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**ECOLOGICAL MODERNISATION AND THE DEVELOPMENT OF THE UK's  
GREEN INDUSTRIAL STRATEGY: THE CASE OF THE UK NATIONAL  
INDUSTRIAL SYMBIOSIS PROGRAMME**

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A thesis submitted in partial fulfilment of the requirements of the Robert Gordon  
University for the degree of Doctor of Philosophy

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## ABSTRACT

The UK National Industrial Symbiosis Programme (NISP) is the first industrial symbiosis (IS) network in the world to have been established at national level. Many studies have recently investigated the UK NISP, but much work remains to be done in understanding the context that enabled the development and management of a large scale IS network. This research aims to explore and understand: (1) the place of the UK NISP within the UK government's 'green' market strategy; and, (2) the management and organisational design employed by the UK NISP in developing and managing a nation-wide IS network. Based on a qualitative inquiry, a case study approach was adopted to conduct this research. In-depth semi-structured interviews were used to gather information from twenty-eight policy officers, government advisors, as well as representatives of the UK NISP and its partner organisations. The research findings showed that the government's decision-making mechanism, in each of the UK countries, was significantly different. Whilst it was found that the UK government is focused on embedding ecological modernisation components in the policy process, there is also a need for extended and consistent decentralisation across the UK and a structural framework that enables non-state stakeholders to effectively influence the policy process. The outcomes of this research indicate a relationship between EM theory and the IS concept. By adopting the ecological modernisation agenda, the UK government can play a significant role in promoting the use of the IS concept by: (1) devising policies that are directly aimed at supporting the development of IS networks; and, (2) aligning the funding for technological innovation with the needs of potential IS projects. Nevertheless, the study found that the future of the UK NISP is entirely dependent on UK government funding and, therefore, it is recommended that the UK NISP should identify ways to raise income from the private sector as well for the UK NISP's long term survival. The findings also highlighted the effectiveness of the organisational design employed by the UK NISP (including leadership at national level, regional delivery strategy and regional partnership strategy) for a large scale IS network and the suitability of the UK NISP's organisational design to the dynamic nature of the IS network development. The regional partnership strategy was found to promote sectoral focus in IS networks, which did not adhere to the 'innovation' and 'diversity' principles of IS. This would result in limited innovation and raise the potential for an IS network to become unstable, for example, if a member decides to leave the network, the lack of diversity in the IS network would make it difficult to replace that member. So it is important that the UK NISP staff and contractors are provided with extensive training to ensure a better understanding of the IS concept principles. In a society facing economic and environmental challenges, this study specifically contributes to the understanding of the context that enabled the development of a large scale IS network that would help integrate environmental protection and economic growth.

**Keywords:** *eco-industrial development, ecological modernisation, environmental policy, industrial ecology, industrial symbiosis, National Industrial Symbiosis Programme.*

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## ABBREVIATIONS USED IN THE RESEARCH STUDY

BREW	Business Resource Efficiency and Waste
BESP	Business environmental support programme
BSSP	Business Support Simplification Programme
CEM	Corporate environmental management
DBERR	Department for Business, Enterprise and Regulatory Reforms
DEFRA	Department of Environment, Food and Rural Affairs
DfE	Design for environment
DTI	Department of Trade and Industry
EA	Environment Agency
EDA	Economic Development Agency
EIP	Eco-industrial parks
EM	Ecological modernisation
EMAS	Eco-management and auditing scheme
EMS	Environmental management system
EMT	Ecological modernisation theory
EPA	Environmental Protection Agency
EU	European Union
GDP	Gross domestic product
ICT	Information and communication technology
IE	Industrial ecology
IS	Industrial symbiosis
ISIE	International Society for Industrial Ecology
ISL	International Synergies Limited
ISO	International Organization for Standardization
KT	Knowledge transfer
KTN	Knowledge Transfer Network
LCA	Life cycle assessment
LGA	Local Government Association
MEBC	Midlands Environmental Business Communications
MFA	Material flow analysis
MISP	Mersey Banks Industrial Symbiosis Project
NEIPS	Networked eco-industrial park system

NI	Northern Ireland
NPT	National practitioners' team
NISP	National Industrial Symbiosis Programme
NGO	Non-governmental organisation
NWDA	North West Development Agency
PAG	Programme Advisory Group
PM	Performance management
R&D	Research and development
RE-KTN	Resource Efficiency - Knowledge Transfer Network
RDA	Regional Development Agency
RTI	Research Triangle Institute
SCP	Sustainable Consumption and Production
SEPA	Scottish Environment Protection Agency
SISP	Scottish Industrial Symbiosis Programme
SW	South West
TPD	Trillium Planning and Development Inc.
TSB	Technology Strategy Board
UK	United Kingdom



## **CHAPTER ONE: INTRODUCTION**

This Chapter provides an introduction to the research topic, aims, research questions and a brief description of the methodology employed in conducting this study. Finally, this Chapter provides a description of the limitations of the study and an outline of the subsequent Chapters presented within this thesis.

### **1.1 Background to the research**

The continuous, rapid deteriorations in the quality of the environment as a result of industrial activities, and international pressure (e.g. by the United Nations) placed on individual countries to remedy their environmental impacts made it clear that the principles of sustainable development should be achieved at national levels. Various treaties (e.g. The United Nations Framework Convention on Climate Change) and associated protocols (e.g. The Kyoto Protocol) were signed among nations in order to help save global natural resources, conserve the environment and manage climate change. As a result, some attractive solutions and proposals for dealing with climate change (e.g. emissions trading, landfill tax) were brought to the forefront of policy development. It was further assumed by international organisations that individual countries would each play a proactive role in order to individually deal with their environmental protection priorities. This led to the development of a new era of climate change and environmental policy reform in most countries of the world, which has been described by von Malmberg and Strachan (2005) as a move towards ecological modernisation (EM).

The theory of ecological modernisation attempts to provide explanations and answers to a number of questions on how sustainable development (SD) can be achieved in practice. Gouldson and Roberts (2000) defined EM as a concept for understanding the potential of integrating ecological and economic approaches through innovative forms of government intervention. According to EM theory, new policies and initiatives are needed in order to integrate environmental protection and economic development (von Malmberg and Strachan 2005). Traditionally, environmental protection was seen as a burden and in contradiction with economic growth. Given the need to improve in both environmental protection and economic development, Gouldson and Roberts (2000) argued that the focus for SD should be on the development of integrated policies that

better enable economic activities, without undermining the ecological objectives, rather than on the environmental policies that might restrict market and societal routines. According to Whitfield and Hart's (2000: 39) analogy, "more of one is purchased at the price of the less of the other", i.e. "... it is possible to promote economic development or to protect the environment but not to do both simultaneously". They argue that the real-life case is more complex than this analogy and that it is about the balance between economic development and environmental protection, for example, how "the balance will be struck between the two, by what means and at whose expense" (Whitfield and Hart 2000: 39). However, "ecological modernisation specifically argues that economic development and ecological crisis can be reconciled to form a new model of development for capitalist economies" (Gibbs 2000: 10).

When elected in 1997, the UK Labour government initiated the development of new environmental policies and appears to have utilised features of ecological modernisation in order to allow a better environment and a new approach towards a modernised economy (Gibbs 2000, von Malmborg and Strachan 2005). According to commentators (e.g. Gibbs 2000) from the field of ecological modernisation, the creation of a successful business climate can facilitate the journey towards sustainable development and this trend has been noticed by the UK government in recent years.

Likewise, industrial ecology (IE) has captured the imagination of international academics, business and government communities over the last two decades. IE aims to achieve a symbiosis between industrial production and consumption and the natural ecosystem (Graedel and Allenby 2003). IE ideas are practised through different forms of eco-industrial development (EID). Industrial symbiosis (IS) networks have gained prominence as one of the approaches to EID, e.g. Kalundborg IS network. Available literature in the field of EID is limited and is based mainly on the example of Kalundborg. If the benefits of IE are to be demonstrated, then it will be necessary to provide examples other than Kalundborg (Erkman et al. 2001). New initiatives have been undertaken for the development of IS networks in the USA, Australia, Europe and other parts of the world where some initiatives are in the planning stage, some are operational and some have already failed (Gibbs 2003a).

It is against this backdrop that the Business Council for Sustainable Development (BCSD) in the United Kingdom (UK) established the world's most ambitious nation-

wide IS network. Funded by the Onyx Environmental Trust (OET) and the Department of Trade and Industry (DTI) initially and then by the Department of Environment, Food and Rural Affairs (DEFRA), the UK NISP is developing in the UK, on a region by region basis (including devolved administrations) supported by Economic Development Agencies in some regions.

The Business Resource Efficiency and Waste Programme (BREW) introduced by DEFRA has been a significant part of the UK government's 'green' market strategy. The UK NISP and several other initiatives were funded by the BREW programme with intent to support businesses in their endeavour to protect the environment through adopting approaches for a new form of economic development (enhancing businesses' competitive advantage and financial incentives).

Among the other BREW initiatives, the UK NISP can be considered a programme, theoretically featuring ecological modernisation, which contributes towards achieving the UK government's agenda of moving towards a better environment and simultaneously providing opportunities for a new form of economic development. The uniqueness of the UK NISP also lies in the fact that it has been the first national initiative in the world which is based on the concept of IS. The UK NISP is managed nationally (contributing towards the UK government's vision of controlling environmental degradation, carbon emissions and the efficient use of environmental resources) and delivered regionally (contributing to the new form of economic development regionally).

Given the high priority of the UK government for a better environment and economic prosperity, it is highly relevant to analyse the UK NISP. Significant research efforts have been specifically focused on the UK NISP including: the drivers and barriers to industrial ecology in the UK (Harris 2004), the effectiveness of the facilitated IS approach (Mirata 2005), the roles and actions of an institutional entrepreneur fostering inter-organisational practices (Paquin 2008) and the social dimensions of IS (Domenech 2010). However, limited research efforts are evident in exploring the policy context and organisational design of the UK NISP which enabled the development of the world's first IS programme at the national level. Therefore, this study reflects on the UK NISP as a key component of the UK government's 'green' market strategy and on the role of national policy and regional context of the UK NISP programme in the strategic

development of such an initiative. This study also critically assesses the management and organisational design employed by the UK NISP. Both these aspects need to be explored to guide future policy development and to identify critical success factors for establishing and managing a large scale IS network. Taken together, knowledge of these aspects will help to better understand how IE approaches can be used effectively to integrate environmental protection and economic growth.

## **1.2 Research aims and research questions**

The broad aim of this study is to explore and understand: (1) the place of the UK NISP within the UK government's 'green' market strategy; and, (2) the management and organisational design employed by the UK NISP in establishing, developing and managing a nation-wide IS network. This research was conducted using a case study approach which draws on the experiences of a range of the UK NISP key stakeholders. This study would make an original contribution to IS theory as well as practice. To this end, the study seeks to answer the following questions:

- (1) Why was the UK NISP adopted by the UK government as one of the key instruments of their 'green' market strategy?
- (2) What are the key barriers to the effective use of the UK NISP as a key instrument within the UK government's 'green' market strategy?
- (3) How crucial is the organizational design employed by the UK NISP in establishing and managing a large scale IS network?

## **1.3 Methodology**

The study was conducted using a case study approach. Given that the aim of this study is to understand and explore the processes involved in the development, management and delivery of the UK NISP, a qualitative approach was most suited to this research. Data were collected from the key stakeholders of the UK NISP including regulatory and policy officers, civil servants, government advisory group members, representatives of the Economic Development Agencies, the UK NISP executives, the UK NISP coordinators and practitioners, the representatives of the UK NISP partner organizations, etc. Purposive sampling was used to select a variety of research participants who were most likely to produce valuable data. Data were collected through interviews. The

interview schedules were used to guide the interviews whilst flexibility was offered to research participants through the semi-structured questions to explore any unexpected themes they considered to be important. Data were managed using the qualitative data analysis software “NVivo” which was an extremely helpful tool to manage the data and the analysis process. Data were analyzed using thematic analysis as this approach was consistent with the interpretative strand adopted for this study. Categories and themes developed from the analysis were interpreted and explained in the research findings. The individual views of the research participants were fully taken into account and presented in the findings Chapters.

#### **1.4 Scope and limitations**

Using the case study approach, this study was initially planned to focus on the business experiences of the UK NISP in three key regions. However, based on the literature review and interviews conducted with UK NISP staff and other stakeholders, as well as the feedback received at international conferences, exploring how the UK NISP fits in with the government’s ‘green’ market strategy and understanding the management and organisational design employed by the UK NISP came across as more crucial elements for the successful development and management of a nation-wide IS network such as the UK NISP. Given that the ‘business experience’ interviews for three regions had already been conducted at this stage, the decision was taken to include all the above areas in this thesis. However, it was also recognised that there was limited evidence of any empirical work in the areas that were previously identified as key elements in the development and management of the world’s first nation-wide IS network. The latter observation provided additional support and justification for a change to the focus of this thesis. Additionally, given the widening scope of the PhD and limitations in terms of the thesis word limit, it was agreed with the supervisory team that regional cases depicting the businesses’ experience of the UK NISP would be excluded from this study. In conjunction with the supervisory team, the decision was taken to focus on an investigation of how the UK NISP fits within the UK government’s ‘green’ market strategy and to develop an understanding of the management and organisational design employed by the UK NISP in establishing and managing a nation-wide IS network. A total of fifty-nine interviews were conducted, but only twenty-eight were used for this study, as a result of the changed focus.

As described above, the nature of this study meant that qualitative methods were likely to be better suited than quantitative methods. Consequently, the initial intention was still to access relevant quantitative data that may be available from the UK NISP and government bodies which could be analysed further at a later stage. However, despite the full access offered by the UK NISP to interview its staff and other stakeholders, there was reluctance within the UK NISP to offer access to quantitative data which directly related to their regional performance. Nevertheless, to a certain extent, other publicly available quantitative data were helpful in gaining an understanding of the UK NISP's performance and how it contributed to the government's "green" market strategy. Therefore, limited analysis/discussion that relates to the UK NISP's specific outputs is presented and discussed.

## **1.5 Outline of the thesis**

This thesis is organised into eight Chapters. To guide the reader through the thesis, a brief description of the subsequent Chapters is provided below:

In Chapter Two, an extensive literature review in the areas of ecological modernisation theory (EMT), industrial ecology (IE), eco-industrial development (EID) and industrial symbiosis (IS) is presented and appraised in relation to the UK NISP. Chapter Three presents an extended literature review focusing specifically on the development and management of IS networks and presents an analysis of the factors that are considered central to the success of IS networks.

Chapter Four provides a complete account of the methods employed in conducting the study including justification for the research methods adopted, the sampling approach, data collection techniques, data collection process, data management, data analysis and ethical considerations.

An analysis of the data obtained from the interviews of the UK NISP's key stakeholders is presented in Chapters Five and Six. These Chapters illustrate and explain the findings related to the UK NISP's position within the UK government's 'green' market strategy, as well as the management and organisational design employed by the UK NISP.

Key findings are discussed and interpreted in Chapter Seven in relation to the relevant literature in an attempt to address the research questions of the study.

The thesis concludes with Chapter Eight where answers are provided to all of the research questions set out in Chapter One. This Chapter outlines the key contributions of the study. The Chapter also provides recommendations for policymakers and facilitators of IS networks. Finally, the implications resulting from the findings of this study into IS research are discussed and future research directions recommended.

## **CHAPTER TWO: ECOLOGICAL MODERNISATION AND THE UK NISP**

Chapter Two provides an overview of the development of the UK NISP. In addition, this Chapter reviews literature on ecological modernisation (EM), industrial ecology (IE), eco-industrial development (EID) and industrial symbiosis (IS).

### **2.1 The UK National Industrial Symbiosis Programme**

#### **2.1.1 Background of the UK NISP**

The World Business Council for Sustainable Development (WBCSD) and its regional partners, e.g. the UK Business Council for Sustainable Development (BCSD-UK) share the belief that business is beneficial for sustainable development and that sustainable development is beneficial for business (WBCSD 2007). The WBCSD is a CEO-led global network of companies which acts as an ambassador of sustainable development for businesses. The BCSD-UK, on the other hand, is one of many regional networks that operate on the principles of the WBCSD to promote sustainable development among businesses. The global regional network members of the WBCSD assist each other in the development, sharing and implementation of the latest school of thought and best practice in economic, environmental and social management of industry.

In their attempt to transform the principles of sustainable development into practical and profitable actions, the BCSD-UK launched the UK NISP. This programme involved introducing the new concept of by-product synergy to businesses and professional leaders from diverse industries in the United Kingdom. The UK NISP was based on a concept initially developed by the Business Council for Sustainable Development –Gulf of Mexico (BCSD-GM) (American and Mexican Chapters) and 18 participating companies (members of Asociación de Industriales del Sur de Tamaulipas). They coined the term ‘by-product synergy’ in 1997 to encourage the use of by-product material which was otherwise wasted. Recently, however, this concept has been widely labelled as industrial symbiosis (IS) and has received prominence over other ecological modernisation initiatives.

The UK NISP attracted the British policy agenda after the publication of the strategy document “Resource Productivity – making more from less” by the Performance and



Innovation Unit (PIU) of the Cabinet Office (PIU 2001). By focusing on the larger goals of economic development and business growth, rather than just concentrating on environmental improvements and waste reduction alone (BCSD 2002), the UK NISP was responding to the needs of this document and was also attracting active engagement of the business community. In 2002, the Department for Trade and Industry (DTI) agreed to provide funding support, whilst The Onyx Environmental Trust (OET) approved funding for the UK NISP via the Landfill Tax Credit Scheme. A statement from the DTI said:

“The DTI recognizes that industrial symbiosis has the potential to reduce the environmental impact of UK business and help it increase its resource productivity. It therefore welcomes the proposal from the BCSD-UK to explore and develop the adoption of IS in the UK and is happy to support it.” (NISP 2004: 11)

In addition to securing funding through DEFRA’s new policy instrument BREW in 2004, the UK NISP also received support from a number of economic development agencies across the UK. DEFRA's BREW Programme used money derived from increases in Landfill Tax to encourage, support and help business to move towards the so called zero-emissions enterprise. The Programme was set up following consultation with business representatives, the Treasury, and the DTI, to meet the rising need of integrating environmental and economic policies towards more effective sustainable development. The UK NISP was launched in the House of Parliament, Westminster in July 2005, by Dr. Alan Whitehead, MP, and Baroness Young, chief executive of the Environment Agency (EA).

The first year of BREW funding (£2.6 million) enabled the UK NISP to expand from just two active regional IS networks to a nation-wide IS network (BREW 2005). It was DEFRA’s revised sustainable development strategy that enabled ecological modernisation through an investment of £284 million over the three-year period, in programmes such as the UK NISP, Carbon Trust and other initiatives that support businesses in reducing waste and emissions and in improving the efficiency with which they use natural resources. Following the UK NISP’s first year success, based on the outputs delivered to DEFRA and Regional Development Agencies (RDAs) in England, the UK NISP continues to receive its share of funding from the BREW programme and from a number of RDAs that support the implementation of the UK NISP in their respective regions.

