, the eco-centre recruited Chinese practitioners with a high-level of language skill (see section 7.5.1). So, when there were any problems regarding implementing the project, the Chinese practitioners were able to communicate with NISP international coordinators directly.

Duan *et al.*'s (2010) stress the importance of having language expertise that can facilitate the communication between KT actors. This research argues that recruiting staff with language skills operating transnational collaborative projects could help to more promote the KT process.

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### 8.3.6 Policy gap

The KT literature seldom discusses the role of policy factors in affecting a transnational KT process. This is probably because previous research has focused on studying transferring business models within transnational companies (see Buckley *et al.*, 2006; Duanmu & Fai, 2007; Inkpen & Pien, 2006; Ding *et al.*, 2009; Park, 2011).

As mentioned in section 7.5.2 and 7.5.6, key problems confronted within the TBNA IS Network programme included the lack of policy stimulus (e.g. landfill tax and a specific CO<sub>2</sub> reduction requirement) and social problems related to illegal waste collection activities. The transferred knowledge (NISP's IS network facilitation model) of in this study is supported by the UK's specific waste policy (see chapter 5). Therefore, applying the transferred knowledge in China requires corresponding policy support, and understanding the UK's policy context is core to the policy replication process. A number of researchers have argued the importance of exploring contextual factors of the location where the good practice has been originally developed (see Dolowitz and Marsh, 2000; Wolman and Page, 2002; Swainson & Loe, 2011).

From one side, it seems that the lack of policy pressure could be temporarily offset by the local government leaders' commitment to the programme as most businesses would choose to follow government guidance to develop a good relationship with the local government (see section 7.5.5.1). However, there still needs to be an effective policy to

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drive business resource efficiency activities. As mentioned by interviewee 18, who is an environmental consultant in TEDA, “if we can let enterprises know and have profits in a short time, they will have motives to be involved in the project but if there’s no profit, after one or two events, no one would like to be involved in the event.” From the other side, fully considering using a personalisation strategy to disseminate the knowledge could reduce the impact of a policy gap (see section 8.3).

So, it is argued that policy factors can be a key factor in funded non-profit KT alliances as implementing certain types of knowledge (e.g. for social or environment development) requires public funding support<sup>36</sup>. Also, when the KT process is initiated, both participants need to negotiate together to discuss how to transfer tailored knowledge to fit a recipient’s policy context. So, although a policy gap can be barrier to KT, it can be reduced by a personalisation strategy for KT.

### **8.3.7 Cultural gap**

Overlooking a cultural gap may create problems for the cross-functional, horizontal collaboration and participative management required by current transnational project management practices (Hong and Engstrom 2004; Ray, 2011). In this research, a number of UK-China cultural differences were found to affect the programme delivery

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<sup>36</sup> Matt *et al.* (2011) mention that using public programmes are viewed as a solution to cope with market-failure, e.g. a lack of privately funded collaborations.

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process rather than KT process. For example, as showing the awareness of hierarchy is important is important in China (Wagner, 2012), the TEDA practitioners had to consider the cultural element in the table plan of QWW and CEO dinner meeting events (see section 7.5.5.1 and section 7.5.5.2). Also, a CEO dinner meeting was held before a QWW to raise the awareness of the programme in high-level managers of the local businesses.

However, in this research, the cultural gap was not a barrier to the KT process as a number of TEDA practitioners possess high-level language skills and had overseas living and study experiences. Therefore, they played the role of communicating with NISP international coordinators about Chinese cultural elements to reduce the chances of misunderstanding during the process of KT. Also, it was TEDA practitioners rather than NISP international coordinators who delivered the IS programme at the Chinese industrial area, the Chinese practitioners could revise the strategy to utilise the transferred knowledge during the programme implementation process.

With respect to solutions to reduce impacts caused by a cultural gap, a number of researchers suggest that it is important to be aware of collaborator's cultural differences. According to Buckley *et al.* (2006) and Liu (2012), cultural awareness can help to build personal trust with local collaborators and therefore eliminate unnecessary misunderstanding and enhance KT processes. However, how to achieve cultural

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awareness is not mentioned. So, it is argued that although a cultural gap can be a factor raising misunderstanding and affecting KT, its impact could be reduced by having language expertise working in the collaborative KT programme and intensive communications between the KT participants. And perhaps more time is needed for familiarisation of the parties in order to start building a trusting working relationship when there is a cultural gap, than would otherwise be the case.

#### **8.4 KT within NISP vs. KT in NISP-TEDA alliance**

Chapter 6 analyses KT within NISP and chapter 7 focuses on KT between NISP headquarters and TEDA eco-centre respectively. In both types of KT, NISP headquarter's software and the programme delivery approach have been transferred. However, more types of codified knowledge on how to programme delivery procedures (e.g. conducting QWWs and site visits) have been formally transferred to TEDA eco-centre than to NISP regional teams (see part (2) of section 6.4.2.1 and section 6.5). The differences of the two types of KT could be affected by a number of factors.

Firstly, the alliance structure in the two KT cases is different. As mentioned in section 6.3, ISL (functioned as NISP headquarters) and organisations comprising NISP regional teams were involved in funded franchising. As ISL had to pay these environmental consultancies to deliver the programme at regional areas, ISL and these

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environmental consultancies were in a client-supplier relationship. However, as analysed in section 8.3.3, ISL and TEDA eco-centre were in a supplier-client relationship through a licensing alliance. Although ISL acted as a knowledge supplier in both types of alliance, its partner selection standard was different.

In its UK alliance, it sought to collaborate with, or pay, professional environmental consultancies to assist it to set up a national programme. However, in the international alliance, it worked on selling its knowledge product to its client (e.g. TEDA eco-centre), who possessed limited knowledge in the environmental consulting field. Thus, ISL could collect IS facilitation knowledge from its UK franchisors (see section 6.4.2.3) but could only collect Chinese cultural and policy knowledge from its Chinese licensee. So, it seems that the alliance structure could affect the process of KT from the perspective of which type of knowledge to transfer and how to transfer it rather than the pace of KT.

Secondly, the geographical contexts of the two recipients' are different. ISL shared closer geographic distance, the same language, and similar cultural and policy contexts with its UK collaborators compared to the TEDA eco-centre. NISP's internal networking events potentially provided more opportunities for informal KT through learning by doing or observing, fact-finding missions and inter-personal experience sharing. This type of KT was fostered by geographic related factors (e.g. shared language and culture) and assisted NISP regional teams to master programme event

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delivery skills and synergy facilitation experiences.

Schulz (2001) and Sammarra and Biggiero (2008) argue that due to geographic proximity and cultural similarity, certain aspects of KT may occur more effectively in territorial systems than in non-localised inter-organisational networks. From the perspective of economic geography, locational proximity allows sufficient day-to-day and face-to-face communications and therefore fosters inter-firm networking and information exchange (Yeung, *et al.*, 2006; Coe, *et al.*, 2007). However, the network of NISP regional teams had a much larger scale than localised clusters that have large quantity of companies with locational proximity. This research shows that firms that are geographically dispersed but located in a common policy and cultural context, can have inter-firm networking and information exchange facilitated by their shared language and culture rather than locational proximity. Particularly, these companies' foreseeable collaboration potential could act as the key driver of their networking and information exchange activities, and would provide a pre-condition for future formal collaboration and KT.

Thirdly, as IS activities are restricted to geographical boundaries (see Gertler, 1997; Chertow, 2000; Sterr and Ott), waste 'haves' and 'wants' recorded in NISP database were only shared within the UK teams as it is possible to make synergies among different NISP regions. Normally, it is not feasible to make synergies between the two

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countries. For a newly formed IS team within NISP, if previous records in the database were read, it would provide the team with a shortcut to learn how to describe a waste stream or identify possible synergy opportunities through drawing upon all cases recorded previously by IS practitioners from other teams. However, the Chinese team did not get the resource to learn this knowledge. Therefore, the need for KT from ISL to international teams was greater than for NISP regional teams.