Although UK NISP became a national programme, it was continued to be managed at regional level. Their key focus was to develop networks of businesses within the regions, as well as across regions where it made business sense. UK NISP organized synergy workshops in all regions. The aim of this exercise was to demonstrate to - and persuade - businesses that they could benefit from underutilized resources (waste and by-products) of other businesses and vice versa. UK NISP reported a development of number of business transactions following these workshops that not only economically benefitted the involved businesses, but also diverted waste from landfills, thus suggesting a win-win for both economy and the environment.

The UK NISP was led by International Synergies Limited (ISL), a central team based in Birmingham and it was managed regionally by regional coordinators supported by a team of regional practitioners and a technology manager. NISP service was delivered by international Synergies directly in some of the regions, whereas delivery was contracted out to consultancy organizations in most other regions. UK NISP services were directly delivered by ISL in 3 regions, and the rest of them were delivered by consultancy organizations, i.e. WSP, Scott Wilson and ARENA network. Table 4.3 in Chapter 4 depicts a list of managing organizations along with the regions covered by each.

ISL developed information and communication technology (ICT) platform to enable members communicate and develop any opportunities for new business transactions. However, business data confidentiality issues, as well as, other issues including monitoring of the outputs being produced through the use of this platform, became an obstacle in providing access of the platform to business members. A decision was then made to develop this ICT platform further, to assist ISL in capturing knowledge and information that was being developed in the regions. This platform was called *Core Resource for Industrial Symbiosis Practitioners* (CRISP). It offered the practitioners all the resources they needed in order to facilitate the development of synergies, as well as, used as a database for capturing all information related to any ongoing projects. CRISP provided ISL with a tool that was capturing all the knowledge and information that was being generated in all the regions and thus more possibility of knowledge transfer across regions, opportunity to evaluate individual practitioners' performance remotely, as well as, enhancing the ability of ISL to provide efficient ongoing services to members, even in case of high staff turnover.

### 2.1.2 Objectives of the UK NISP

The UK NISP is a well established resource efficiency and waste minimisation programme. It aims to create resource efficiency by identifying and implementing synergies and linkages between different industries which will result in previously unwanted or low value output resources becoming useful and competitively priced inputs for others (DEFRA 2005a). Introduced as one of the policy instruments of the UK government's ecological modernisation agenda, the role of the UK NISP is to assist the government in meeting environmental and economic targets that include: (1) the efficient use of materials, energy and water; (2) increased use of business waste as a resource; (3) reduced production of waste and its harmful effects; (4) optimised use of materials, energy and water per unit output; and, (5) the improved profitability and increased competitiveness for businesses. Specifically, the UK NISP should assist the UK government to meet its obligation of the Kyoto target, i.e. reduction in greenhouse gas emissions by 12.5% from 1990 levels and a cut in CO<sub>2</sub> emissions of 20% by 2010 to meet domestic goals (DEFRA 2003). The UK's Fourth National Communication to the United Nations Framework Convention on Climate Change stated that "UK greenhouse gas emissions in 2004 and 2005 were around 14.5% below the base year level, compared with the 12.5% reduction required to meet the UK's Kyoto commitment" (DEFRA 2006: 6). It also stated that the UK introduced additional measures to help meet the 2010 domestic goal to reduce CO<sub>2</sub> emissions 20% below the 1990 level and it appears the UK NISP and other BREW programmes constituted part of these measures.

One of the aims of the UK NISP is to assist the UK government in diverting waste from the landfill to meet the diversion requirements set out in the Landfill Directive. Following the publication of the 'Waste Strategy' in 2000, which set out a vision of sustainable waste management, a report was produced by the Prime Minister's Strategy Unit 'Waste Not, Want Not', which outlined possible steps to achieve the targets outlined in the Waste Strategy (DETR 2000). Acting on a number of recommendations made in this report, the Chancellor of the Exchequer proposed raising Landfill Tax to a medium to long-term level of £35 per tonne, from 2005-2006 (DEFRA 2003). However, this increase was introduced in the anticipation that it would encourage local authorities and industry to find alternatives to landfill. Furthermore, the money received through Landfill Tax has been recycled to fund BREW Programmes like the UK NISP which advise and assist businesses in finding alternative ways to deal with waste. Target levels

for the reduction of landfilling by commercial and industrial waste in 2010, were set below 80% of 1998 levels (DEFRA 2003).

In specific terms, the UK NISP's intention by launching this programme was to assist the UK government in achieving the following objectives over a three year period (see Table 2.1):

**Table 2.1: The UK NISP targets**

<b>The UK NISP Objectives</b>	<b>Targets</b>
Diversion of waste from landfill in every region (Tonnes)	100,000
Reduction in CO <sub>2</sub> (Tonnes)	600,000
Encourage private investment in recycling/reprocessing (£)	40,000,000
Create new jobs through new business start-ups and growth	300
Save jobs which would otherwise have been lost	300
Training events to be delivered to industry	600
Create additional industry sales (£)	12,200,000
Deliver cost savings to industry (£)	10,000,000
Achieve higher asset utilisation	-
Reduce industry use of potable water	-
Support and encourage innovation leading to export potential in environmental technologies	-

Source: Author generated; data adapted from Baker (2006) and DEFRA (2005b)

### 2.1.3 Partners of the UK NISP

The concept, on which the UK NISP operates, requires strong partnership and networking. In order to work effectively, they are required to be in close partnership with specific organizations which complement each other's work. The UK NISP claims to work in close partnership with the Local Government Association (LGA), the Environment Agency (EA) and the Resource Efficiency - Knowledge Transfer Network (RE-KTN).

### *2.1.3.1 Local Government Association*

In order to effectively achieve their objectives, such as improving the local economy, protecting the environment, etc., local authorities have the vital function of dealing with businesses on a day-to-day basis. Similarly, in order to deliver their targets, the UK NISP develops ongoing relationships with businesses. Local authorities can also play an important role by becoming more resource efficient through participation in the UK NISP, and also by assisting businesses in the region to do the same. Local authorities are beneficial to the UK NISP by: helping businesses find information, e.g. facts about the rising costs of landfill or new waste regulations; by supporting businesses attempting to improve resources management and/or by recommending businesses liaise with the UK NISP for specialized information related to IS. The UK NISP, on the other hand, facilitates businesses' endeavors to divert their waste from landfill which also enables local authorities to achieve their landfill reduction target; assists in the development of regional spatial strategies which take into account the sustainable use of natural resources; endeavours to promote re-manufacturing, re-use and re-cycling which offers commercial opportunities as well as environmental benefits, which, in turn, improves the local economy; the UK NISP also provides local authorities with a link to local businesses and access to wider research and a national business network (NISP 2005). The UK NISP employs a Local Government Liaison member to work alongside the LGA and local authorities to help businesses improve their resource management and identify potential new business and market opportunities (NISP 2006a).

### *2.1.3.2 Environment Agency (EA)*

The EA is the leading public body responsible for protecting and improving the environment in England and Wales. The Environment Agency offices across the country are involved in carrying out government policies, enforcing and regulating business and industry practices, providing useful information about compliance to legislation and improving environmental performance. Both the EA and the UK NISP are partly funded by DEFRA's BREW Programme to assist the government in achieving its environmental targets. EA works with the UK NISP and other BREW programme funded initiatives to help ensure that businesses are aware of their responsibilities, and provides support and compliance assistance to legitimate businesses. The EA works in partnership with the UK NISP to encourage new synergies

between companies and provides assistance in answering any queries regarding legislation and regulations that may arise during project planning and implementation. In the minutes of meeting of the Regional Environment Protection Advisory Committee, held on 10<sup>th</sup> January 2006, the EA announced that:

“With new legislation coming through and the development of organisations such as NISP, we expect waste issues to improve in the next few years.”(EA 2006a)

The Environment Agency, whilst understanding the potential of the UK NISP, also introduced a partnership programme with the UK NISP to divert waste into productive use (EA 2006b). The UK NISP was able to draw upon its partnership with the EA on various projects. One successful example was the project “Bumper Result for the UK NISP West Midlands” which involved the UK NISP, a UK NISP member - Recycled UK Limited and the EA. Recycled UK Limited collects used car bumpers from businesses throughout the West Midlands region and once any metal is removed, the plastic is shredded at the company’s site in Wolverhampton. Any remaining small quantities of metal and paint are then removed from the plastic, which produces a clean ‘resource’ that is sold to a host of manufacturers to make new products, including wheelie bins. The UK NISP West Midlands worked with Recycled UK Limited and the EA to ensure the company met waste carrier and hazardous waste regulation criteria. EA approval was received within a few months enabling the company to start diverting 1,200 tonnes of plastic waste from landfill, reducing carbon dioxide emissions by 4,350 tonnes and creating 5 new jobs (ISL 2006).

#### *2.1.3.3 Resource Efficiency - Knowledge Transfer Network (RE-KTN)*

The UK government has committed £370 million in a rolling programme of support to technology innovation through its Technology Programme. The Resource Efficiency - Knowledge Transfer Network (RE-KTN; formerly Mini-Waste Faraday) is one of the many Knowledge Transfer Networks funded by the DTI. The RE-KTN helps UK industry and commerce minimise waste through the development and implementation of innovative technologies and processes aimed at increasing business competitiveness and leading towards environmental and financial sustainability (RE-KTN 2006).

The national team of RE-KTN is complemented by regionally located technology managers supporting the UK NISP activities across the country. These technology managers provide technological innovation advice to the UK NISP practitioners and members planning and implementing new IS projects. They also assist in developing solutions for the implementation of new projects. The UK NISP's partnership with the RE-KTN ensures the programme taps into the UK's best technological expertise and innovation, increasing the potential for IS through the implementation of new technologies and processes (NISP 2006a).

#### 2.1.4 Outputs of the UK NISP

Most of the intended targets were quantified by the UK NISP to enable effective evaluation of the programme. However, some targets, such as, reduce industry use of potable water, support and encourage innovation were, as such, not measurable (see Table 2.1). Thus it is difficult to report the extent of the programme's outputs at the end of its first year. Since BREW was involved in funding other programmes along with the UK NISP, it was concerned how these programmes would report their outputs. Such reporting was required to allow BREW to assess, both the impact of funding and the activities of the funded programmes, which would then allow decisions to be made on how to most effectively distribute funding among these programmes in the coming years. Due to the need for consistency throughout the BREW programmes in reporting outputs, DEFRA developed a matrix which they recommended programmes used when reporting their outputs. The matrix included the following measures: diversion of material from landfill, reduction in hazardous waste, conservation of virgin raw material, conservation of water, reduction in CO<sub>2</sub> emissions (greenhouse gas equivalents), increased sales for business and cost savings.

This matrix included all DEFRA's priorities, in terms of their environmental protection and economic development targets. The UK NISP's achievements for 2005/2006, (outlined in Table 2.2), have been independently verified by the audit company, Databuild Ltd. It involves measures satisfying BREW's requirements and takes into account the application of attribution and persistence. Attribution has been measured on three levels: None – 0%, Partial – 50% and Full – 100%. The use of persistence in measuring benefits is flexible, as it was found difficult to establish persistence in every project, until, or unless, a typical persistence factor was established. In cases where

persistence cannot be estimated, the benefits of the projects are assumed to last for 5 years, gradually decreasing by 25% every year.

**Table 2.2: The UK NISP outputs for 2005/2006**

Brew measures	Reported outputs	Adjusting for attribution	Adjusting for persistence	Output per £1M invested
Materials diverted from landfill (Tonnes)	636,852	393,670	1,360,395	388,684
Hazardous waste eliminated (Tonnes)	221,625	110,813	289,531	82,723
Virgin materials saved (Tonnes)	950,137	598,957	2,129,306	608,373
CO <sub>2</sub> saved (Tonnes)	328,964	279,118	1,198,264	342,418
Water saved (Tonnes)	264,475	132,238	330,594	94,455
Additional sales for business (£)	16,510,335	14,164,648	64,958,819	18,559,662
Cost savings to business (£)	36,449,707	31,585,723	145,768,655	41,648,185

Source: NISP (2006b) and Agarwal and Strachan (2007)

## 2.2 Ecological modernisation and the UK environmental policy

This study is set in the context of the UK NISP which is a visible manifestation of the UK government's commitment to an agenda of ecological modernisation.

### 2.2.1 Ecological modernisation theory

“Ecological modernisation is a new, and in many ways an improved, synonym for sustainable development” (Buttel 2000: 63). Authors such as Welford (1995) have questioned the capability of ecological modernisation as a strategy for promoting sustainable development. Gouldson and Roberts (2000) argue that the focus should be on the development of integrated policies that could better enable economic activities without undermining the ecological objectives, rather than on environmental policies that might restrict markets and societal routines. The EM theory supports, along with many other interpretations discussed later in the Chapter, new forms of policy



intervention that integrate environmental protection and economic growth. Gouldson and Roberts (2000) argue that, rather than perceiving economic development to be the source of environmental decline or seeing environmental protection as a brake on economic development, ecological modernisation calls for the application of economic policies that harness the forces of entrepreneurship for environmental gains and environmental policies that positively influence economic development. Gouldson and Roberts's statement is in line with Mol (1997), who argued that the economy should be 'ecologized' and the ecology should be 'economized', creating a win-win situation for society. von Malmberg and Strachan (2005), in agreement with these views, noted that policy interventions, based on ecological modernisation, will not only improve environmental performance but also economic competitiveness at the macro and micro scale of economies.

### 2.2.2 Emergence of ecological modernisation theory

The ecological modernisation theory (EMT) was developed initially in a small group of West-European countries, i.e. Germany, the Netherlands and the UK. The concept of EM initially emerged "in four separate policy communities around the International Union for the Conservation of Nature (IUCN), the United Nations (UN), Organisation for Economic Co-operation and Development (OECD) and the European Union (EU)" (Young 2000: 24). The idea of the EM theory was developed by the German sociologist Joseph Huber and the German political scientist Martin Janicke, in the 1980s (Mol 2000). EM theory received prominence through the seminal works of Arthur Mol and Gert Spaargaren and Maarten Hajer in a more critical perspective (Pataki 2005). "Nearly as remarkable as ecological modernisation's rising visibility and influence has been the diversity of the meanings and usages of this concept" (Buttel 2000: 58). Literature has interpreted EM theory in several different ways: as a social theory (Mol 1995, Spaargaren 2000, Buttel 2000); as a synonym for strategic environmental management, IE, eco-restructuring, etc. (Buttel 2000, Hawken 1993); as a discourse of the environmental politics and policies (Mol 1995, Hajer 1995, Buttel 2000); and, as a programme of environmental and economic policies designed to tackle the ecological problems (Mol 1995, Gouldson and Murphy 1997). In spite of differing interpretations of the ecological modernisation theory, most commentators agree with the claim that "ecological modernisation offered a way of greening contemporary capitalism so it would be possible to have economic growth that was benign in environmental terms"

(Young 2000: xi). It is, therefore, argued that environmental protection, which was seen as a burden on the economic development, can actually complement a different kind of economic growth

### 2.2.3 Business and ecological modernisation

IS means a collaborative approach towards ecological modernisation, through the exchange of material and energy, shared use of assets, logistics, skills, etc. IS is a practical application of IE is one way in which the concept of ecological modernisation has been taken forward as a pragmatic political programme (Gibbs 2003b). One advantage of IS approach over other IE approaches, is that it can be implemented at project, industry, local, regional and/or national levels to meet environmental objectives, without being an obstacle for economic growth. Most IS programmes in the world are implemented at project and industry level, which in some cases developed further into eco-industrial parks (EIPs). Some efforts are also being made in the direction of developing regional IS networks, e.g. Geneva Regional Industrial Symbiosis. It is against this back drop that the UK NISP was launched on a national level in July 2005. The UK NISP is the first national IS initiative in the world funded and supported by national government, managed nationally and delivered at regional/local level. It is argued that programmes initiated and supported at national levels are effective if applied at regional/local levels to allow implementation in line with regional/local context. A detailed appraisal of the UK NISP structure and strategies may help in the development of an ecological modernisation programme that translates the environmental objectives of the government into financial incentives for businesses and vice versa.

The UK NISP claims to be a programme driven by the demands of its corporate members. The UK NISP brings together companies from all business sectors encouraging inter-organisational inter-sectoral resource efficiency through material exchange. UK NISP members are recruited by regional practitioners, through a series of awareness workshops and training events. Information about availability and the need of by-product resources is collected and analysed and synergies are identified in order to link companies for material exchange. Assistance is also provided by the UK NISP and partner organisations on legislation and regulations, as well as by offering solutions to any technological problems in the planning and implementation of these projects. The

UK NISP claims to work with over 9000 members from different business sectors (NISP 2007). However, only members identified as having synergy are actively involved with the UK NISP.

To what extent is the EM theory view that economic agents are social carriers of ecological restructuring and reform true? The initiative to develop an IS network was instigated by the industry itself. One successful example, 'Waste to energy – tackling the UK's waste tyre problem' was perhaps the first in a series of IS projects. Two leading UK organisations, Waste Tyre Solutions and Sapphire Energy, a joint venture company of the Lafarge Cement UK and Michelin Tyre PLC., came together to find a use for scrap tyres in cement manufacturing. They managed to recycle 100% of all tyres collected by using them as cement kiln fuel, preserving non-renewable fossil fuels (NISP 2007). It is important to notice that this initiative was not the result of government environmental policies, which indicates that some private initiatives may lead to environmental targets being met. However, as von Malmborg and Strachan (2005) argue, this may not be the case for most UK companies and it is hard to regard UK companies and the UK business community in general, as being the principal social carriers of ecological restructuring and reform in the area of climate change. This aspect may need to be explored further, through empirical work, to identify the real motive why businesses join the UK NISP and impact it has on ecological restructuring and reform.

#### 2.2.4 Government intervention and ecological modernisation

In recent years, numerous UK government policies, attempting to integrate economic and environmental policies, have been at the forefront of policy development. Policy associations are planned and implemented to take the EM agenda into consideration and, as argued by Gouldson and Roberts (2000), these policies should not restrict economic activities but enable them to support the ecological modernisation process. Governments have agreed to support EM as "it addresses the environmental problem while avoiding the need for structural economic change" (Young 2000: 28). Many commentators, e.g. Gouldson and Murphy (1997) and others, contend that economic and environmental goals can be integrated into the ecological modernisation of the advanced industrial economy through innovative forms of policy development. It is claimed that the UK NISP is based on the concept that no conflict exists between

environmental protection and economic growth, which is one of the main characteristics of EM theory. Similarly, there are other features which confirm policy initiatives, like the UK NISP, to be actively promoting ecological modernisation, such as, technological innovation, integrated policy development, etc. As EM characteristics have been identified as being most relevant in the development of the UK NISP programme, EM seems to be the most appropriate theoretical approach through which the UK NISP's place in the UK government's 'green' market strategy can be analyzed.

Mol's (1995) ecological modernisation model takes four institutional transformations into account: 1) the role of science and technology in environmental deterioration and reform; 2) the role of economic and market dynamics and economic agents; 3) role of the government at various levels; and, 4) the role of social movements and Non-governmental organisations (NGOs). In the context of this research, this study will focus on and contribute to one of the four institutional transformations, namely, the role of the government at various levels, with regard to the UK NISP that claims to assist in economic development without harming the environment.

Huber (1985, in Murphy 2000) stated that in some cases the government should play no role in the ecological modernisation process, as it may hinder the development and diffusion of clean technologies. In contrast, Spaargaren and Mol (1992) and Blowers (1997) were concerned about ecological modernisation's lack of attention on the role of state institutions and its reliance on industry to resolve pressing ecological concerns (Crowley 1999). Mol and Spaargaren (1993) criticized Huber's view and argued that it is difficult to imagine an ecological switchover without government intervention at various levels. Thereafter, changes were suggested in the role of the government to facilitate environmental reform, including modifications in the environmental policy, from curative and reactive to preventive and proactive, from closed policy-making to participative policy-making, from centralised to de-centralised and from dirigistic to contextually steering (Mol 1995). However, Gibbs (2000) argues that this may not involve a role for a strong bureaucratic government. Mol (2000: 46) agrees that a "... more decentralised, flexible and consensual style of national governance with less top-down hierarchic command-and-control regulation [needs to] emerge". He also argues in favour of opportunities being handed over to non-state actors, so that they take over the responsibility for tasks traditionally handled by the government, moreover, he supports

a distribution of power that allows conflicts to be resolved without government interference.

Although increasing importance has been given to business in ecological modernisation programmes, the government has an important role to play in the development and survival/growth of these programmes. Government intervention, as von Malmborg and Strachan (2005) argue, relates to (i) establishing demanding environmental targets, (ii) pursuing macro-economic restructuring by shifting the emphasis away from energy and resource intensive industries, and (iii) ecologizing the economy and economizing the ecology, creating win-win situations for companies and society. Combined environmental protection and economic growth, as suggested by EM theory, can only be realised if the government helps to develop the industry's capacity of to respond to the needs of sustainable development.

The UK government has taken significant steps in this direction by understanding the importance of ecological modernisation and by making changes in their policy, using the ecological modernisation theory. Some examples of these transformations as outlined in the UK Sustainable Development Strategy are: (i) development of programmes for decoupling environmental degradation from economic growth, e.g. BREW Fund, the Waste Strategy Review, etc.; and, (ii) increased devolution of responsibility of strategic direction to regional levels including strengthening regional leadership (DEFRA 2010). These aspects need to be explored through empirical research to show how the UK government's plan reflects and seems to be in line with the modern environmental discourse proposed by the ecological modernisation theory.

#### 2.2.5 Themes of EM theory suitable for this study

This section explains the theme(s) of the EM theory that have been identified as being most relevant to the aims of this study, i.e. the UK NISP's place in the UK government's 'green' market strategy. As certain features of the EM are identified to be most relevant to the UK NISP and its associated policies, using themes derived from EM theory to explore the policy context of the UK NISP is unavoidable. Development of the UK NISP programme and associated policies and programmes at national/sub-national level appear to have been influenced by central government intervention.

Therefore, transformation of the government's role is considered to be one of the key themes of the EM theory suitable to conduct this study.

By employing the ecological modernisation theory, focus is placed on examining the UK government's policies, programmes and the policy process which affect the UK NISP. Transformation in the government's role, with regard to the UK NISP's place in the UK government's 'green' market strategy, has been explored in this study from the following ecological modernisation theory perspectives: 1. development of policies and programmes for decoupling negative environmental impacts from economic growth; 2. alternative and innovative approaches to environmental policy; 3 support for development and diffusion of new (clean) technology; 4. development of preventive and proactive environmental policies; 5. involvement of non-state stakeholders in policy-making; 6. decentralisation of policy-making and implementation; 7. adoption of contextually steering approach (through the use of a mix of regulatory, market and voluntary instruments). Perspectives 1 to 3, are also noted by Gouldson and Murphy (1996) and Murphy (2000) as key tenets of the EM theory which can be used for the assessment of the government's environmental policy choices. These perspectives are useful to evaluate the extent to which the UK government has adopted the EM agenda. However, these perspectives could only explore the policies and programmes overarching the UK NISP. Perspectives 4 to 7, on the other hand, are seen as conditions that are conducive to EM (Milanez and Buhrs 2007). These perspectives that reflect Mol's (1995) 'transformations in the role of the nation-state' are relevant when examining policy formulation and the implementation process affecting the UK NISP.

In the UK Sustainable Development Strategy, it was highlighted that the government aims to develop policies and programmes for decoupling negative environmental impacts from economic growth (DEFRA 2010). A key tenet of the ecological modernisation theory also suggests that there is no necessary conflict between environmental protection and economic growth and that they may, in fact, be mutually supportive (Murphy 2000). This perspective is particularly useful in understanding whether the UK NISP and the associated policies and programmes could be seen as a genuine effort by the UK government to decouple environmental harm from economic growth.

von Malmborg and Strachan (2005) highlighted the government's role in ecologizing the economy and economizing the ecology to create a win-win situation. An effort by the UK government to encourage alternative and innovative approaches to environmental policy and programmes is the way forward to achieve this vision. For example, Murphy (2000) states that placing an economic value on nature and the voluntary initiatives of the government may encourage economic actors to protect the environment. This perspective is, therefore, useful in exploring whether the UK government has been encouraging alternative and innovative approaches to environmental policy, e.g. by placing economic value on nature, by integrating environmental policy goals into other policy areas, by developing voluntary instruments/programmes to encourage voluntary involvement of industry to protect environment (Murphy 2000, Gibbs 2003b).

Technological development has been seen as the focus of the EM Theory. Development and application of more sophisticated technology was regarded as being key in addressing environmental problems (Huber 1982, 1984, 1985, in Murphy 2000). As Murphy stated, "EM is based on the invention, innovation and diffusion of new technologies and techniques of operating industrial processes government action in these areas is a focus of ecological modernisation theory" (Murphy 2000: 3). Therefore, this perspective is important to explore whether the UK government supports the development and diffusion of new technology in the context of the UK NISP.

In addition to the above three perspectives, Mol (1995) suggested four other dimensions of government intervention that could assist in realising the ecological modernisation agenda, including changes in environmental policy from being curative and reactive to preventive and proactive, moving away from closed policy making to participative policy making, moving away from centralised to decentralised formation and implementation of policy, moving away from command and control approach to steering/consultative style of governance.

"Exploring alternative and innovative approaches to environmental policy is another measure which would allow a shift towards ecological modernisation" (Gibbs 2003b: 253). This perspective considers whether recent government initiatives, including the UK NISP and other relevant policies and programmes, embrace proactive and preventive approaches. Exploring the presence of both pull and push factors in the

policy instruments, advocated by governments at various levels would provide an understanding of the holistic approach adopted by the government. Elements crucial under this perspective include: support for increased use of technology to prevent environmental degradation, increased use of economic or market based instruments including tax instruments, promoting the use of environmental performance standards, e.g. ISO 14001 to integrate market forces and community engagement (Choy 2007: 30-31).

Moving away from closed policy making to participative policy making is another key dimension within Mol's (1995) interpretation of the transformation in the government's role explored in this study. Increasing emphasis has been placed on the role of non-state stakeholders, including industry and environmental groups, in strategic decision-making and the formulation and implementation of policy. As industry and environmental groups have a greater understanding of the environmental issues, their involvement in the decision-making process and policy formulation is seen as essential by many EM proponents (see Schlosberg and Rinfret 2008, Christoff 1996, Frijns et al. 2000). The relevance and extent of participation, and the government's effort to bring together relevant stakeholders in the decision-making and policy formulation processes are some of the key elements that can be explored through this EM perspective.

Decentralisation of the environmental policy formulation and implementation perspective has also been observed by Mol (1995), in order to realise the ecological modernisation agenda. The nation-state is not the only government level to influence policy (Mol 2002). Gibbs and Jonas (2000) pointed out that selected powers of the nation state (UK) are handed over in three directions: upwards, i.e. supranational, downwards, i.e. sub-national and horizontal, i.e. inter-regional organisations owned by the state. In the context of the UK, Gibbs described the European level as being supranational, where the UK government has adopted a number of European directives and has also engaged in the European Environmental Action Programme; devolved administration and local authority levels are classified as being sub-national, as the UK government has handed over selected and varying environmental policy powers to devolved administrations and offered local authorities the responsibility to meet the internationally agreed environmental policy, e.g. Agenda 21 through the local agenda 21 process; and, the Environmental Agency is classified as being an inter-regional organisation operating regionally, whilst wholly owned and controlled by central



government (Gibbs and Jonas 2000). This perspective could help explore, whether and to what extent, the UK government witnesses this new form of decentralised governance at various levels (as described by Gibbs and Jonas 2000) within the UK NISP context.

Adoption of contextually steering approach by the government is also regarded as a condition conducive to EM (Mol 1995). Moving away from a dirigistic to a contextually steering approach may have varying significance for different people/institutions. The role of a strong command and control approach is criticised by many, however there is evidence to suggest that not having regulations in place may result in further deterioration of the environment. The stand taken in this thesis proposes the implementation of a mix of regulatory, market and voluntary instruments. "... regulations could be retained to set basic minimum standards and to deter free riding" (Neale 1997: 11) and market instruments could offer financial incentives to businesses, in order to encourage them to minimise environmental damage, for example, eco-taxes, eco-labels, etc. Moreover, voluntary instruments, such as industry groups' voluntary agreements and government funded Business Environmental Support Programmes (BESPs) could also be employed. This perspective could help explore, in the UK NISP context, whether and how the government has changed from developing over-regulated policies to an appropriate mix of policies that, as Mol (1995) suggests, would create favourable conditions and contexts for environmentally sound practices.

### **2.3 Industrial Ecology, eco-industrial development and industrial symbiosis**

This section reviews literature relevant to the development of the field of IE and EID. The section begins with background information on the origin of the IE and EID field, its gradual development and ends with a critical appraisal. The concept of IE and its several dimensions are outlined in this section, with particular focus placed on the direction of further research for its institutionalization. Here, it is necessary to state the overall goal of IE. IE, as a field of enquiry, aims to make use of a minimum amount of natural resources to their highest possible value in order to conserve ecological systems. IE has been practised in various parts of the world to conserve natural resources and improve industrial capability, through various forms of EID. Cohen Rosenthal (2003: 14) outlines the benefits of practising IE:

“For business, eco-industrial development offers new avenues for profitable companies. For communities, eco-industrial options lead to more rooted businesses, good jobs and a cleaner environment. For local and global ecosystems, eco-industrialism promises a lighter load on the environment.”

However, there is limited evidence to support these claims. In addition, the notion that the economy and environment are in direct and fierce conflict is an out-dated belief. Therefore, there is a “need to ... demonstrate that the answers to economic and environmental problems are often the same” (Piasecki 1992: 874). “Much more research is needed to delineate the bounds where the prescriptions derivable from industrial ecology hold true” (Ehrenfeld 2004: 830). Thus, an attempt is made to discuss the concept of EID and its existence in the past as a tool of economic development. This section also describes different classifications of eco-industrial activities in various contexts and discusses the prominence of IS networks as one of the main EID approaches.

### 2.3.1 Industrial Ecology

IE is based on the metaphorical relation between the natural and industrial ecosystems. “The IE concept uses the metaphor of sustainable natural ecosystem as a model for transforming unsustainable industrial systems” (Korhonen et al. 2004: 290), which as noted by Korhonen and Strachan (2004) has become a distinct characteristic of the IE concept. Ehrenfeld (2004) showed his concern in terms of IE developing as a field of enquiry and argued that IE has penetrated the academic world though its legitimacy requires expanding. “Ideas like industrial ecology must become institutionalized if they are to have much effect on the reality of everyday activities” (Ehrenfeld 2004: 825).

The name “industrial ecology” was coined in 1972 when it was officially used by the Tokyo Ministry of International Trade and Industry (Ehrenfeld 2004). There was ongoing work in this field before the name ‘industrial ecology’ came into existence though it did not achieve much attention from academics until 1989. It was an article ‘Strategies for manufacturing’ by Frosch and Gallopoulos (1989) that made IE popular as a theoretical concept and its relationship with industrial activities (Agarwal and Strachan 2006). They described IE as a holistic approach to maintain a proper balance between economic benefits and environmental needs.

Several definitions are available, but it is not easy to fully understand the holistic concept of IE (Agarwal and Strachan 2006). According to Tibbs (1993), the natural ecosystem was considered to be limitlessly vast, but the continuous expansion of the industrial system has compelled us to consider the limits of natural ecosystem and its relevance to industrial operations. A very general and basic definition of IE was given by Tibbs (1993: 3):

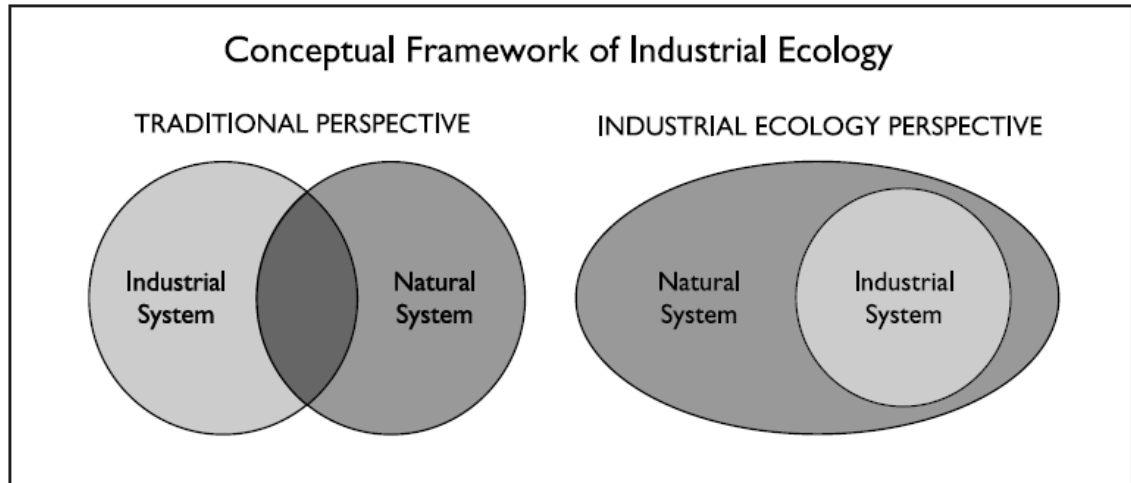
“Industrial ecology takes the pattern of the natural environment as a model for solving environmental problems, creating a new paradigm for the industrial system in the process.”

Allenby and Cooper (1994) proposed further development of IE as a biological metaphor which has become the main source of the concept of IE. IE was also defined as:

“The study of the physical, chemical and biological interactions and interrelationships both within and between industrial and ecological systems.”  
(Garner and Keoleian 1995: 2)

The views of Tibbs (1993), Allenby and Cooper (1994) and Garner and Keoleian (1995) are in line with the argument of Jelinski et al., that “an industrial system must be viewed not in isolation from its surrounding systems, but in concert with them” (Jelinski et al. 1992: 793). Chertow (2002) proposed a conceptual framework (see Figure 2.1) of IE based on the above argument:

**Figure 2.1 Conceptual framework of industrial ecology**



Source: Chertow (2002)

Chertow advocated that “by focusing on industrial operations in the context of the surrounding air, water, and land use systems in which they are a part, more integrative solutions are possible” (Chertow 2002: 9).

Erkman (1997) identified that most authors more or less agree on at least three key elements of IE. The first element is its systems approach, where IE studies the whole system that includes material and energy flows, rather than just studying a component of the system. Garner and Keoleian (1995) argue in favor of the systems approach as it provides a holistic view of environmental problems, making them easier to identify and solve. The second element of IE is that it takes into consideration material and energy flows in and outside a company’s boundary. This is consistent with the findings of Korhonen and Strachan (2004) which indicated that the systems approach to physical flows of matter and energy requires a network and an inter-organizational approach, although its intra-organizational aspects cannot be ignored. The third element is the use of key technologies as crucial components to achieve the transformation from an unsustainable industrial system to a viable industrial ecosystem.

Jelinski et al. (1992) conceptualized IE in three development models, i.e. Type I, II and III. Type I, as described by Korhonen and Strachan (2004) is a linear, immature and unsustainable model; Type II is a semi-matured state; and, Type III is a mature and materially closed ecosystem (Korhonen 2005a) that is ultimately sustainable (Jelinski et al. 1992). The goal of the IE community is a move towards the Type III ecology, i.e. an ecosystem that has evolved from linear and quasi-cyclic material flows into a situation

where the resources of life are limited and therefore the system operates through almost the complete cyclic nature of material flows (Jelinski et al. 1992, Allenby and Cooper 1994, Korhonen 2001). Korhonen (2005b) notes that, unfortunately, we still lie between the Type I and Type II model. Frosch and Gallopoulos (1989) have emphasized that an ideal industrial ecosystem, i.e. Type III, can never be attained in practice, though it can be closely approached to maintain a standard of living without adversely affecting the environment. Most commentators (Korhonen 2002) agree with Frosch and Gallopoulos on this issue by pointing out that an ideal industrial ecosystem is probably unattainable, although it would be worth pursuing as a goal. The direction presented by this vision is the way forward in environmental policy and industrial environmental management (Allenby and Cooper 1994, Korhonen 2001). It is perhaps not possible to move to a Type III model. However, proper implementation of the IE notion can take us between the Type II and Type III model.

The key tools of IE include material and flow analysis (MFA), substance flow analysis (SFA) focusing on individual substances (Korhonen and Strachan 2004), environmental life cycle assessment (LCA) for material and energy flows of products, and design for environment (DfE) that aims to design a product that will have minimum environmental impact throughout its life cycle. Tools, such as MFA and SFA are used simply for the identification of material and energy flow intervention, but LCA can be adopted as a management tool, as a life cycle oriented environmental management (Sinding 2000). DfE can also be defined as a management tool as it aims to create action, rather than just being employed for the identification of material and energy flow intervention (Lowe 1997). These tools have been used by the industry effectively, but no real measures have been suggested to enhance the development and application of these tools in industrial networks, on a regional or national level. Similarly environmental management systems, e.g. ISO 14001 or Eco-management and Auditing Scheme (EMAS) standards, concentrate on individual firms. Korhonen et al. (2004) argue that the system context of IE does not ignore the intra-organizational tools and tends to use both intra-organizational and inter-organizational approaches in parallel and in complement to each other.

Korhonen (2005b) suggested the more structural and organizational characteristics of ecosystems that can be used in the development of industrial ecosystems, some of which are discussed here: roundput, diversity, locality. “Industrial systems exhibit a

linear throughput flow of matter and energy that depletes natural resources and generates waste and emissions ...” (Korhonen et al. 2004: 290). Korhonen (2005a) suggested the ‘roundput’ model, benefits of which are described by Deutz and Gibbs (2004: 349) in economic, environmental and social terms:

“In economic terms waste ‘roundput’ has benefits for all parties: reducing waste disposal costs on the one hand and expenditure on raw materials on the other. Environmental gains are simultaneously achieved by a reduction in both waste production and resource use. The social gains associated with sustainable development are a little more tenuous in IE projects, being dependent on the increased profitability of participant companies benefiting local economies and thereby the local population.”

The value of IE will depend on ‘diversity’, the extent to which it can provide possibilities for interrelating industrial inputs and outputs, diverse actors that can develop more opportunities for synergies, and diversity in information. Korhonen and Strachan (2004) point out that the Type I – Type III model does not even consider diversity of system development within the industrial ecosystem. On the one hand, if an actor from the system opts out, then the diversity of the system would help to recover the system by involving another actor. On the other hand, an increase in the diversity of actors would perhaps create an increase in conflicting interests (Korhonen et al. 2004).