Significantly, the difference between the two types of KT case studies is not just *domestic vs. transnational* or *intra-organisational vs. inter-organisational*. There are also differences relating to the participants' client-supplier relationship defined by their alliance structure and the contextual factors affecting the transferred knowledge when comparing two types of KT initiatives. These differences all need to be considered in the design of a KT initiative. The next chapter provides a conclusion of this dissertation.

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## **Chapter IX Conclusions**

### **9.1 Findings for research questions**

In the following sections the extent to which the research questions have been answered are addressed, and the research objectives are reviewed.

#### **9.1.1 Findings for research question one**

Q1: What are the differences between the political and regulatory contexts of the UK and China in relation to IS?

Chapter 5 focused on the first research question. The UK and China both have policy contexts targeting resource efficiency and landfill diversion/pollutants reduction which affect IS activities.

##### 1) Ownership of delivery programmes

In the UK, NGOs have been widely used to the delivery of public services (including resource efficiency promotion) (Wettenhall, 1981 & 2005; Flinders, 2004). To some extent, using NGOs instead of government departments to provide certain public services, such as facilitating industrial resource efficiency, has been argued by Laking (2005) and Tan (2010) as a more efficient way to deliver better results. NGOs can be more focused on specific objectives and have the freedom to make management

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decisions without operating with multiple or unclear objectives and limited managerial freedom. Conversely, the Chinese government has retained command of the whole resource efficiency promotion process (see section 5.2). At the national level, responsibility for promoting resource efficiency and pollutants reduction is split among ministries such as NDRC, MIIT, and MEP. At the regional level, it can be either the subordinate of NDRC or that of the MIIT to promote resource reutilisation among industries, as to the interpretation of the function of government departments varies from province to province (Jin, 2009). As there have been professional environmental consultancies (ISL and its UK franchisees) focusing on facilitating IS activities, the UK has a clearer and more efficient approach for ISD compared to China.

## 2) Regulations directly supporting IS

From a regulatory perspective, the UK government has provided both “sticks” (e.g. landfill tax) and “carrots” (e.g. business facilitation programmes and guidance) to businesses for resource efficiency and landfill diversion (see table 5.1). The landfill tax and the escalator have brought substantial pressure to the business of waste management (Seely, 2009a), and have potentially pushed businesses in the UK to seek reduction, reuse and other waste management solutions, such as IS activities. Meanwhile, a number of public programmes (such as WRAP and NISP) have been supported by special funding raised by the landfill tax to promote resource efficiency (Eunomia, 2008; Seely, 2009b). The IS programme therefore acts as an option for UK

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businesses to cope with the policy pressure. In contrast, the Chinese regulations have provided less pressure and more rewards (e.g. funding support and preferential tax) for specific resource efficiency activities (see table 5.1). Businesses or industrial parks adopting advanced techniques/technologies for resource efficiency and pollutants reduction tend to be rewarded (see MIIT, 2010; NDRC, 2011a). Therefore, only IS activities regarding the use of specific techniques/technologies could be supported by Chinese government.

### 3) Policies co-incidentally supporting IS

In the UK, fostering networking among SMEs is perceived to be an efficient way to build trust and relationship for collaborative resource use (Hanna & Walsh, 2002). Therefore, the IS network facilitation approach has been financially supported by the government. However, China has focused more on developing “hardware” (e.g. infrastructures) and supporting larger enterprises which have the capacity to introduce advanced resource efficiency technologies (see MIIT, 2011b). So, it seems that the Chinese approach targets intra-company resource efficiency activities rather than collaborative IS activities without advanced technologies being adopted.

## **9.1.2 Findings for research question two**

Q2: How have specific organisations attempted to promote IS in each country and how has knowledge developed and transferred among these

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organisations for ISD?