‘Locality’ gives an indication of the importance of local values, local resources and local co-operation as ecosystems remain within the local carrying capacity (except for a few exceptions, e.g. import of non-renewables in the Kalundborg’s IS network) (Korhonen 2005a). “Energy use could be reduced through locally integrated production and end-consumption” (Korhonen 2005a: 11). Thus, the locality characteristic of the ecosystem is useful for an industrial ecosystem, as every industrial ecosystem has its distinct local values, level of resources and diversity of actors.

Several authors (e.g. Boons and Roome 2001, Korhonen 2004a, Korhonen et al. 2004) have questioned whether IE can significantly expand beyond its present dominant industrial metabolism focus and move from the descriptive analysis of materials and energy flows in industrial systems towards a prescriptive framework, offering concrete solutions and practical measures for policy-makers and business managers.

Subsequently the question is raised by Korhonen et al.: “How can we develop policy and management approaches to realize the Type III eco-industrial development vision in practice?” Korhonen et al. (2004: 299). Frosch and Gallopoulos suggested that “corporate and public attitude must change to favour the ecosystem approach, and government regulations must become more flexible ...” to support strategies for waste minimization (Frosch and Gallopoulos 1989: 150). On the other hand, Deutz and Gibbs (2004) stressed the importance of co-operation between local authorities and public and private actors for progress towards EID.

A research need is identified by Korhonen et al. (2004), which would perhaps enable answering the above questions if taken into consideration in further IE research. They realized that “... the study of the physical flows of matter and energy cannot inform managers, planners and policymakers, about how to change the ways in which individuals, groups, organizations, and the general society behave” (Korhonen et al. 2004: 302). Posch (2004), in agreement with Korhonen et al. (2004), points out that the network and systems approach should be taken into account not only in the description of material and energy flows, but also when considering the human dimension of the networks, the actors and the decision-makers in industrial ecosystems. Although the physical flow of material and energy has been the main focus of the IE theory, authors (e.g. Ehrenfeld 2000, Boons and Roome 2001, Korhonen et al. 2004) argue that IE theory should also consider the human dimension, i.e. the actors involved with the flows. Ehrenfeld (1997: 90) asserts “The coupling of human activities to such a systematic framework is the basis for this new organizational principle called industrial ecology”. Therefore, Korhonen et al. (2004) suggest that IE’s link to management and policy studies would provide innovative routes to change present unsustainable industrial systems into viable industrial ecosystems. Korhonen et al. (2004) proposed three themes as organising categories in linking IE to management and policy studies. These include “(i) inter-organisational management, (ii) development and management of industrial ecosystems, and (iii) industrial ecology as a vision and source of inspiration for management strategy” (Korhonen et al. 2004: 296).

In most IE literature, it has been noted that the concept of IE focuses on the interaction among groups of cooperating firms and their stakeholders, such as the community, NGOs working alongside and the government. It positions IE as a form of environmental management in inter-organisational networks (Korhonen et al. 2004).

“Stakeholder management theory is an important path to pursue in linking environmental management theory to IE” (Korhonen et al. 2004: 296). The stakeholders’ position in traditional stakeholder management was one of risks as a result of their demands on the company (Madsen and Ulhoi 2001), although if the stakeholders perception of IE was true, it could provide new opportunities (Korhonen et al. 2004) in the development and management of inter-organisational networks.

An appropriate approach towards the development and management of industrial ecosystems can only encourage the industrial system to move towards Type III. The most essential elements for realizing a Type III industrial ecosystem include: co-operation between public and private actors (Deutz and Gibbs 2004) that which Piasecki (1992) argues have conflicting interests and preferences; mutual trust and communication among the participating member companies and the willingness to cooperate (Sterr and Ott 2004); information flows among the actors, community involvement and active government policy (Korhonen et al. 2004); central role of local authorities (von Malmberg 2004) in planning and providing information and support; and, most importantly local authorities acting as a leader (Deutz and Gibbs 2004, von Malmberg 2004, Korhonen et al. 2004).

IE has potential features that can be used as a source of inspiration and creativity when developing new business strategy planning principles, e.g. stakeholder co-operation and participation with diverse actors, planning for local community development projects, etc. (Korhonen 2004a).

### 2.3.2 Eco-industrial development

“Critical analysis of the development of IE in practice would provide a basis for better understanding of the potential of the concepts of industrial ecosystems and of the value of the field of IE as such” (Korhonen et al. 2004: 293). Literature on EID is clumsy and fragmented, despite a growing interest in the field. “Eco-industrial development refers to a broad and multi-faceted set of ideas, and has been evolving and deepening over the years” (Spiegelman 2001: 3). In order to understand the concepts, principles, strategies, goals and value of EID, it would be helpful to discuss some of its definitions. Côté (2000: 3) interprets EID as “a community of manufacturing and service businesses seeking enhanced environmental and economic performance through collaboration in



managing environmental and resources issues including energy, water and materials”. Pellenbarg (2002: 65) suggests:

“It is not the product or service that is the leading aspect here, but the joint ambition of firms located on the site to organize their activities strategically in such a way that environmental goals are served without obstructing economic performance, or even better, by enhancing this performance”.

EID strategies “have been practiced by businesses for centuries to conserve valuable resources, encourage innovation, and maximize financial profit” (TPD 2003: 5). Cohen-Rosenthal (2003: 21) also affirms this by arguing that “eco-industrial connections occur all of the time in all kinds of businesses and communities”. In one of his articles, Desrochers (2002b) presented historical evidence from 19<sup>th</sup> and 20<sup>th</sup> century literature, demonstrating that one of the eco-industrial activities, which he described as inter-firm recycling linkages, were a dominant characteristic of the past economic development but he argued that the majority of commentators (Ayres 1994, Côté and Smolenaars 1997, Lowe 1997, Ehrenfeld and Gertler 1997) from IE and other related fields disagreed. There are two main reasons for this, one of which is “... a lack of research into the spontaneous formation of inter-firm recycling linkages ...” and the other is “... the progressive and cumulative implementation of market distortions and regulatory barriers to resource recovery over the last century” Desrochers (2002b: 1031). Desrochers provided ample historical evidence refuting the belief “that past economic development was characterized by a linear model of extraction, use and disposal” (Desrochers 2002b: 1035). EID strategies are not new concepts though, as Desrochers (2002b) argues that in the past, they were practiced on a smaller scale based on the level of technological innovation and regulatory barriers.

“What is new is the emphasis on the comprehensive application of these strategies with the multiple objectives of maximizing financial returns, improving connections between businesses and their communities, and reducing environmental degradation” (TPD 2003: 5). I will argue in favor of Desrochers’ (2002) view, based on the evidence available, which is also supported by TPD (2003), Cohen-Rosenthal (2003) and Sterr and Ott (2004), that EID strategies were possibly practiced in the past, although probably on a smaller scale, and were perhaps not conscious and/or systematic. Cohen-Rosenthal (2003) raised questions about the on-going eco-industrial activities, whether

they are conscious and systematic? if the stakeholders involved know how to adjust to new markets, technologies and materials, and whether they add value to the shareholder, stakeholder and the environment?

There are several ongoing eco-industrial activities that are neither conscious nor systematic. However, progress in the field of IE, particularly the move from material and energy flow aspect of IE to the human dimensions, strategic management and policy perspective aspects would assist in the realisation, systematisation and also in further development and the effective management of such activities. Additional research is required to identify cases where eco-industrial activities are present in order to identify how these initiatives developed, their key stakeholders, how they are managed and whether they add value to stakeholders and the environment.

### 2.3.3 Classification of EID and IS initiatives

The Research Triangle Institute (RTI) produced a classification of EID based on different group of actors and emphasis:

- a single by-product exchange pattern or network of exchanges;
- a recycling business cluster (e.g. resource recovery, recycling companies);
- a collection of environmental technology companies;
- a collection of companies making 'green' products;
- an industrial park designed around a single environmental theme (i.e. a solar energy-driven park);
- a park with environmentally friendly infrastructure or construction; and
- a mixed use development (i.e. industrial, commercial and residential) (RTI 2003: xii).

However, Trillium Planning and Development Inc. (TPD) in a feasibility study, focused on the four concepts of EID which were considered as the most relevant and specific for the US planning area: (1) bio based industry cluster - that would produce alternative fuels, lubricants and co-products increasing the value of agricultural resources, such as corn and soybean (e.g. biodiesel from soybean oil); (2) high performance warehouse and distribution centers - used for the logistics division of retailers and wholesalers, by co-locating combination of firms with complementary distribution channels; (3) research and technology park - that would focus on commercialization of research; and, (4) eco-park (planned mixed-use commercial park) that would be branded and marketed as an EIP and planned according to EID principles, including business-to-business and business-to-community networking, energy and resource efficiency, pollution prevention, sustainable land use, building design, etc. (TPD 2003)

Chertow (1999: 9) classified EID as perhaps based on size and geographical coverage of the eco-industrial activities: (1) through waste exchanges - businesses recycling or selling recovered materials to other firms, e.g. scrap dealers; (2) within a firm - occurs either in large organizations that often behaves as if they were a collection of several different entities or by integrating operations further up the life-cycle chain; (3) among firms collocated in an eco-industrial park - businesses located in a set geographical area

exchange energy and material and share information and services such as transportation; (4) among local firms that are not collocated - relies on using existing businesses and inviting some new ones to create a synergy, although this type of EID does not require strict geographical proximity; and, (5) virtual eco-industrial parks - allow businesses to share waste stream, however the use of energy over large distances would perhaps be impossible or inefficient. Chertow (2002) claimed that last three approaches can readily be identified as IS.

Musnikow and Schlarb (2002) classified most eco-industrial activities into one of the following four categories: (1) eco-industrial park – It utilizes the format of traditional industrial parks and co-locates several businesses on a specific property; (2) transformed existing industrial park – Existing parks are converted into eco-industrial systems by adapting the park to incorporate eco-industrial principles and activities; (3) virtual eco-industrial network – creates materials link and other connections among industries within a region without relocating businesses; and, (4) combination of forms – this employs some, or all of the three types of eco-industrial initiatives mentioned earlier.

Conversely Roberts (2004) utilised a different approach by outlining EID at three distinct levels: firm level, eco-industrial park level (or industrial symbiosis network level) and networked eco-industrial parks level. “Applying industrial ecology at the firm level can achieve significant operational savings; however, there may be limitations related to scale and quality of waste or materials by-products that affect recovery costs” (Roberts 2004: 1000). According to the BCSD (2002) report, EID covers a wide array of issues including material, energy and water balances for companies, their production processes and capacities, needs for support functions and infrastructures, human and knowledge resources, etc., and aims to develop long-term continuous partnerships based on the direct communication of network companies. Mirata argues that “... IS networks can allow improvements in the efficiency and effectiveness by which different resources and capacities are utilized going beyond that which can be achieved by fragmented pursuit of improvements in individual units” Mirata (2004: 967). Networked eco-industrial park systems (NEIPS) are the clustering of IS networks which are a step ahead of IS networks and represent IS macro-level developments that have strategic links or alliances with other IS networks across regions (Roberts 2004).

Based on the range of classifications of EID initiatives in literature, e.g. Roberts (2004), Chertow (1999), RTI (2001), TPD (2003) and others, it is evident that the definition of EID has not developed sufficiently to set boundaries which could identify the type of initiatives constituting an EID initiative. It is obvious that majority of classifications made include the concept of EIP and/or IS, literature on IE and EID has used both terms in conjunction with each other. Based on a thorough investigation of 13 projects undertaken by groups of students during a two year period, Chertow (1999) claimed that EIPs are a part of IS. IS, based on the concept of IE and EID, is an approach that is practiced to achieve sustainable development. This approach has been in existence for many years, but it is argued that different names have been used when applying the same prescription for practicing sustainable development, such as ‘green twinning’, ‘by-product synergy’, ‘zero waste/zero emissions/100% product operations’ and ‘cradle-to-cradle eco-efficient manufacturing’ (Mangan and Groberg 1998).

IS networks aim to increase business performance whilst reducing pollution and waste (Cohen-Rosenthal 2004). Korhonen and Strachan (2004: 5) stated that “the clearest link between IE and business studies comes through industrial symbiosis”. They also emphasized that “industrial symbiosis is, by far, the easiest to understand and the most popular industrial systems application of the natural ecosystems metaphor or analogy, it enables us to consider the potential of the metaphor in practical corporate and industrial environmental management” (Korhonen and Strachan 2004: 3). IS is achieved when two or more businesses cooperate and collaborate with each other and use the other’s by-products or throwaway material. This not only improves business performance by increasing profits and attaining competitive advantage, but also protects the environment by reducing waste and the use of natural resources.

Chertow’s (2002) classification of EID initiatives, based on the size and geographical coverage of eco-industrial activity, has been effective. Musnikov and Schlarb (2002) and Roberts (2004) used a similar approach in classifying EID activities, i.e. based on size and geographical coverage. Whereas classification of EID initiatives by the TPD (2003) and RTI (2001) mainly focuses on particular contexts and sectors, which complicates the understanding of IS. Context oriented classification does not allow the development of a generic approach and sector oriented approaches do actually limit the exchange of by-products and may restrict the development of IS. IS, as Korhonen (2002) argues, requires diverse actors in the system to complement by-product synergy.

Therefore, it can be suggested that classification based on size and geographical coverage (e.g. Chertow 1999, Musnikov and Schlarb 2002, Roberts 2004) would be best suited to the further development of IS. Chertow (2002) argued that the last three types of eco industrial activities in her classification above, can be identified as IS, i.e. utility sharing and symbiosis among firms that are co-located (eco-industrial park), symbiosis among firms that are not co-located and do not require strict geographical proximity (eco-industrial network), and symbiosis among firms that are virtually networked and could be spread at large distances (virtual eco-industrial network/park or industrial symbiosis network), e.g. regional network. In addition, transformed existing industrial park, which is also known as brown-field development, included in the classification by Musnikov and Schlarb (2002), is also a very important component of IS. Based on the above categorizations of EID initiatives and the associated discussion, a more focused classification has developed that includes approaches that only fall in the IS category (see Table 2.3). This classification omits any industrial sector-wide approaches and appreciates the diversity of the industrial system which is considered a key feature of the IS concept. It aims to include initiatives that focus on achieving utility sharing and symbiosis among diverse sectors of industry.

**Table 2.3: Classification of IS Initiatives**

- |   |
|---|
| <ul style="list-style-type: none"> <li>• Green Twinning (<i>single material and/or energy exchange</i>)</li> <li>• Eco-industrial Park (<i>green-field development</i>)</li> <li>• Eco-industrial Park (<i>brown-field development</i>)</li> <li>• Eco-industrial Network (<i>no strict requirement of geographical proximity</i>)</li> <li>• Virtual Eco-industrial Network (<i>networks spread in large areas, e.g. regions</i>)</li> <li>• Networked Eco-industrial System (<i>macro level developments across regions</i>)</li> </ul> |
|---|

Source: Author generated

“Industrial symbiosis has gained prominence among other sustainability strategies for industry” (Altham and van Berkel 2004: 2). It is evident from Kalundborg’s most cited example that the IS approach could be very successful, although the limited examples of successful initiatives to-date prove that it is not easy to plan, develop and manage IS networks. Kalundborg’s IS network is built as a networking co-operation among six processing companies, a waste handling company and the municipality of Kalundborg, and they successfully exploit each other’s residual or by-products on a commercial basis, minimizing pollution and optimizing the use of various resources (ISK 1995). “The symbiosis evolved gradually and without a grand design over the past 25 years, as

the firms sought to make economic use of their by-products and to minimize the cost of compliance with new, ever-stricter environmental regulations” (Ehrenfeld and Gertler 1997: 69). “Bilateral exchanges of waste materials were primarily motivated by economic benefits, although as a result, tangible environmental benefits have been gained ...” (Christesen et al. 2000: 378). Influenced by the example of Kalundborg, IS initiatives are being launched in the USA, Australia, the UK and most European countries, which demonstrate the revolutionary development of IS networks.

#### 2.3.4 IE and EID areas suitable for this study

Most of the attention, in the fields of IE and EID, has been given to material and energy flow aspects but it has also been highlighted as a network oriented concept. The study of physical flows of matter and energy in industrial ecosystems is usually the way in which the IE concept is approached, while the study of more structural and organisational characteristics and properties of industrial ecosystems are addressed in only a few texts (Korhonen and Strachan 2004).

“The concepts of industrial ecology must be recognised and valued by public officials, industry leaders and the media” (Frosch and Gallopoulos 1989: 152); and, it should be adopted by the government as well as industry. Progress in the field of IE is perhaps not possible without the participation of industry. Brown (1992: 877) argues that in order for this to be achieved, “companies not only need to understand that the potential benefits exist but also need to know where to go for advice and expertise”. As suggested by Korhonen et al. (2004) linking the dominant natural science and engineering aspect of IE to the management and policy studies would enable the field to institutionalize. More needs to be done on its structural and systems aspects, (Côté and Cohen-Rosenthal 1998), otherwise “industrial ecology may become strongly criticized as mere ‘wishful thinking’ ...” (Johansson 2002, in Ehrenfeld 2004: 830). Additional evidence is needed to prove that the field of IE is an effective tool for business and society and to demonstrate how it can be effectively applied in practice, in order to address the problems the world is facing today.

Drawing on the IE and EID literature, the next Chapter explores and analyses the key factors that are instrumental in the development and management of IS networks.

## **CHAPTER THREE: DEVELOPMENT AND MANAGEMENT OF IS NETWORKS**

Chapter Three reviews literature specific to the factors influential in the development and management of IS networks. This study was initially planned to focus on the business experiences of the UK NISP in three key regions. However, the decision to shift the focus from the business perspective to management and organisational design employed by the UK NISP was taken based on a number of justifications, the details of which are provided in Section 1.4 – *Scope and limitations* in Chapter 1. The literature presented in this chapter has a number of elements that relate to the understanding of the business perspective. However, the content within this chapter is also instrumental in understanding the management and organisational design employed by the UK NISP, which became the key focus of the thesis, and thus provides a clear rationale to be included in the thesis.

### **3.1 Factors central to the development and management of IS networks**

In the past, most IS networks, e.g. Kalundborg, have been regarded as self-organising initiatives, driven by the economic incentives they brought to the participating companies. Such self-organised IS initiatives have proved their sustainability potential, generating triple bottom line benefits for society as whole. This inspired the development of similar conscious IS initiatives, which aim to achieve environmental protection as well as economic and social development. Co-ordinating bodies played a key role in catalyzing the conscious IS initiatives through their involvement in raising awareness and the facilitation of IS network development. “Such co-ordination is, or should be, informed by an understanding that development of synergistic relations among regional economic functions depend on various factors rooted in different domains” (Mirata 2005: 44). Therefore, self-organised IS initiatives were initially studied by Tibbs (1993), Ehrenfeld and Gertler (1997), etc. in order to identify the most crucial factors in the development and management of IS networks. These were then applied to the conscious efforts made in this direction. Later, Mirata (2005), Eilering and Vermeulen (2004), Gibbs and Deutz (2005, 2007), Heeres et al. (2004) and Starlander (2003) studied cases of IS that were conscious initiatives. These studies identified factors that were found to be central to the development and management of IS networks.



Sterr and Ott (2004) presented key lessons from the Kalundborg case, which Tibbs (1993), Ehrenfeld and Gertler (1997), etc. considered to be crucial for the development and management of IS networks. Sterr and Ott (2004) divided the key lessons into three broad categories: historic and systematic considerations; economic, technical and political considerations; and, spatial considerations. A summarised version of these lessons is presented in Table 3.1 within their broad categories:

**Table 3.1: Crucial factors for the development of IS networks**

Category	Example of factors
Historical and systematic considerations	<ul style="list-style-type: none"> <li>• Mental proximity among key actors and collaboration for common interest;</li> <li>• Inter-company connections on the basis of mutual trust;</li> <li>• Long-term oriented output-input relations; and</li> <li>• Decision makers.</li> </ul>
Economic, technical, and political considerations	<ul style="list-style-type: none"> <li>• Proactive answers to new or stricter environmental regulations;</li> <li>• Economy and ecology need not be contradictory and may fit well together;</li> <li>• Systematic search for similar potential symbiotic connections;</li> <li>• Impetus of participants for innovation and inter-company co-operation; and</li> <li>• Stabilised connections.</li> </ul>
Spatial Considerations	<ul style="list-style-type: none"> <li>• A gradual intensification of recycling and cascading systems;</li> <li>• A full degree of transparency of material and energy flows on the level of the industrial site</li> <li>• A rising degree of regional transparency of undesired outputs and desired secondary materials</li> <li>• A selective expansion of industrial recycling and cascading solutions across regions.</li> </ul>

Source: Adapted from Sterr and Ott (2004) and modified by author

Heeres et al. (2004) used the similar context to Sterr and Ott (2004), although they presented factors in the form of obstacles that organisations may face when attempting to participate in symbiotic relationships. The five barriers outlined by Heeres et al. (2004: 987-988) are: “technical (an exchange is technically feasible); economic (if exchange is economically unsound or risky from a company perspective); informational (the right people do not have the needed information at the right time); organisational (exchange does not fit in the current corporate organisational structure); and, Regulatory/Legal (an exchange is restricted because of laws and regulations)”.

Mirata (2005) categorised the factors influencing the development of IS networks, in line with the obstacles identified by Heeres et al. (2004), within the same five domains: technical, economic, political, informational and organisational (see Table 3.2).

**Table 3.2: Factors influencing development and functioning of IS networks**

<b>Domain</b>	<b>Example of factors</b>	<b>Potential area of influence</b>
Technical	<ul style="list-style-type: none"> <li>• Availability of reliable and cost effective technology;</li> <li>• Compatibilities between needs and capacities; and</li> <li>• Physical, chemical and spatial attributes of input and output streams.</li> </ul>	<ul style="list-style-type: none"> <li>• Number and diversity of potential symbiotic exchanges</li> <li>• Extent of environmental, economic and social benefits</li> <li>• Extent of investment and effort required to develop and maintain synergies</li> </ul>
Economic	<ul style="list-style-type: none"> <li>• Costs of virgin inputs</li> <li>• Value of waste and by-product streams;</li> <li>• Transaction and opportunity costs;</li> <li>• Size of capital investment and discount rates</li> </ul>	<ul style="list-style-type: none"> <li>• Extent of economic advantage and competitiveness gained;</li> <li>• Need for alternative finance;</li> </ul>
Political	<ul style="list-style-type: none"> <li>• Overarching environmental policies</li> <li>• Nature and implication of relevant laws and regulations; and</li> <li>• Relevant fiscal elements (taxes, fines levies, subsidies and credits).</li> </ul>	<ul style="list-style-type: none"> <li>• Direct development and innovation;</li> <li>• Incentives for environmentally preferred technologies, including formation of symbiotic linkages;</li> <li>• Render synergies illegal; and</li> <li>• Add to transaction costs.</li> </ul>
Informational	<ul style="list-style-type: none"> <li>• Access to relevant information;</li> <li>• Availability of timely and reliable information from a wide spectrum of areas to the right parties; and</li> <li>• Continued review of information.</li> </ul>	<ul style="list-style-type: none"> <li>• Possibilities to identify synergies;</li> <li>• Possibilities to operationalise synergies; and</li> <li>• Risk perception of companies.</li> </ul>
Organisational	<ul style="list-style-type: none"> <li>• Trust;</li> <li>• Openness;</li> <li>• Environmental maturity;</li> <li>• Level of social interaction and mental proximity;</li> <li>• Local availability of decision-making powers;</li> <li>• Organisational history;</li> <li>• Nature of interactions among industry, policy makers and regulators; and</li> <li>• Social embeddedness (degree of familiarity)</li> </ul>	<ul style="list-style-type: none"> <li>• Presence/creation of the necessary institutional framework for collaboration;</li> <li>• Development of synergies;</li> <li>• Maintenance of synergies; and</li> <li>• Risk perception</li> </ul>

Source: Adapted from Mirata (2005)

Eilering and Vermeulen (2004: 249), however, used a different approach, where it was assumed that the factors they identified “influence the process from ambition to

performance”. IS network development is influenced by a broad category of factors including: goals that developers are seeking to achieve (e.g. the vision of sustainability); location specific features; business specific features; social features; the organisation of the decision-making process; and, policy instruments (Eilering and Vermeulen 2004). These factors are summarised in Table 3.3.

**Table 3.3: Factors influencing IS network process from ambition to performance**

<b>Factors</b>	<b>Example of factors</b>	<b>Areas of influence</b>
Goals that developers are seeking to achieve (e.g. the vision of sustainability)	<ul style="list-style-type: none"> <li>• Extent of environmental improvement;</li> <li>• Sustainable symbiosis in relation to the environment;</li> </ul>	<ul style="list-style-type: none"> <li>• Level of ambition</li> <li>• Level of measures chosen to move towards sustainability</li> <li>• Level of environmental gains one hopes to achieve</li> </ul>
Location and Business Specific features	<ul style="list-style-type: none"> <li>• Companies with complementary needs and resources;</li> <li>• Diversity of companies</li> <li>• Stable material and energy flows</li> <li>• Match of demand and supply (quantity as well as quality)</li> <li>• Geographic proximity among companies</li> </ul>	<ul style="list-style-type: none"> <li>• Achieve symbiosis and/or utility sharing;</li> <li>• Divergence of interests;</li> <li>• New business risks that may lead to unhealthy dependencies;</li> </ul>
Social Features	<ul style="list-style-type: none"> <li>• Trust between companies</li> <li>• Anchor company</li> <li>• Pioneer</li> <li>• Mental proximity between the companies</li> <li>• Core group of companies with a distinct environmental profile</li> <li>• High degree of organisation</li> </ul>	<ul style="list-style-type: none"> <li>• Attract complimentary partners</li> <li>• Clarity of the vision of IE</li> <li>• Consideration of joint interest of companies</li> </ul>
Organisation of decision-making process	<ul style="list-style-type: none"> <li>• Involvement of both private and public bodies;</li> <li>• Top-down or bottom-up approach</li> </ul>	<ul style="list-style-type: none"> <li>• Secures and maintains support for the process;</li> <li>• Avoidance of possible problems and debate</li> </ul>
Policy instruments	<ul style="list-style-type: none"> <li>• Legislation</li> <li>• Requirements on companies to join IS network;</li> <li>• Financial incentives;</li> <li>• Contractual agreements</li> <li>• Input and exchange of knowledge and information</li> </ul>	<ul style="list-style-type: none"> <li>• Flexibility;</li> <li>• Speed of IS network development;</li> <li>• Motivation for IS development and</li> <li>• Commitment to IS network and risk liability</li> </ul>

Source: Author generated (adapted from Eilering and Vermeulen 2004)

The work of Sterr and Ott (2004), Eilering and Vermeulen (2004) and Mirata (2005) is vital, in understanding the key factors and the influence they have on IS network development and management. However, it is evident that these commentators have varied opinions, in terms of which factors are the most important for the effective development and management of IS networks. Sterr and Ott (2004) advocate that

information transparency is central to a stable IS network, although they did not undermine the importance of mutual trust among the actors and their willingness to cooperate. They also argue that “political interests, the legal framework and planning efforts can help to set the things in motion” (Sterr and Ott 2004: 963). Whereas, Eilering and Vermeulen (2004: 266) claimed “... that the social cohesion between companies is very important” as their study revealed that most successful cases were the ones in which “the companies had a shared history or the companies had been partners in the same chain for a long time”. On the other hand, Mirata (2005) gave equal emphasis to all factors (see Table 3.2). However, he argued that “an appropriate information management system appears to be one of the key enablers for IS network to successfully evolve and operate” Mirata (2005: 45). But the factor that drives an IS project in companies is its technical feasibility, which is measured in monetary terms to identify if it is worth pursuing (Mirata 2005). Besides other aspects, he considers “relevant laws and regulations to be another important drive for organisations to switch to alternative practices ...” (Mirata 2005: 46). This could generate improved environmental performance, but it could perhaps be detrimental to businesses’ competitiveness as it might not always improve economic performance. Therefore, legislative and regulatory elements can hinder or delay the development of synergistic relationships (Mirata 2005). Schwarz and Steininger (1997, in Mirata 2005) argue that organisational factors can present the biggest challenges leading to the failure of IS initiatives, even in the presence of all other favourable factors. Therefore, “organisational issues are likely to form the key group of factors that determine the development and proper functioning of IS networks” (Mirata 2005: 46).

However, in order to contribute to a better understanding of IS development and management, an extended literature review is conducted to analyse factors that are central to the success of IS networks.

## **3.2 Extended analysis of factors central to the development and management of IS networks**

### **3.2.1 Vision of IS networks**

The ambitious vision of IS networks is based on an industrial ecosystem which mimics the flow of matter and energy in a natural ecosystem. It is apparent that the natural

ecosystem is materially closed and the only by-product it produces is energy in the form of heat. This makes the natural ecosystem virtually waste free. The ambitious vision of industrial ecosystem and, therefore, the vision of IS networks (an application of the field of IE), is to utilize the model of a natural ecosystem by developing diverse industrial actor networks that interact and use each others' waste material and waste energy in an attempt to create a waste free industrial system. Korhonen (2005a) stated that it is the effective eco-industrial system in Kalundborg that has encouraged the use of this concept in most countries around the world. However, this provokes the question, "what is the real motive behind the development of IS networks?" Is it concerned with environmental protection, or does it involve institutional pressure, the eco-efficiency of firms, business opportunities, a move towards achieving sustainability or a basis for regional and/or local development? In order to evaluate the success of an IS initiative, it is necessary to understand the real motive behind its development. The focus should be on both the IS initiative aims and how it is perceived by various stakeholders. Therefore, it is important that there is a common vision for the network as a whole. In order to evaluate how IS networks are developed and managed effectively, the IS network vision and how it is perceived by various stakeholders is the first and main factor to be discussed and analysed. The motive behind every individual network may be different, therefore, it is vital that the institutional settings in which they have developed and the funding structures that have been put in place for each of these networks are identified, to understand the context in which they developed.

Starlander (2003) questions, if the parties involved understand the overall objective of IS networks and what can be achieved through this collaboration. "In contemplating significant change, business needs to be able to find common ground with the program of action being proposed" (Tibbs 1993: 7). Nevertheless, businesses may want to participate in IS networking for their own reasons, such as institutional pressure or the desire for competitive advantage, which may conflict with the overall objectives. Therefore, developing a complete vision for an IS network (both in the short and long term), while taking into consideration the motives of businesses to join an IS network, may help in its appreciation. It is necessary to ensure this vision is not being developed just to satisfy the individual needs of a particular actor.

Funding from different sources may force programme co-ordinators to satisfy the requirements of funding bodies, which support the programme for their own particular

reasons, e.g. the DEFRA's BREW programme partly funds the UK NISP in order to achieve their waste reduction targets, whereas economic development agencies collaborate with the programme in order to realise their economic development targets, i.e. the creation of new jobs and businesses. This may divert the programme co-ordinators' attention away from the original objectives of the programme and instead focus may be placed on satisfying the targets set by the funding bodies. This may, in turn, encourage programme co-ordinators to obtain more funding to ensure the mere continuation of the programme, rather than to help it meet its actual objectives. Mirata (2004: 970) suggests, "having the right institutional setting in a region is also among the most important elements for IS programmes and is an area where co-ordination bodies can make a difference". Therefore, as well as the right institutional setting, emphasis should also be given to the funding structure of the programme so that efforts are made not only to obtain more funding but to generate appropriate outputs to achieve the objectives of the programme.

### 3.2.2 Alignment with normal business practice

The IS approach would become popular amongst businesses if the benefits outweighed the associated risks/disadvantages (Starlander 2003). "... a central factor influencing the outcome of IS networking is how well it is aligned with the economic reality businesses are confronted with" (Starlander 2003: 18). van Leeuwen et al. (2003) argue that economic and organisational implications are largely ignored and business specific features are rarely taken into account. Tibbs (1993: 7) state that businesses prefer:

"...an objective that can be clearly interpreted in management and technical terms, and is compatible with business activity. The ideal agenda should allow progress to be measured, enhance business performance, and be applicable in any industry, permitting alliances and co-operation among corporations and between industries."

Heeres et al. (2004) and Gibbs and Deutz (2007) also emphasize the importance of focusing on the implementation of low cost and both environmentally and economically beneficial projects to encourage utility sharing and material and energy exchanges. A number of the factors that fall in this category are discussed in the following sections.

### *3.2.2.1 Economic incentive and competitive advantage*

IS initiatives, as contended by Jacobsen (2003, in Starlander 2003) are not core business but side business. Starlander (2003) argued in support of Jacobsen (2003, in Starlander 2003) that IS initiatives are fundamentally different from other types of networks, such as clusters that tend to address the normal supply chain and the main products and services of companies. However, IS networks can be seen as sustainable business clusters consisting of diverse industry actors, not concentrated in a particular geographic area but clusters in a virtual sense spread across large areas. Brouder and Berry (2004: 4) advocate that “sustainable business clusters would have all the same economic advantages as a business cluster, but these would be further enhanced by the value added of sustainable development”. Brouder and Berry (2004) also argue that besides economic gains, sustainable business clusters produce long term social and environmental gains which would further enhance competitiveness of businesses.

Increased profitability and competitive advantage appears to be the main motive for companies to join IS networking (Starlander 2003, Mangan and Groberg 1998). Heeres et al. (2004) advocated that if symbiotic exchanges are economically unsound, it might constitute a barrier to IS network development. Sterr and Ott (2004, in Gibbs and Deutz 2007) contended that even though companies are aware of the economic advantages of participating in an IS network, the costs involved may discourage them from modifying the way in which they work. Mangan and Groberg (1998) have therefore, recommended the use of project evaluation tools at an early stage of the project, such as, life-cycle cost analysis and full cost accounting tools, to conduct an evaluation of the economic benefits of the project. Clear economic benefits for all parties involved in the project must be outlined to keep the parties interested and committed to the project. Cohen-Rosenthal (2000, in Starlander 2003) further argued that for this approach to be successful, both economic and environmental benefits need to be demonstrated.

Competitive advantage is essential for the businesses' success, therefore no company will be interested in participating in an IS project if they fear they will lose their competitive advantage. Although businesses are willing to participate in developing environmental friendly strategies, they consider it important to maintain their competitiveness. Starlander (2003) advocates that as well as improvements in the businesses' environmental performance, IS networking should provide companies with

benefits that outweigh the associated risks and disadvantages. For example, the number of institutional investors, who take into account the corporate responsibility of companies when making an investment decision, are increasing rapidly. Joining IS networks would enhance the reputation of companies and would dictate their interest in being socially and environmentally responsible. Gibbs and Deutz (2007: 1690) found that many EIP developers in the United States "... were strongly of the opinion that designation as an EIP had helped to speed up the development process because of its benefits as a marketing device and a means to create a 'unique selling point'".

There is little evidence to suggest that businesses consider participation in IS networks to be critical aspect of conducting business. Therefore, there is a need for IS network co-ordinators to analyze whether businesses see IS as a tool for enhancing their competitiveness. An evaluation of the competitive situation and market potential should be conducted (Mangan and Groberg 1998) and the clear benefits for each party involved should be evaluated (Starlander 2003) in order to assure businesses that participation in IS networks will add to their competitive advantage.

### *3.2.2.2 Investment potential and flexibility for businesses*

IS networking investment needs may not align well with business reality as companies would be keen to obtain short payback times (Starlander 2003). However, payback times in industrial symbiosis networks tend to be longer and may not be achievable in the short term when planning and designing symbiotic linkages. The entry fee to join the network and/or to use any advisory services may also work as a tool to keep companies interested in and committed to IS projects, although, conversely it could also deter, as there are no guaranteed returns (Starlander 2003). Moreover, companies may view projects having no guaranteed returns as unattractive. Although, as Gulati (1995, in Starlander 2003) argues, even if a company is convinced of the benefits of such investments, it may still be difficult for it to persuade its collaborating partner(s) to invest. Various government sources of UK NISP funding, have to some extent, helped to cross this barrier, partly. The funding enabled the UK NISP to offer free services to members interested in participating in IS networking, but further investment may be required by collaborating partners for some projects. However, the government could withdraw the UK NISP funding anytime, which may prevent the UK NISP providing free services. Therefore, it is worth questioning whether the current approach to funding



the UK NISP is sustainable in the long term and whether the UK NISP needs to consider other ways of generating income.

Short term benefits and the reliability of long term adaptation of IS networks are important for businesses considering participation. Therefore, short term pay backs and small successes need to be "... focussed on, achieved and celebrated, while maintaining a more comprehensive and challenging long term vision" (TPD 2003: 27). Nevertheless, a new generation of products and processes might negate the benefits of an ongoing project, for example, a firm participating in a synergy may wish to reduce its waste stream, by using a new technology, but other firms may have been relying on that waste as their inputs (Gibbs 2003a). This may result in loss and disappointment for one or more actors and the possibility of them opting out of the IS network. If a business opts out of the network, it may also lose the high set up costs of any operating synergies (Kirschten 2005).

It may, therefore, be beneficial if these aspects are evaluated by the IS network coordinators before businesses embark on an IS project. It will not only assist in ensuring member commitment, but also in identifying the duration and overall benefits of the programme. This information will, in turn, help participating members to develop contracts that share the liability risk of a project and will also protect members from opportunistic behaviour of other firms. Thus, it may be useful for the development and proper functioning of IS networks, that a typical persistence factor is established, which can assist in identifying the duration of an IS project and its overall benefits.

From the above discussion it is clear that the presence of the persistence factor, which can help identify the duration and benefits of the project is essential in convincing industry to invest. It may also be important to outline an exit strategy when initiating any projects, which would offer flexibility to the collaborating partners. This allows participating companies to withdraw from the IS network if necessary. Formal or informal contracts, which include an exit strategy, should be agreed upon when initiating an IS project, as this would convince companies about the IS project's investment potential and flexibility.