Chapters 5, 6 and 7 addressed various aspects of the second research question. In the UK, the key organisation promoting IS is ISL which delivers NISP, a government-funded programme. Funded by the UK government, ISL worked on expanding a regional IS programme into a nationwide network through franchising. A number of environmental consultancies were selected and paid by ISL to organise NISP regional teams delivering ISL's "business" model --- facilitating resource (e.g. by-products, expertise, etc.) exchange among NISP business members.

NISP's IS network facilitation knowledge has been developed through acquiring other organisations' (such as BCSD-GM, BCSD-UK & IIIIEE) knowledge and repeated practices of implementing the facilitation of knowledge in the UK context (see Mirata, 2004). After the programme was expanded nationwide through a franchising model, ISL (NISP headquarters) worked on formally transferring knowledge (e.g. how to operate NISP's database) to its franchisees. The intentional KT was to ensure the sharing of an integrated database between all NISP regional teams (see section 6.5.1). There was also informal KT among members of the franchise network--- learning workshop facilitation skills through attending QWWs held by other regions, or by drawing upon other region's experiences through conducting fact-finding missions, or exchanging skills through cross-regional networking events (see section 6.5.2).

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There was also knowledge transferred from franchisees to ISL led by the latter. This can be viewed as ISL's attempts to codify good practices (e.g. programme delivery procedures and synergy facilitation knowledge) in the franchising system. The KM initiatives were primarily to generate the organisation's knowledge product (IS programme delivery strategy) for dissemination/sale (see section 6.4.2.2). In addition, through acquiring IS network facilitation experiences in the franchise, synergy facilitation knowledge could be codified by the headquarters and used to improve the programme delivery efficiency in the UK (see section 6.4.2.3). Besides KT within NISP, another type of KT refers to exchange of the IS concept between NISP and its business members. This type of IS thinking could be transferred through NISP QWWs. However, this type of KT is not a focus of this study and has not been explored.

In China, as mentioned in chapter 5, except for a number of government departments targeting resource efficiency promotion, no other organisations were found to promote ISD at a national scale. KT among regional governments are in the form of implementing higher level government directions, and good practices are gradually captured by the central government and finally, good practices are required to be replicated by other regional governments based on the central government's new policy (Ma, *et al.*, 2012). The process of KT between different levels of government was not studied in-depth as it is not relevant to the major research topic, KT between the UK

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and China for ISD.

### **9.1.3 Findings for research question three**

Q3: What collaborations are there between the UK and China for ISD?

Which types of knowledge has been transferred and which factors have affected the KT process?

Chapter 7 focused on addressing the third research question. In this case study, the UK-China collaboration on replicating the experience of NISP within TBNA, was funded by the EU Switch Asia Programme. The aim of the 4-year programme was to build a TBNA IS Network, recruiting 800 member enterprises and launching 80 industrial symbiosis projects with knowledge transferred from NISP (TEDA AC, 2009). The alliance structure between ISL and TEDA eco-centre was therefore classified as a licensing operation as the recipient was allowed to design and use its own programme logo to deliver the programme in TBNA and expand the programme to other Chinese area without ISL's management. The major content of transferred knowledge covered how to build a programme delivery team, programme development strategies, programme operational methods and the use of NISP's software (SYNERGie) (see section 7.4).

Based on reviewing all the influential factors affecting KT discussed in the existing

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literature (see section 3.6) and conducting an in-depth case study, a number of outcomes affecting this transnational KT process in a licensing alliance are derived (illustrated in figure 8.4). This research argues that in trans-nationally inter-organisational KT, a knowledge provider's disseminative capacity and teaching intent can be core to its knowledge dissemination process; a recipient's absorptive capacity and learning intent potentially affect its knowledge learning process. Other factors such as KT media, language differences and cultural gap could affect the participants' knowledge embedding and acquiring processes. This differs from other researchers' opinions which stress there is a relationship between alliance structure and KT performance (see Mowery *et al.*, 1996; Chen, 2004; Jiang and Li, 2009; He *et al.*, 2011). This research argues that alliance structure only indirectly impacts on a KT process through affecting participants' teaching and learning intent. Furthermore, the objective of forming a learning alliance rather than the structure of an alliance can more directly affect teaching and learning intent. Also, given the existing literature's lack of an in-depth case study on exploring how influential factors affected a KT process (Michailova & Mustaffa, 2012), examples have been given in section 8.3 to discuss each factor's role in NISP-TEDA KT with the comparison of other researchers' opinions.