### 3.2.2.3 *Involvement of employees at all levels in organisations*

Any operational and strategic decisions made must coincide with the interests of the company's various stakeholders. Thoresen (2001) suggests that the company's internal mapping should be organised by their key environmental person and that relevant personnel at different organisational levels should be involved according to their product and process knowledge and their ability to deal with change. The co-ordinating bodies' role is to ensure that "... the learning process develops according to intentions and to make practical arrangements connected to the group discussions" (Thoresen 2001: 21). If this is not the case, businesses would be reluctant to participate, as the IS approach crosses the organisational boundary and employees may resist any radical changes, resulting in the IS network being regarded as very low priority.

### 3.2.2.4 *Spatial proximity*

Physical location factors have more relevance when the companies within a network are co-located geographically, e.g. in the case of EIPs. Dunn (1995, in Carr 1998: 242) argues that "close proximity facilitates communication and information exchange among management and employees, resulting in more secure partnerships". However, "for individual firms the territorial limits and market size of an eco-industrial park are usually too small to guarantee continued existence" (Gibbs and Deutz 2007: 1693). It is therefore essential to note that the scale of symbiosis should also be taken into consideration when deciding on any IS projects. IS networks may have advantage over the EIP structure in the spatial context, as they do not restrict the development of inter-firm exchange within a pre-defined park or an industrial estate. IS networks instead scatter over a large area, perhaps contributing to more possibilities of building upon existing industrial regional networks.

The regional level, as Mirata and Emtairah (2005) argue, is given special emphasis in the development and management of IS networks because of the location and agglomeration aspects of regional economy and also since the regions provide a suitable nexus for the coordination of innovation activities for regional competitiveness and environmental protection. Maltin (2004) also emphasizes the suitability of the regional level, as regions are broad enough to accommodate the global and national strategies in the planning process and local (small) enough to implement them effectively on a local

level. Mirata and Emtairah (2005: 994) advocate that “the people who live in the vicinity feel the environmental and social implications of regional activities the most”. Thus, by developing and managing IS networks regionally there is a greater possibility that companies will be prepared to address economic development as well as environmental protection.

Another issue raised by Mangan and Groberg (1998) is that of the safe and economic transportation of by-products from its producer to its consumer. They stress that “transportation options and economics should be evaluated” (Mangan and Groberg 1998: 5) by the network co-ordinators addressing the above issue. The closer the synergy partners are, the easier and more economical it would be to transport by-products. Another advantage of geographical proximity is that it is more likely to generate high levels of trust among synergy partners (MacKinnon et al. 2002, Gibbs 2003a). This is most attractive for EIPs as companies are collocated in the same geographical area, however, it can also be argued that EIPs may not be successfully operated due to their rigid structure which reduces the flexibility of member firms.

#### *3.2.2.5 Risk and liability*

Risk and liability issues are additional factors that influence the development and management of IS networks. Kirschten (2005) argues that there are potential risks involved in the development and management of innovation networks, which is also true for IS networks. Furthermore, Kirschten (2005) questions the necessity for increased transparency between co-operating members. This situation may put members at risk as they need to disclose their trade secrets, which could be used against them if the firm does not co-operate with others.

The use of a particular type of waste, e.g. hazardous waste, as a by-product may increase the user’s liability, if they are unable to utilize the by-products because of a lack of demand for the resulting goods. If a by-product is not utilised by a recipient company, but is produced on a regular basis, it will, in turn, become waste for the recipient company and they will have to dispose of it according to regulations and incur high disposal costs (Ehrenfeld and Gertler 1997). This may deter buyers from participating in symbiotic relationships as they may become liable for waste which is not even produced by them. Similarly, as Frosch (1992) argued, a producer will be

reluctant to handover its by-product to a user company or to sell it to a waste broker if ultimate responsibility for this by-product cannot be transferred along with it. Additionally, there may also be issues in terms of the regular availability of sufficient quantity and quality of by-products. These issues may arise due to changes in the production, reduced demand or a change in the production technology, which may eventually also affect the buyer. This suggests that buyers are perhaps at a disadvantage because of the increased risk liability and reduced reliability of supplies and quality of by-products. This may discourage buyers from using by-products which is key to IS network development and therefore, may result in the failure of the IS approach.

#### *3.2.2.6 Opportunistic behaviour of firms*

If only one main provider of resources and/or services exists, others could threaten they will move to external suppliers. A similar situation would occur if one member company becomes overly dependent on another which may lead to opportunistic behaviour on the part of that company. Companies' mutual dependence can prevent opportunism. Therefore, it can be argued, that a network with an anchor tenant or consisting of various sized companies may experience opportunistic behaviour. Similarly, having champions, i.e. companies which are particularly committed to an IS network could be detrimental to the effective functioning of the IS network, as strong interest in one particular area would encourage them to only stimulate development in that particular area and the development in other areas would be ignored. Mirata (2004) presented the example of the UK's Humberside IS network, where a champion company focused specifically on identifying recipients for its by-product, which created a limited diversity of firms participating in the IS network. However, on the other hand, not having an anchor tenant or a champion may also be detrimental to a developing IS network. It would be a more attractive option for potential firms if a large organisation, which has the ability to consume or provide large quantities of by-products, is already part of the network. Thus, anchor tenants or champions may be considered important in maintaining general commitment to the network and members motivation.

#### *3.2.3 Social and organisational factors*

Organisational factors in the development of IS networks have been given priority by many authors (e.g. Heeres et al. 2004, Mirata 2005 and Starlander 2003). Some

commentators, e.g. Mirata (2005) advocate that if organisational factors are not sound, they may appear as a barrier to symbiotic relationships, even after most other favourable conditions.

### *3.2.3.1 Co-operation and collaboration*

Mangan and Groberg (1998) consider by-product synergy to be an initiative that crosses the organisational boundary for mutual benefits. Mangan and Groberg (1998: 2) argue that “by-product synergy cannot be realised without creative collaboration between those who generate and those who consume by-products”. Gibbs and Deutz (2007) consider co-operation as a key factor influencing networking and interchange activity. Kirschten (2005) argues that the possibility of sharing innovation, risks and costs in the network prompts co-operation. Gibbs and Deutz (2007: 1684) quoted that:

“By co-operating with each other in an industrial ecosystem, businesses can improve their combined environmental performance by measures that could increase profit margins and thereby potentially advance economic development”.

Due to limited co-operation between the parties, Gibbs and Deutz (2007), during their study of EIPs, found it difficult to investigate inter-firm activities; however, they discovered that “there were interactions present between businesses other than material and energy exchanges, including discussions aimed at setting up such interchanges as well as other forms of co-operative behaviour”, such as, interchange of personnel, travel to work arrangements, etc. Therefore, it may be suggested that the cooperating and collaborating behaviour of firms, may potentially open up the possibility of inter-firm linkages and therefore the development of competencies at network level. Gibbs (2003a) advocates that EID clearly depends upon co-operative and collaborative behaviour between businesses. Here, the question is raised how firms can be motivated to work towards such cooperative and collaborative behaviour to encourage inter-firm networking?

### *3.2.3.2 Motivation and willingness to participate*

The willingness of firms to participate in symbiotic relationships and develop existing relationships plays an important role. The notions of willingness, as Gibbs and Deutz

(2007: 1693) argue, "... depend upon specific organisational cultures within an area". There also seems "... to be lack of motivation on the part of private sector firms to become involved with networking and materials exchange" (Gibbs and Deutz 2007: 1690). As by-product synergies cross organisational boundaries, they may face resistance (Mangan and Groberg 1998). Project stakeholders should be motivated at all organisation levels to overcome the resistance. As well as the firms, "... public sector agencies and other relevant local actors must be willing to cooperate and commit themselves to the process" (Gibbs 2003: 229).

### *3.2.3.3 Inter-firm trust and communication*

Trust has received much prominence in IS literature (e.g. Thoresen 2001, Gibbs 2003, Starlander 2003, Gibbs and Deutz 2007, Kirschten 2005) as central factors for inter-firm networking and co-operation. The success of Kalundborg lies on the symbiotic relationship between actors, which gave rise to trust and therefore, long term professional relationships (Gibbs (2003a). Gibbs (2003a) argues that it is not easy to develop and maintain IS networks without taking relational assets, such as, trust, mental proximity, and the willingness to co-operate into consideration. Therefore the success of IS networks will perhaps depend on the measures taken in order to create these relational assets.

Trust is defined as "a type of expectation that alleviates the fear that one's exchange partner will act opportunistically" (Gulati 1995, in Starlander 2003: 26). Starlander (2003) suggests that trust may be developed if the companies had repeatedly completed successful transactions in the past, as well as through intense communication and face-to-face contact. It implies that the degree of trust may gradually become higher through intense communication and regular contact amongst individuals. "Good communication among all stakeholders – businesses, communities, and government agencies – is essential to the success of by-product synergy projects" (Mangan and Groberg 1998: 2).

Social interaction may be another way to develop inter-firm trust (Starlander 2003). Social interaction has to take place in the form of informal meetings amongst individuals from companies responsible for IS partnership development. Due to its small size, in the city of Kalundborg, regular, non-professional social activities between individuals helped the companies to develop inter-firm trust and mental proximity.

Mirata and Emtairah (2005: 1001) agree with the majority of authors about the importance of proper communication and claim that it helps to obtain “a more diverse range of parties interested in IS programmes and diversifying the possibilities for collaboration”. Therefore, formal and informal face-to-face contact between members is important for developing trust and mental proximity among actors; and it should be encouraged and facilitated by IS network co-ordinators.

#### *3.2.3.4 Organisational culture and values*

The role of individual companies’ culture and values has also been stressed as a means of ensuring the proper functioning of IS networks. Heeres et al. (2004) argue that organisational culture and values might appear as obstacles to the symbiotic relationships if a symbiotic exchange does not fit with the wider corporate culture and values of a firm. Starlander (2003) advocated that businesses are expected to take decisions on a local level to participate in IS networks, but they may not have the decision-making powers at the local level. Limited management decision-making powers at the local level in the UK NISP Humber and West Midlands regions was one of the factors obstructing the programme’s development (Mirata 2004). This was because, as Mirata (2004: 979-980) argues, most companies were part of “... national and multi-national corporations whose headquarters, where decisions pertaining the IS programme can be taken, are located elsewhere”. In these corporations, decisions on such matters are taken on a centralised basis for their corporate network as a whole rather than on a local level. Therefore, the limited decision-making powers locally (Gibbs and Deutz 2007), change of management and corporate approval (Starlander 2003) in such organisations makes it difficult for local companies to become involved in symbiotic relationships.

In addition to the top management other high-level individuals, e.g. production managers and technicians/workers should be included in discussions at early stages of planning a symbiotic relationship. Mangan and Groberg (1998: 3) argue that “from CEOs to factory floor workers, from community leaders to government regulators, all organisation levels should be involved in identifying, evaluating, and implementing projects”. Kirschten (2005) supports the involvement of actors from all stages of the value creation chain, for the joint work to be successful. Mangan and Groberg (1998: 5) also emphasized that employees at all levels should be informed and “motivated by

organisational leadership to make by-product synergy a priority using performance goals and measures, and other incentive programs”. Starlander (2003) argues that a combination of both top-down and bottom-up approaches remains central to the commitment of the companies and therefore for the success of an IS network.

#### 3.2.4 Role of co-ordinating bodies

The presence of a public body that coordinates the network is considered central by some authors (e.g. Mirata 2004, Korhonen 2004a, Deutz and Gibbs 2004, von Malmborg 2004). Its existence is unavoidable as it catalyses new interactions and also helps to sustain existing relationships in IS networks. Emphasis is placed on the advantages of having an academic institution, consultancy or a public body, or a combination of these as a co-ordination agent, rather than a private company. Private companies, although they can be more committed, might not be a good option as they may concentrate on areas of particular interest and ignore other areas that are essential for effective IS networking. Starlander (2003) and Mirata and Emtairah (2005) identified a number of co-ordinating bodies’ roles that assist in the development and management of IS networks.

##### *3.2.4.1 Introduction to the concept of industrial symbiosis*

EPA (2001) noted that knowledge gap is a significant barrier to many companies thinking of adopting IS approaches. They argue that companies are simply not aware of IS opportunities, therefore, an introduction to the concept of IS (Starlander 2003), including an awareness of existing IS practices and their benefits, should be the first and most important role of co-ordinating bodies. Businesses are usually reluctant to embark on projects that focus on environmental protection. As Tibbs (1993: 8) pointed out:

“Initially business had a hard time taking environmentalism seriously, and saw the philosophy underpinning it as passive, regressive, anti-growth, and anti-technology – an attitude that made genuine action on environmental issues almost impossible. In the terminology of strategic planning, the resulting posture was purely reactive. Any environmental action taken was largely in response to the pressure of legislation or public opinion. In its narrowly-defined desire to defend the status quo and to remain profitable, the company of yesterday restricted itself to the minimum effort necessary to ensure compliance and end-of-pipeline



cleanup. This posture was intrinsically vulnerable to unanticipated risks and unforeseen costs, and suffered from an inability to acknowledge new business opportunities being created by environmental concern.”

So industry needs to be informed that IS activities are not just concerned with environmental protection but they also create opportunities for businesses. Mirata and Emtairah (2005) claim that efforts made in the early stages of the LISP programme have been useful to programme members. A seminar with most LISP programme participants in attendance, assisted in raising the awareness of environmental challenges and the benefits of collective action. Mirata and Emtairah (2005) argue that this exercise resulted in a shared understanding and collective commitments of the participants towards common goals. It is emphasized by Trillium Planning and Development Inc.:

“... businesses, governments and communities are capable of embracing new ideas and innovating, it is up to those championing the project to communicate how these new ideas will translate into new profits, more and better jobs, and an improved environment.”(TPD 2003: 6)

Therefore, there is a need to disseminate information that introduces the IS concept and outlines the benefits of participating in IS projects, by using examples of case studies with successful transactions.

#### *3.2.4.2 Information management*

Centralising information is viewed as crucial for development of IS networks. Mirata and Emtairah (2005: 995) consider that “assistance with the identification of improvement potentials through the collection and analysis of relevant data is one of the main tasks of the co-ordinating bodies”. It would not only help in centralising information and making the system more efficient, but will also convince potential actors to participate in symbiotic relationships. Companies might have to disclose their trade secrets, which is contrary to their organisation culture, in order to engage in a symbiotic relationship, as information about material input, by-products and waste streams is essential for IS networking. Although it can be argued that IS networking or by-product exchange normally takes place between a highly diverse group of members which are seldom direct competitors, therefore sharing information should not be perceived as dangerous to any party involved (Starlander 2003). Starlander (2003)

emphasizes that companies may be reluctant to share information about their inputs and outputs; however, these companies are more willing to share this information with co-ordination agents, as it is perceived that the risk of information leakage would be much lower. The fact that co-ordinating bodies hold discussions with individual companies about the availability of resources and their needs (Starlander 2003) and provide them with detailed information about the possibilities related to their operations (Mirata and Emtairah 2005), was also found to be beneficial. This may speed up the process and also result in the reduction of transaction costs.

I would agree with Starlander (2003) and Mangan and Groberg (1998) that information regarding the availability of a by-product/resource streams and potential partners should be collected and centralised for access by any interested parties. However, communication among the partners themselves should not be undermined as future progress of IS networks is based on trust and the mental proximity of partners. Sterr (2000) suggests that IS co-ordinators should provide facilities and create high level of interaction among the IS network members. As discussed in Section 3.2.3.3, social interaction and face-to-face communication are considered vital in developing inter-firm trust and mental proximity among members which are, in-turn, key to the co-operation and collaboration in IS networks. The Kalundborg IS network is a classic example of such network development, based on informal social interaction between the individuals of organisations who led the so-called first ever IS network. Mirata and Emtairah (2005) also presented an example of LISP where interaction and communication among the participating firms were facilitated through regular meetings and seminars.

#### *3.2.4.3 Information and communication platform*

Heeres et al. (2004) argue that in order to establish symbiotic exchanges, relevant information should be given to appropriate individuals, at the right time. “Informational barriers may make it difficult to find new uses for waste products, relating to poor information regarding the potential market and potential supply” (Gibbs 2003: 228). Information on technologies and regulations are also seen as key to successful symbiotic exchanges (Sagar and Frosch 1997). Ausubel (1992: 882) points out that, “... when the economy is trying to transmit signals, or the environment is trying to transmit signals about itself, the economic and other agents are not always receiving them”. So the argument can be made that this signal transmission or information dissemination

needs to be facilitated. Since this information can aid the decision-making process in firms whether or not to participate in IS networks, it is important that the co-ordinating bodies find ways of making this information available. Co-ordinating agents, with the consent of interested parties, can collect and centralise information about potential actors and resources. The availability of an information system can ease the process, as an awareness of the available input-output resources will encourage potential members to join IS networks and to reap the potential benefits. This will not only assist in speeding up the IS network development process, but also in reducing the projects' transaction costs.

Communication between individuals from participating organisations and other stakeholders has also been given high importance for the development and effective management of IS networks. Mirata and Emtairah (2005: 997) state that:

“IS networks can provide a forum for people to explore solutions in the context of mutually shared interests. Thus, overcoming the barrier of having access to resources required for reaching or disseminating relevant information that can be beyond the reach of both suppliers and users.”

Furthermore, the availability of a communication platform for the actors, which aids formal and social interaction is also necessary in order to manage IS appropriately as discussed in the preceding sections of this Chapter. This will not only develop trust and mental proximity, but will also maintain stability of interactions.

Mirata and Emtairah (2005) consider stability of interactions to be central to the development and management of IS programmes. They believe that the number and nature of symbiotic relationships depends on the needs and capacities of local/regional companies and these are likely to increase due to the greater number of companies and more diversity. Therefore, one of the key roles of an IS network co-ordinator is to provide network-specific communication instruments/tools to support interaction between diverse participants (Kirschten 2005).

Development and proper management of an effective information and communication platform is considered vital by many authors (Kirschten 2005, Sterr and Ott 2004, Mirata 2005) for the success of IS networks. Kirschten (2005: 142) claims that “such information and communication platforms would make it easier to find suitable

potential network partners”. Thus, it may be suggested that the development and management of an information and communication platform should be one of the major roles of the co-ordinating bodies.

### 3.2.5 Stakeholder involvement

#### *3.2.5.1 Involvement of public agencies*

There are very rare examples of industrial symbiosis networks being developed without policy intervention. However, Gibbs and Deutz (2007: 1692) argue that collaborative behaviour between firms is central to EID, but “such behaviour is difficult to develop from scratch through policy intervention”. Korhonen et al. (2004) suggest that local authorities could provide managerial, informational, infrastructural and political support. “Thus policy intervention can play an enabling role in helping to identify EID opportunities and creating the appropriate conditions for inter-firm networking to take place” (Gibbs and Deutz 2007: 1692). The ways in which various government bodies and other institutions can contribute towards an enabling context for industrial symbiosis network development is discussed below.

Central government has a key role to play in contributing towards an enabling context for an industrial symbiosis network. This role may include funding support, as well as the implementation of a mix of a regulatory, market and voluntary instruments to encourage IS network development (Gibbs 2003).

Involvement of other public bodies such as regional economic development agencies would also be beneficial for IS network development and management (Mirata 2005, Gibbs 2003). IS network facilitators, as well satisfying their own agenda, may also assist public bodies in achieving their objectives. This may enable public bodies to commit to an IS approach. On the other hand, these public bodies would have pre-existing institutional networks on which IS networks could be built (Starlander 2003). Additionally, there is the possibility of securing additional IS project funding from some public bodies (e.g. economic development agencies) if the outcomes of the IS project contribute to the goals of these public bodies. The involvement of these public bodies can also add to the credibility of both the IS networks and the co-ordinating body when

communicating with regional businesses and other stakeholders, and there is also the possibility of public bodies acting as co-ordination agents (Starlander 2003).

Some authors (Lowe 1997, Korhonen 2001, von Malmberg 2004, Gibbs 2003, Korhonen et al. 2004), stressed the central role local authorities play in the EID. Local authorities could contribute by offering managerial and political support, providing informational services and infrastructural support, acting as network brokers and anchor tenants (Korhonen 2004 et al.), participating in resource exchange and encouraging inter-firm co-operation (Gibbs 2003). In most cases of EID studied, (e.g. by von Malmberg 2004, Deutz and Gibbs 2004), involvement of local authorities was found to be important. However, it is essential to note that most successful projects were led by a particular unit, i.e. local economic or business development and not the unit for environmental protection (Korhonen et al. 2004). This may suggest that businesses are prepared to explore opportunities for their economic development and not for environmental protection, and that is one of the main motivations for participating in IS networks.

#### *3.2.5.2 Pre-existing institutional platforms and linkages*

Pre-existing links among companies are often the crucial deciding factor in encouraging companies to co-operate (Gibbs and Deutz 2007). It is considered difficult to develop and maintain an IS network when it is not built on a pre-existing platform. The involvement of Midlands Environmental Business Communications (MEBC; a regional environmental business association) as a co-ordinating body for the UK NISP West Midlands programme contributed to a large extent, to the development of the IS network, due to their extensive network and diverse industry actors (Mirata 2004). An important factor contributing to the success of IS networks appears to be the identification of institutional platforms that existed prior to the development of the IS network. Building an IS network on the pre-existing platform will create a sense of community amongst the actors and a high degree of trust and mental proximity. Kalundborg's IS network is an excellent example of companies having a pre-existing sense of community and therefore, a high degree of trust and mental proximity. Thus, pre-existing networks may be very useful in encouraging the development of inter-firm networking, due to a potentially high degree of trust and mental proximity pre-existing between the network firms.

It should also be taken into consideration that a successful IS approach in one particular region cannot be transferred elsewhere without first identifying the institutional platforms in the new region. It is highly probable that institutional platforms may already exist in the new region and failing to recognise them and utilising an approach that has been successful in other regions may result in the failure of the IS network in the new region. Building on existing strength, when attempting to develop new EID projects, is considered more effective (Korhonen 2002, Gibbs 2003). Kirschten (2005) also argues that such networks can only be economically successful if they provide a realistic alternative to existing solutions and can also be linked up with pre-existing structures. Therefore, pre-existing links are often seen as a crucial deciding factor for EID (Gibbs and Deutz 2005); the unavailability of these links in a region might also explain the failure of an IS network.

#### *3.2.5.3 Technical experts*

Is it technically feasible to convert the by-product to a resource? Heeres et al. (2004) addressed technical feasibility as a barrier to EID and identified when it is technically unfeasible to establish symbiotic exchange. It has been pointed out that ‘resources are not, they become’ (DeGregori 1987, in Desrochers 2002: 1042), “most notably through technical innovation” (Desrochers 2002: 1042). Mangan and Groberg (1998) suggested the involvement of technical experts from the onset to the end of a project, which would encourage innovation and evaluation of all technical options. Again the co-ordinating bodies are responsible for appointing a team of technical experts who can explore any technical innovation possibilities in order to find ways of utilising a by-product and to evaluate its feasibility of generating for financial and ecological benefits.

#### *3.2.5.4 Regulators/policymakers*

Ausubel (1992) points out the importance of incentive structures, including rewards and penalties, for individuals and organisations. Gibbs and Deutz (2007) have identified environmental legislation as a driving force in the development of IS networks in the UK. Escalating landfill tax and a landfill ban for some wastes, as well as the impact of the Climate Change Levy (Mirata 2004), i.e. a scheme that provides incentives to firms for reducing their energy usage, have actually made IS economically viable.

On the other hand, regulations that do not allow the exchange, transportation or storage of by-products that can be reused, are considered by many authors (e.g. Heeres et al. 2004, Gibbs and Deutz 2007, Starlander 2003), as a huge barrier to symbiotic exchanges. In a research conducted by Sagar and Frosch (1997), the majority of the participants expressed some level of frustration with regulatory agencies. Frosch (1992: 802) has been very specific about the inappropriateness of some of the regulations that interfere with the implementation of sensible solutions and he wrote:

“We have all heard tales of possible uses of hazardous waste materials as inputs to other processes that were impossible to realize because the would-be user and would-be supplier could not solve the problem of getting transportation permits to get the material from the place where it was generated to the place where it could be used. This seems rather foolish, since a transportation permit to some place is likely to be required for either destruction or disposal. Refusal to permit transport results in generating a hazardous waste-transportation problem and a hazardous waste-disposal problem, instead of generating only a hazardous waste-transport problem, with disposal of the material being an economical input to an industrial process. This is not an argument for no regulation of hazardous or troublesome materials but rather is an argument for regulation appropriate to the problem: regulation that will encourage reuse and recycling in an industrial ecology rather than regulation that turns out to interfere with sensible solutions. An industrial ecology point of view will require that we rethink how we want to regulate waste materials of all kinds.”

IS cannot be practised without easing these waste handling regulations. Kirschten (2005: 142) advocates that:

“Greater flexibility in the arrangement, treatment and alteration of existing legal and technical regulations would support the accomplishment of co-operation....”

Mangan and Groberg (1998) argue that regulatory experts should be involved in the evaluation of projects and if there are any issues – there should be communication or collaboration with the legislators and government agencies to achieve regulatory relief to proceed with the project. In order to deal with these problems, it is therefore

important that legislators and other government agencies become involved in the evaluation phase of IS projects to be able to identify issues that are vital for the development of IS networks. Frosch (1992: 803) advises that “legislators, policymakers and regulators need to start thinking about the system problems and need to stop thinking about the problem of the month”. Frosch (1992: 803) also argues that “we can not continue to regulate this system while ignoring its system aspect”.

### 3.2.6 Networking, learning and innovation

Inter-firm networking is the basis for the development of the IS concept. Wallner (1999, in Gibbs 2003: 230) argued that in IS, “it is not the single element of the production system, the company, that is the subject of analysis, but the network of region-wide settled enterprises”. Diversity of actors plays a crucial role in maintaining the co-operation and stability of the network. The diversity of actors in an industrial ecosystem is compared to that of natural ecosystem by Korhonen (2005a). Korhonen (2005a: 9) argues that “when certain species depart (or die), the system is able to recover and adapt through diversity in the species, organisms and in their genetic variance and information.” This can be equally true in the case of IS networks, if anything changes diversity may help it recover. The availability of diverse industry sectors may allow adjustment to the demanding resource (input-output) needs of the network and therefore maintain co-operation and stability. Diversity of industry sectors can also promote innovation in areas such as, identification of new markets, alternative funding sources, new unique business alliances, etc. However, it should not be forgotten that “diversity in the actors involved in cultural or economic systems leads into diversity of interests, preferences and values, which can be conflicting” (Korhonen 2005a: 10). Korhonen (2005a), therefore, argues that the use of diversity to achieve interdependency, co-operation, adaptation or stability between the actors involved, may not be as easy as it is in the natural ecosystem setting.

Gibbs and Deutz (2007: 1689) argues that through interaction and co-working, encouraged by EID, it would be possible “... to develop the types of institutional learning processes and stimulate culture change associated with sustainable development” that will encourage firms to “... learn about appropriate behaviour and alter their own behaviour and actions”. Kirschten (2005) holds the similar view that co-operation and collaboration among the members open up the possibility of mutual



learning about innovations in their relative fields and the development of competencies at the network level.

Regions are being given increasing importance in the IS networking context, as certain types of information and knowledge exchange takes place more effectively on a regional level (Mirata and Emtairah 2005). This may, therefore, provide more opportunities for learning and development. As companies may not be accustomed to networking and might not have the necessary skills to develop and manage such relationships, emphasis should be given to learning specific networking skills, which are essential for managing IS networks (Starlander 2003). For example, “some innovations remain confined to the sectors in which they were originally developed and do not diffuse to others where they could provide considerable benefits” (Mirata and Emtairah 2005: 997). Mirata and Emtairah (2005) argue that IS networks, through their emphasis on inter-sectoral transactions, can help to overcome this difficulty. This echoes the diversity principle of IS presented by Korhonen et al. (2004) in Chapter Two. Mirata and Emtairah (2005) suggest that IS networks will provide industry with the opportunity to shift their focus from sectoral innovation activities and to look for new solutions at the inter-sectoral interface, which may stimulate the exploration of innovative solutions through inter-organisational interactions. “Inter-organisational concepts can result in considerable cost savings and environmental benefits when compared to the optimal strategies implemented independently by the individual companies” (Fichtner et al. 2005: 73).

Mirata and Emtairah (2005: 1000) noted that inter-organisational interaction not only assists in implementing identified solutions, but also contributes to learning in various forms. They utilised the single and double loop learning concept of Argyris (1997, in Mirata and Emtairah 2005), who defined single loop learning as a detection and correction of a mismatch without changing the underlying values and status quo that govern the behaviour; double loop learning was defined as the detection and correction of a mismatch, by first changing the underlying values and other features of status quo. Mirata and Emtairah (2005: 1000) claim that “the learning that has been taking place until now was dominantly single loop learning”. Nevertheless, it was pointed out that attempts were made by LISP co-ordinators to initiate a double loop learning process in the final stages of the programme’s period through a future vision workshop for the beneficiaries, and these beneficiaries showed great interest in testing new ideas (Mirata

and Emtairah 2005). Thus double loop learning appears to be a step forward for businesses in changing the way they work and this may be possible with the increased inter-organisational interaction found in IS networks.

Kirschten (2005) also argues that some members may co-operate by merely acting as supplier or consumers of a by-product which incurs certain dependencies and reduces the flexibility of a firm. Joining the network not only reduces the firm's flexibility, but may also limit innovation for a long term co-operation in the network. This, in turn, may result in companies deciding not to participate in symbiotic relationships. Boons and Berends (2001), on the other hand, see networks as loosely coupled systems that play an important role in preserving flexibility. They also claim that this flexibility can be developed by recruiting diverse participants in the network, and thus, the increased possibility of taking various perspectives into account. These various perspectives, in turn, assist in generating innovative ideas, which increase the opportunities for innovation and inter-firm learning.

### **3.3 Concluding summary**

This Chapter analyses critical factors that are central to the development of IS networks and contribute to an understanding of how IS networks can be developed and managed effectively. Within the scope of this thesis, the focus would be to explore the management and organisational design of the UK NISP and its effectiveness in the management and organisational design employed by the UK NISP in the development and management of a large scale IS network.

Having reviewed the literature in relevant areas of the study, the thesis will now turn to the empirical work of the study. The next Chapter describes and justifies the methodology and the methods employed in conducting this study.

## **CHAPTER FOUR: METHODOLOGY**

Chapter Four describes the methodology used for this study and also provides information concerning the research context. Although an introduction of the methodology employed is given in Section 1.3 of Chapter One, this Chapter aims to build on this and to offer assurance that appropriate procedures were used when conducting this research.

Undertaking research involves a number of linked activities from identifying research questions, research design, analysis and interpretation through to conclusions and the acknowledgement of the research limitations. Researchers select their own research design based on their experiences and the needs of the particular research project and the majority tend to initially choose between qualitative or quantitative research, without actually considering the philosophical issues that might seriously affect the quality of research outcomes. This Chapter will outline the research design adopted and provide a justification of why this particular approach was unavoidable when conducting this study.

The Chapter includes a discussion on the following: research background; nature of the research design; whether the study was conducted as a snapshot or a longitudinal study; whether the research was new or was built on an existing study; the selection of research methods used, and it is justified on the following: (1) philosophical issues around the research design; (2) research methods that have been previously used in this area of study; and, (3) methods that enable the questions set out in this study to be answered; the sampling strategy; data collection techniques; tools and techniques used for data management; data analysis and interpretation; and, reporting the findings.

### **4.1 Research background**

A number of different options were taken into consideration when choosing this project. Given my interest in the field of IE, the ecological modernisation agenda of the UK government and the innovative policy and the ideas on which the UK NISP was based, there appeared to be a huge potential for understanding and exploring the UK NISP and its policy context as it is a unique Business Environmental Support Programme and the only IS initiative in the world to be launched on a national level. More specifically, the

research project arose from a gap identified during an extensive literature review conducted in the field of IE and EID, extended discussions with a number of the UK NISP senior executives, and participation in a series of IE workshops and conferences around the world.

There was some initial resistance from UK NISP executives when trying to convince them to agree on the proposed study and allow full access to the UK NISP key stakeholders, including employees and members. However, on realising the importance of the study and the benefits arising from the findings, the UK NISP executives finally expressed their interest in supporting the study. As a result, the UK NISP agreed to fully support this doctoral study and to act as an industrial collaborating body. In practical terms, the support included: (1) direct access to the UK NISP senior personnel and company network partners; (2) attendance at the UK NISP regional co-ordinators' meetings and other relevant events; and, (3) assistance when undertaking fieldwork. Having obtained full access to the UK NISP network, it was appropriate to set boundaries for the research study.

The broad aim of this study is to explore and understand the UK NISP's place in the 'green' market strategy of the UK government and the management and organisational design employed by the UK NISP in establishing and managing a nation-wide IS network, using the experiences of a range of the UK NISP stakeholders. The UK NISP, a UK business environmental support programme, operates in nine regions of England and in three devolved administrations: Scotland, Wales and Northern Ireland (NI). All nine regions of England and the three devolved administrations are referred to as regions throughout the thesis for two reasons: (1) the geographical size and population of devolved administrations are similar to that of English regions; and, (2) to assist the writing process and to avoid repetition of words to maintain interest. However, the different political context of each devolved administration has been accounted for where necessary, and the term 'devolved administration' has been used where necessary to distinguish devolved administrations from the English regions. The majority of the potential participants of the research study were located around the UK, as the UK NISP is a national programme and it is delivered regionally. Therefore, the research was conducted on the UK level (to include all English regions and all devolved administrations) to cover the policy context, as well as the management and organisational design employed by the UK NISP.

The specific research questions addressed to realise the aim(s) of the study were:

- (1) Why was the UK NISP adopted by the UK government as one of the key instruments of their 'green' market strategy?
- (2) What are the key barriers to the effective use of the UK NISP as a key instrument within the UK government's 'green' market strategy?
- (3) How crucial is the organizational design employed by the UK NISP in establishing and managing a large scale IS network?

In order to address the research questions in depth, the study was divided into two phases. A total of twenty-eight interviews were conducted with research participants, sixteen in Phase One and twelve in for Phase Two. Participants included policy and regulating officers, national and regional government representatives, civil servants, NGO representatives, representatives from trade organisations, the UK NISP executives, representatives from the UK NISP key stakeholder organisations, and the UK NISP regional co-ordinators and practitioners. More information about the participants is presented in Table 4.2 for Phase One and Table 4.3 for Phase Two. The details on the selection of participants are outlined in Section 4.4. Having set the research background into context, I now turn to the main approach used for the research design.

## **4.2 Selection of research method(s)**

There are a number of ways in which the selection of research method is justified by research studies. This is based on my understanding of the following: (1) the philosophical issues around research design; (2) research methods utilised in the past in this area of study; and, (3) and the need of particular method(s) which are unavoidable in realising the research aims and objectives addressed in this research study.

### **4.2.1 Philosophical issues around research design (research strategy)**

Most researchers (e.g. Easterby-smith et al. 2002) contend that ignoring the philosophical considerations during the process of research design can seriously affect research quality. To address this issue and to make an informed decision on the research

method(s), two historical research paradigms within the social science research were compared: positivism and interpretivism (Denscombe 2002). Considering the ontological and epistemological assumptions, in relation to each of the approaches, was believed to be important.

With regard to ontological considerations, positivism relies on the cause and effect, similar to the natural world, which may exist quite independently of the people’s belief (Denscombe 2002); whereas, in an interpretivism paradigm, the meaning is given by people (Easterby-Smith et al. 2002). It is both the phenomena and the related context, as it is understood by the people, which are significantly important for this study, thus suggesting the adoption of an interpretative approach. With regard to epistemological considerations, the positivist paradigm relies on observation and measurement; whereas, in an interpretative paradigm, reality is determined by the people and needs to be interpreted (Easterby-smith et al. 2002). People’s experiences of phenomena and their interpretation are key in addressing the research questions, which is also possible using interpretative approaches. By taking into consideration both the ontological and epistemological assumptions, it is clear that the interpretative paradigm holds stronger ground than positivist paradigm, with regard to the research questions addressed.

In addition, both approaches have strengths and weaknesses that influence the outcomes of any research. A summary of the strengths and weaknesses of both approaches are presented in the Table 4.1:

**Table 4.1: Strengths and weaknesses of positivism and interpretivism approaches**

	<b>Strengths</b>	<b>Weaknesses</b>
<b>Positivism</b>	<ul style="list-style-type: none"> <li>• Wide coverage of the range of situations</li> <li>• Fast and economical</li> </ul>	<ul style="list-style-type: none"> <li>• Inflexible and artificial</li> <li>• Not effective in understanding Processes</li> </ul>
<b>Interpretivism</b>	<ul style="list-style-type: none"> <li>• Ability to understand people’s meaning</li> <li>• Adjust to new ideas/issues as they emerge</li> </ul>	<ul style="list-style-type: none"> <li>• Needs great deal of time and resource</li> <li>• Difficult analysis and interpretation</li> <li>• Difficult to control pace, progress and endpoint</li> </ul>

Source: Adapted from Easterby-Smith et al. (2002)

Since this study is exploratory in nature, the flexibility to adjust, as new ideas/issues emerge is significantly important. Based on the strengths and weaknesses of each of the approaches, it is very clear that the interpretivist approach, although considered difficult

when compared to the positivist approach, has the ability to address the research questions effectively.

In my view philosophy is the starting point, as it allows an understanding of the approaches that have been traditionally used, as well as their limitations and advantages. Taking philosophical issues into consideration from the onset of the research project has indeed provided ideas for brainstorming, facilitating decisions made on the research design. The interpretivist approach appeared to dominate the positivist approach in the context of this study due to: (1) the need to cover the contextual conditions; (2) the need for a human centred approach to capture the experiences of people; and, (3) the need for the flexibility it could provide.