#### **9.1.4 Reflections on research question four**

Q4: How can the research findings develop a greater understanding of KT

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between the UK and China for ISD? How can the research contribute to KT and IS?

This research provides a greater understanding of KT between the UK and China for ISD through tracking the development and evolution of the transferred ISD knowledge in both KT participants' contexts. This is discussed below:

Firstly, it addresses the lack of in-depth case studies of KT in specific types of alliances. (see He, *et al.*, 2011). In-depth case studies of domestic KT within a funded franchising alliance and transnational KT within a funded licensing collaboration have been conducted. Through comparing the two types of KT, this study found that number of types of codified programme delivery knowledge formally transferred from NISP headquarters to TEDA eco-centre was larger than to NISP regional teams; also, TEDA eco-centre could not access to NISP's database (CRISP), whereas all other NISP regional teams access this. The phenomenon could have resulted from their different objectives of forming alliance and different geographical contexts (see analysis and discussion in section 8.4).

Secondly, this research potentially provides an analysis of the problems of KT strategy without personalisation elements and stresses the necessity and potential to combine codification and personalisation. In the NISP -TEDA collaboration, at the beginning of KT, KT was conducted in a very one-way fashion from the provider to the recipient

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without the recipient's attempt to require a specific information package or the provider's attempts to provide a tailored IS network facilitation approach. During the process of programme implementation, the policy gap of the two countries was always a barrier to implementing the transferred knowledge (see section 7.5.6). Therefore, there was need to incorporate a personalisation strategy at the beginning of the collaboration. KT researchers have argued that there is the possibility to combine both codification and personalisation strategies to disseminate knowledge in KIBS (see Hansen, *et al.*, 1999; Shankar & Gupta, 2005; Bettiol, *et al.*, 2012) but in-depth examples to demonstrate the possibility are limited.

Thirdly, when studying KT between western countries and China, researchers have discussed the role of cultural gaps, language differences and the extent of support from local Chinese government (see Buckley, *et al.*, 2006; Inkpen & Pien, 2006; Matt *et al.*, 2011; Ding *et al.*, 2011). However, these have generally overlooked policy and regulatory factors as previous research has focused on KT within international businesses where economic policies between the western and China are not believed to be significantly different --- China also has promoted a market economy. Regarding transferring ISD knowledge which has been highly affected by policy context, it is necessary to consider policy differences between the two countries. It is further argued that in KT studies, researchers can at first analyse how the transferred knowledge has been developed to identify which contextual factorcontextual factors (e.g. policy,

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regulations, culture, economy and religion) have largely shaped the knowledge. Then, it is necessary to explore how the identified key contextual factorcontextual factors can affect the KT process under study.

Fourthly, contrast to most KT research, which only focuses on transnational KT (see Buckley *et al.*, 2006; Inkpen & Pien, 2006; Chen *et al.*, 2010; Liao and Yu, 2012), this case study has involved both of the KM and KT process in the knowledge provider's system and the transnational KT processes (see chapter 6 and 7). Through conducting a qualitative case study, a model conceptualising KM and KT processes is derived (see figure 8.3). It is argued that the model has four characteristics --- it covers both knowledge development and KT processes, illustrates a two-way KT process, highlights the importance of communications in a KT process, and shows a cyclic process of knowledge learning process. These characteristics have been discussed by various researchers (see Sveiby, 1997; Albino *et al.*, 1999; Thompson *et al.*'s, 2009; Miesing *et al.*, 2007; Jasimuddi *et al.*'s, 2012) but not been integrated in one model (see section 8.3). The knowledge evolvement-based model presents a process of how a provider's knowledge is created, developed and transferred, and how the transferred knowledge has gradually been combined into the recipient's knowledge. This model stresses the importance for the recipient to understand the provider's contextual factors that affect the development of the transferred knowledge. Tracing the origin of the knowledge could enhance a KT process. In contrast to other models in the KT

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literature (see Albino *et al.*, 1999; Thompson *et al.*, 2009), this model distinguishes the processes of transferring tacit and explicit knowledge in a transnational KT context where the languages used by KT participants are different. Tacit knowledge can be disseminated by coordinators from the knowledge provider to the recipient and be interpreted if it is necessary. Whilst, explicit knowledge stored in the provider's organisational knowledge base can be selectively disseminated to the recipient, and may need to be translated.

In addition to contributing to KT theory, this research also contributes to IS theory in three ways:

Firstly, major ISD policy tools have been summarised (in chapter 5) and these tools can be selectively adopted by policy makers based on their policy targets. Through comparing ISD contexts between the UK and China, the research proposes that China could draw upon the UK's experiences for ISD through the following actions:

- Putting pressure on business to divert landfill;
- Using “the tonnages of waste diverted from landfill” rather than the “pollutants reduction rate” as an important environmental protection assessment indicator;
- Clarifying the responsibility boundaries between the NDRC, MIIT, MEP and their subordinates.

Secondly, this study provided an in-depth exploration of IS network facilitation

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knowledge conducted by NISP, which has been widely cited as an ISD exemplar (see Mirata, 2004, 2007; Mirata & Pearce, 2006; Paquin & Howard-Grenville, 2009). Exploring NISP's IS network facilitation knowledge in this research indicates that synergies facilitated by NISP were not only IS activities. Finding outlets (e.g. cheaper recyclers) were counted as solutions in the programme as it could bring economic benefits to its business members (see part (2) of section 6.4.2.1). Landfill diversion, CO<sub>2</sub> reduction and other achievements were reported to and checked by government but there was no requirement that the result should be achieved by facilitating IS activities. This could be the result of national waste policy treating IS as only one of several policy tools for resource efficiency and pollution or landfill reduction (see chapter 5). So, it shows that putting academic ideas (e.g. IS) into practice requires adaptability to contexts such as national policy targets and feasibility of programme implementation. This is especially true in the UK context, where the IS delivery model was reliant on public funding, i.e., free at point of delivery, such funding is vulnerable to being withdrawn<sup>37</sup>. Also, it found that NISP's strategy could be characterised as promoting networking among businesses through delivering QWWs, identifying and sharing synergy opportunities for free but not focusing on providing technical/policy consultation for synergy implementation.

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<sup>37</sup> Most British public sector organisations including NISP are being forced to adjust to cuts in their funding. WRAP plans to cut NISP's budget by 30%. This, in turn, reflects DEFRA's decision to cut WRAP's budget by 37%, from £48 million in 2010/11 down to £30m in 2014/15. NISP receives the largest proportion of WRAP funding (Croner-i, 2012).

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Finally, it also provided an in-depth exploration of how NISP's IS network facilitation had been implemented in a Chinese industrial area. The knowledge was transferred to TEDA eco-centre with funding support from the EC. With a 2-year experience of delivering the TBNA IS network programme, TEDA eco-centre had built its own strategy to implement the local IS programme. Changes were made to ensure that the transferred knowledge (IS network facilitation approach) could be adapted to the Chinese social and cultural context (see section 7.6). Key problems that confronted the programme included the lack of policy stimulus (e.g. landfill tax and specific CO<sub>2</sub> reduction requirement) and social problems related to illegal waste collection activities. However, it seems that the lack of policy pressure could be temporarily offset by the local government leaders' commitment to the programme as most businesses would choose to follow government guidance to ensure a good relationship with the local government (see section 7.5). With the local government's support, the TBNA IS Network would be developed into Tianjin IS innovative Technical Alliance with Tianjin municipal government funding support (TEDA eco-centre, 2012a). However, it still needs time to test whether the programme can be sustainably developed in future or not. Also, the strategy to build a sustainable funding mechanism to support various resource efficiency programmes still needs to be explored.

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## **9.2 Limitations and future research direction**

The major limitation of this research is that the quantity of the KT cases for ISD is limited. For example, if people in NISP or TEDA centre refused to talk to me, conducting the research would have been problematic as no indepth data could be collected. Also, due to time and funding constraints, the thesis could not address a number of related issues. The following section proposes the overlooked issues in this research and discusses how they could be explored in future research.

Firstly, this research only focuses on studying how ISD knowledge has been transferred among IS facilitators. There is no in-depth exploration as to how IS knowledge has been ‘vertically’ transferred from IS facilitators to business representatives to put IS into practice. Therefore, a number of cases covering IS network facilitation with successful and unsuccessful results could be selected for future study. The findings could categorise various patterns of KT between IS facilitators and business members, identify which factors can promote IS knowledge to be communicated between IS facilitators and business members to implement IS.

Secondly, the dissertation summarises business resource efficiency policies and their delivery landscape (see chapter 5). However, how these policy decisions have been made by central government and have been implemented by different levels of government are not clear. In order to address this issue, government officials from

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different levels in the UK and China could be interviewed to collect information on which approach has been selected by their administrative region to promote business resource efficiency, and how the choice has been selected. Also, efficiency and effectiveness of the policy making and implementing process could also be compared. The research findings could investigate similarities and differences in policy implementation patterns of the two countries, and how the patterns have been evolved in history, and discuss how they can learn from each other.

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## **Interviewee List**

1. Anonymous 1, a staff of NISP regional team A, UK, Oct 2009
2. Anonymous 2, a staff of NISP regional team A, UK, Jan 2010
3. Anonymous 3, a staff of NISP regional team A, UK, Jan 2010
4. Anonymous 4, a staff of NISP regional team A, UK, Jan 2010
5. Anonymous 5, a staff of NISP regional team B, UK, Feb 2010
6. Anonymous 6, a staff of NISP regional team B, UK, Feb 2010
7. Anonymous 7, a staff of NISP regional team C, UK, Mar 2010
8. Anonymous 8, a staff of NISP regional team C, UK, Mar 2010
9. Anonymous 9, a staff of NISP regional team C, UK, Mar 2010
10. Anonymous 10, a staff of NISP headquarters, UK, Mar 2010
11. Anonymous 11, a staff of NISP headquarters, UK, Apr 2010
12. Anonymous 12, a person previously worked with NISP headquarters, UK, Jul 2012
13. Anonymous 13, a staff of NISP headquarters, UK, Feb 2010
14. Anonymous 14, a staff of the TEDA eco-centre, China, Apr 2010
15. Anonymous 15, a staff of the TEDA eco-centre, China, Apr 2010

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16. Anonymous 16, a staff of NISP headquarters, UK, Nov 2010

17. Anonymous 17, a staff of the TEDA eco-centre, China, Jun 2012

18. Anonymous 18, a staff of the TEDA eco-centre, China, Apr 2010

19. Anonymous 19, a staff of NISP headquarters, UK, Jun, 2012

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## Example of Consents Letter

Dear [name of the interviewee],

I'm a PhD student from the Geography Department, University of Hull. I would be very grateful if I could visit [the interviewee's organisation] to interview you about inter-organisational collaborations for promoting industrial symbiosis [some month] at your convenience.

I think the interviews would last around 45min to 1 hour. All information would be treated in confidence and would only be referred to anonymously. If you're interested, please let me know and I'll send you an outline of questions I want to know. Thank you.

Please don't hesitate to contact me or my supervisor Dr Pauline Deutz ([p.deutz@hull.ac.uk](mailto:p.deutz@hull.ac.uk)) if you would like any more information. Thank you for your attention. I'm looking forward to hearing from you.

With regards,

Qiaozhi