#### 4.2.2 Research methods utilised in the past in this field of study

Literature available in the area of EID and IS clearly demonstrates that research has been undertaken in this area. In the past, research on IS has mainly been conducted to cover three general aspects: (1) the study of potential opportunities/synergies when using the concept of IS; (2) evaluation of the outputs occurring from IS initiatives; and, (3) uncovering unknown IS projects in different parts of the world. Additionally, many research studies have focused on the UK IS initiatives including: sustainable development through inter-company collaboration (MISP 2004), drivers and barriers to industrial ecology in the UK (Harris 2004), effectiveness of the facilitated IS approach (Mirata 2005), governance, partnership and sustainable industrial development (Proctor 2005), roles and actions of an institutional entrepreneur fostering inter-organisational practices (Paquin 2008), and social dimensions of IS (Domenech 2010). However, limited research efforts are evident in exploring and understanding two key areas as discussed in Chapter One, Section 1.1: (1) policy intervention at the UK-wide level in the development and management of the UK NISP; and, (2) the management and organisational design employed by the UK NISP, which may have enabled the successful development and management of the world's first IS network at national level. This research study will address this gap. The past studies related to the UK NISP have been reviewed to evaluate their methodological approaches and these methodological approaches are appraised in the context of this study.

For the launch of a study conducted by MISP (2004) regarding identifying potential synergies, based on industrial symbiosis principles, thirty-four representatives from different size companies from various sectors were invited to participate in a workshop. Twenty-three of these representatives agreed to participate in the project. Data were collected via a questionnaire that explored the operations of companies in terms of their inputs, outputs, infrastructure, operational facilities, service capabilities and expertise. This appeared to be an appropriate approach for that study as the anticipated data were wholly quantitative about the company's inputs, outputs and company's other resources and did not require a huge amount of detail until a potential synergy was seen to be emerging. That particular study was not designed to provide an in-depth understanding of the context or the experiences of key stakeholders in the IS networks' development and management, which is the case with this research. In addition, the use of a questionnaire in this study would make it difficult to maintain the flow of feelings and perspectives of individuals, which would not arise when interviewing the research participants in a face to face situation. Therefore, the use of the survey questionnaire was considered unsuitable for this study.

The study conducted by Harris (2004) examined the influence of the drivers and barriers on the implementation of the IS concept in the UK. Harris's (2004) study aimed to establish the extent to which IS was implemented in the UK and the impact of legislation, regulations, economic incentives, as well as that of the participating companies' organisational structure and culture on the implementation of the IS concept. In contrast to MISP (2004), Harris (2004) adopted qualitative methods and action research to gather data from businesses in Scotland and used semi-structured interviews as the main data collection technique. In order to offer a greater insight and capture the experiences and opinions of key stakeholders, this study adopted a similar qualitative approach to that used by Harris (2004), but not the action research. This is because action research particularly suited Harris's (2004) study since the IS initiatives' development was at an early stage in Scotland and fieldwork undertaken for his study covered a smaller geographical area, unlike this research which focused on a fully developed national IS initiative and covered the whole UK.

Another research study was undertaken by Mirata (2005) to develop and promote a uniform methodology to create synergistic linkages to assist with the development of a regional IS initiative. The methodology included: identifying key parties (businesses),



introducing them to the IS initiative and gaining their commitment to participate. Unlike MISP (2004) that relied only on quantitative data, both qualitative and quantitative data were collected by (Mirata 2005), through the use of a specifically designed information database. Data included inputs and outputs, utilities and logistics, infrastructure, human and information resources. This method covered a broad area in terms of resources, inputs and outputs as well as hard and soft issues, using both the qualitative and quantitative approaches. That approach was most suitable for that particular study as it was designed to identify potential members and synergies. However, this study is concerned with exploring the experiences of the key stakeholders of the UK NISP and not the quantitative outcomes of the UK NISP activities. This required consideration of the context of their experiences and a human centred approach to methodology; which supports the use of qualitative methodology here.

Of particular importance to this study, is the work of Proctor (2005) who focused on the impact of regional policy context on the UK eco-industrial development initiatives being developed at the time of her study. Proctor (2005) used the qualitative method approach to undertake empirical work that included conducting semi-structured interviews, covering three economic regions with a variety of nine EID projects. This study employed a similar methodological approach to that of Proctor (2005), although there are differences that are worth mentioning. These include: (1) Proctor (2005) focused on the regional context, whereas this study focused on both the national and regional context; (2) Proctor (2005) studied different types of EID, whereas this study focused on one particular EID; (3) Proctor's (2005) study comprised of nine case study projects, whereas this study is an individual case; and, (4) Proctor (2005) undertook empirical work in three regions, whereas this study undertook empirical work in all regions across the UK. Nevertheless, the method adopted in this study is similar to that of Proctor (2005), in the sense that both these studies required a human centred approach to capture the context and the phenomena, including the experiences and opinions of the participants.

Paquin (2008) studied the UK NISP actions, as an institutional entrepreneur, to support the process of emergence and diffusion of inter-firm practices. He adopted the qualitative method and used various data collection techniques, such as, interviews, observations of NISP events and archival documents, which suited this study as it required understanding the actions of the UK NISP in the emergence and diffusion of

inter-firm practices. This study, although it utilised observations of NISP events and study of archival documents for a better insight, also used interviews as the main data collection technique. Paquin's (2008) study focused on four regions which made it feasible for him to adopt a longitudinal approach, capturing data at various time intervals. In addition to qualitative methods, this study would have also benefitted from using a longitudinal approach, however, due to resource and time constraints attached in conducting a UK-wide study this was not possible.

More recently, Domenech (2010) conducted a study which was aimed primarily at understanding the social dimension of the IS networks' emergence and development. In this case, Domenech (2010) adopted grounded theory as the most appropriate methodological approach for the exploratory nature of her study, which focused on comparing and contrasting the IS network methodology in three European countries, including the UK. Domenech (2010) predominantly focused on understanding the social dimension of IS networks. She employed the social network theory which was appropriate for examining the relationships between the actors which contributed towards an understanding of the social dimension of IS networks. However, her study failed to take into consideration the involvement of private sector organisations in delivering the UK NISP in various regions, which may have further added to the understanding of the social dimension of IS networks. Apart from the use of the same UK NISP case, Domenech's study was considerably different in its focus to that of this study, and thus the methodology adopted by her was only suitable for this study, to the extent that the choice of methodology was qualitative and adopted a semi-structured interview approach.

Following the review of the past research methods where the qualitative approach is dominant, this study employed qualitative methods, as supported by the interpretative strand, to ensure that all relevant stakeholders' views and their experiences of the development and management of IS initiatives were taken into consideration, rather than focusing on quantitative outputs. There were no existing frameworks available that might have perfectly suited the context of this study. However, a review of research methodologies used in the earlier studies was useful gaining an insight into developing an appropriate methodology to suit this study. This led to the possibility of using a qualitative method to cover the different perspectives in depth. However, it was also

considered important that the suitability of the proposed method is discussed in conjunction with the research questions to be addressed.

#### 4.2.3 Justification of research methods based on the research questions

Denscombe (2002) contends that the research objectives should drive methodology, rather than the ontological and epistemological stance of what the social world is like and the fundamental principles by which we can come to understand it. There is an ongoing debate on the appropriateness of the approaches in social science research. Denscombe (2002) argues that no single approach is perfect and that the social researchers should move to a more pragmatic approach that would not adhere to a positivist or interpretivist epistemology, but would address the topic being investigated. Similar views are shared by Mason (2002) and Clough and Nutbrown (2007), who support the notion that research methodology is not about finding a philosophical stand, but rather identifying an appropriate approach to address the research questions. “A characteristic purpose of a methodology is not to show, how such and such appeared to be the best method available for the given purposes of the study, but how and why this method was unavoidable – as required by - the context and purpose of this particular enquiry” (Clough and Nutbrown 2007: 19)

Following on from the discussion on the philosophical issues, it was evident that a qualitative approach is most suited for this research project. As the main aim of the research is to understand and explore the processes involved in the development and management of the UK NISP, using the experiences of a range of UK NISP stakeholders, it would be difficult to measure these using quantitative approaches. The focus of the project would remain on the individuals’ experiences of the UK NISP processes, rather than quantifying material outputs. The qualitative approach would provide the appropriate techniques to capture their experiences and the possibility of interpreting the collected information, using the human brain, unlike the quantitative approach which is rather inflexible. Having said that, there are a few occasions when secondary quantitative data has been utilised in this study to support findings arising from the study. In order to justify why conducting qualitative research was unavoidable, it would be useful to discuss the need for qualitative methods in this particular study, in relation to its research aims and objectives.

Phase One explored the UK NISP's policy context; with a view to understanding the UK NISP's place in the UK government's 'green' market strategy, using ecological modernisation as a theoretical lens. There has been limited work undertaken in this area in the past and therefore, it was not possible to evaluate any previous research methodologies used in similar research. Given the lack of research in this specific area, it is necessary to assess whether policy and regulatory context plays any role in the development of a large scale/nation-wide IS network. Moreover, with limited number of possible participants, it was difficult to consider a quantitative design. Notwithstanding this, in order to explore the policy context of the UK NISP and to understand the UK NISP's place in the UK government's 'green' market strategy, it required a person centred approach. Qualitative methods offer a person centred approach through the use of a number of techniques to gather rich data.

Phase Two critically appraised the management and organisational design employed by the UK NISP. Since the UK NISP is a national programme, delivered regionally, it was crucial to take the national leadership and management aspects, as well as the regional delivery (including different contexts of the regions) into consideration, in order to gain a holistic understanding of the management and organisational design employed by the UK NISP. This was again a matter of a person centred approach. The qualitative design, therefore, was unavoidable if a good understanding of the management and organisational design employed by the UK NISP was to be had.

### **4.3 Research design**

The case study approach was adopted for this research. A case study is seen as either a choice of object to be studied (Stake 1995), or as a research strategy (Yin 1994). When considering Stake's (1995) views, the UK NISP has been identified as a case 'object to be studied' as it satisfies the criteria of being specific, unique and a bounded system. It is my interest and intention to explore and understand the complexities of this particular case in a manner which is described as an intrinsic case study by Stake (1995).

In contrast, Yin's (1994) approach to define the term 'case study' as a strategy/methodology also fits within the context of this research. Given the nature of this research enquiry to study the phenomena, its context and the need to use multiple

sources of information, a case study design appeared to be unavoidable. According to Yin (1994: 13),

“... a case study is an empirical enquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomena and context are not clearly evident.”

After conducting an extensive literature review in the field of EID and after initial interaction with the UK NISP stakeholders, it was clear that the context of the UK NISP phenomena is highly significant. As Yin (1994) suggests, using a case study would be appropriate if it is the researcher's wish to deliberately consider the contextual conditions. Given the scope of the study and in order to fully cover the phenomena and the contextual conditions, it was considered inevitable that the data were collected from multiple sources. Yin (1994) suggests that a case study enquiry relies on multiple sources of evidence, which further justified the case study design for this study. Within Yin's (1994) classification of the types of case studies: exploratory, descriptive and explanatory, this study appeared to be predominantly exploratory in the light of the research questions being addressed.

As this study is concerned with issues related to development and management of the UK NISP, it was vital to collect data at various time intervals. However, collecting data in this manner was not feasible because of time and resource constraints. It was, therefore, decided to take a snapshot of the situations rather than adopting a longitudinal approach to conduct this study. However, this did not restrict me gaining access to: the UK NISP events; secondary data, e.g. books, theses, articles, newspapers, documentary evidence from the UK NISP; and, the people involved in the different stages of the UK NISP processes to enable systematic representation of that time.

It would be appropriate to state at this stage that this kind of specific approach to explore and understand a business environmental support programme (BESP), such as the UK NISP, with regard to its processes, does not appear to have been adopted in the past. Literature reviewed in the areas of IE, EID, environmental policy and ecological modernisation did not provide any readily available frameworks that might have perfectly fit the context of this research. Although, initially, it was designed to be a deductive approach, it grew inductively once the literature review was conducted. The main reason for this was the limited research in this area. As a result, the development

of - and use of any existing - frameworks to conduct this study appeared to be very difficult. So the study was designed in a way to allow theory to emerge from the inductive process. However, the argument by Zina O'Leary (2004) is not supportive of a clear cut distinction between the two approaches. According to her, research design might move between deductive and inductive approaches. This is because when theories began to emerge from the interpreted themes from raw data, the study tended to move towards a process of confirmation of findings, using the theories identified at earlier stages. This resulted in a design that moved from deductive to inductive and inductive to deductive at various stages of the research study.

#### **4.4 Sampling**

Sampling techniques used for the purpose of selecting appropriate participants varied in both phases of the research project. The two main types of sampling: random (probability) and purposive (non-random or non-probability) sampling have been discussed in most literature (e.g. Zina O'Leary 2004). Given the needs of the study and the make-up of the population, purposive sampling approaches have been adopted for both phases of the research project. The justification for choosing the sampling techniques is discussed below:

Focus was placed on two types of sampling in Phase One: Purposive and snowballing. Purposive sampling, as described by Denscombe (2007), is used in situations where the researcher already knows something about the specific people or events and makes deliberate choices because they are seen being likely to produce the most valuable data. In addition to purposive sampling, snowballing sampling was also adopted to identify more individuals through those being interviewed. This provided the possibility of including other important individuals who were not included in the initial stages. Snowballing also helped me to use the nominator as reference to be able to approach new individuals with some credibility. Participants in this phase included regulating and policy officers, civil servants, representatives from NGOs and trade organisations, Government Advisory Group members, representatives from the economic development agencies, academics, and executives from the UK NISP and other partner organisations. The majority of participants in Phase One were located in England for the following reasons: (1) Policy/legislation powers held centrally in England in certain areas; (2) In England, there was a structured action plan/programme to fund BESPs, unlike other

countries in the UK; (3) the UK NISP started off at regional level in England; (4) the UK NISP received a backup for national launch initially in England; and, (5) the UK NISP headquarters are located in England. However, the UK NISP's existence in the devolved administrations was not ignored. Representatives of most organisations involved in the decision-making, in relation to funding and supporting the UK NISP in each of the UK countries, participated in Phase One. The information regarding the research participants in Phase One is presented in Table 4.2, which includes the position/level of research participants, the type of organisation to which they belong, the country in which these organisations are located, and the specific role of research participants, with regard to the UK NISP:

**Table 4.2: Summary of research participants for Phase One**

<b>Research participants</b>	<b>Position of research participants</b>	<b>Type of organisation</b>	<b>Country</b>	<b>Role of research participants</b>
PIR01	Policy Advisor	TO*	England	Advisory
PIR02	Executive	NGO	England	Advisory
PIR03	Civil Servant	Government	England	Decision-making
PIR04	Executive	Regulator	England/Wales	Delivery/Advisory
PIR05	Executive	NGO	England	Advisory
PIR06	Executive	TO*	England	Advisory
PIR07	Executive	EDA**	Northern Ireland	Decision-making
PIR08	Executive	Technology support	England	Delivery
PIR09	Managerial	UK NISP	England	Delivery
PIR10	Executive	UK NISP	England	Delivery
PIR11	Executive	UK NISP/Academia	England	Delivery
PIR12	Executive	EDA**	England	Delivery/Advisory
PIR13	Executive	EDA**	Scotland	Decision-making
PIR14	Managerial	Regulator	Scotland	Decision-making
PIR15	Civil Servant	Government	Scotland	Decision-making
PIR16	Civil Servant	Government	Wales	Decision-making

Source: Author generated

\* - Trade Organisation; \*\* - Economic Development Agency

In Phase Two purposive sampling was used for understanding the management and organisational design employed by the UK NISP. Since the UK NISP was delivered regionally, it was important to include all the UK NISP regional co-ordinators or practitioners (in regional co-ordinators' absence) from the respective regions and the manager of the National Practitioners' Team (NPT). NPT was a significant addition to the regional delivery of the UK NISP. It appears to have allowed the UK NISP to identify and coordinate the projects of large companies, which have operations in various parts of the UK, by dealing with them centrally (nationally) instead of approaching them in individual regions. Co-ordinators of the UK NISP in all English

regions and all devolved administrations (with an exception of Northern Ireland where the programme was due to be launched), as well as the NPT manager were included to gain a wider understanding of the management and regional context of the UK NISP delivery. Although it involved considerable cost and time to interview individuals in every region around the UK, it appeared to be the best approach in order to understand how the programme was being managed nationally as well as regionally. The information regarding the research participants in Phase Two is presented in Table 4.3, which includes their position at the UK NISP, region/territory they manage and the managing organisation to which they belong:

**Table 4.3: Summary of research participants for Phase Two**

<b>Research participants' Code</b>	<b>Territory Cover</b>	<b>Managing Organisation</b>
P2R01	East Midlands	Scott Wilson Group plc
P2R02	East of England	Scott Wilson Group plc
P2R03	London	WSP Group plc
P2R04	North East	ISL*
P2R05	North West	WSP Group plc
P2R06	Scotland	Third Wave/ISL
P2R07	South East	Scott Wilson Group plc
P2R08	South West	WSP Group plc
P2R09	Wales	ARENA** Network
P2R10	West Midlands	ISL*
P2R11	Yorkshire and Humber	Yorkshire Forward
P2R12	UK	ISL

Source: Author generated

\* – International Synergies Limited; \*\* – Awareness Review and Environmental Action

#### **4.5 Data collection technique**

There are several methods used to collect data for qualitative research studies. These include: interviews, ethnography, participant/non-participant observation, insider research, etc. Davies (2007: 152) advises that “interviewing provides the possibility of reaching conclusions specific to the sample and the detailed analysis can enable complex interpretations of each individual’s perspectives in their particular context”. Therefore, interviewing appeared to be the correct technique. In addition, the study needed to explore the feelings, experiences and thoughts of participants which made it obvious that the use of interviews was unavoidable in this particular study. Semi-structured interviews were used as the main technique for data collection during both phases of the research study. Semi-structured interviews, as the main data collection



technique, were most appropriate because of the exploratory nature of the research. In addition to satisfying the need of covering certain themes that were considered important, semi-structured interviews allowed more flexibility for the exploration of unexpected themes that the research participants considered significant. Although an interview schedule was used to guide the interviews, semi-structured questions provided full flexibility to research participants when responding to the questions. Moreover, a semi-structured schedule enabled them to expand on their responses and add what they saw as crucial. In addition, research participants were given the opportunity to make any comments while the interview was being concluded. Two interview schedules, consisting of a number of semi-structured questions, were developed to ensure that the research participants were asked the right questions from each of the phases. Different interview schedules also made it easier to manage and analyse data, and compare and contrast the views of different groups.

#### **4.6 Data collection**

The semi-structured interview schedules prepared were very wide ranging for both the phases of the study in order to allow a thorough exploration of the topics in hand. Initially, individuals were contacted by email or telephone. The interview schedule for Phase One is presented in Appendix A and that for Phase Two is presented in Appendix B. The nature and the significance of the research study were outlined at the first instance. It was also made clear how their involvement would contribute to this study. Most of the individuals were happy to participate in the study. After a certain level of difficulty in organising the appointments, most of the individuals identified were interviewed with one exception, who was unable to attend the interview due to ill-health. As discussed during the sampling section, the snow balling approach was used to identify any other important stakeholders who could contribute to the study. This was a useful strategy as it enabled the involvement of other important individuals omitted from the initial stages.

As suggested by Davies (2007), researchers need to give thought to their own presentation when meeting their research participants. He asserts that research participants may not feel entirely comfortable and may consider it to be an unusual encounter. In order to deal with this situation and to make research participants feel comfortable, every effort was made to present myself in a way that made the research

participants feel comfortable. The research participants were assured that their identity would not be disclosed when presenting the findings. In order to deal with the confidentiality of the research participants, a code was used against each of the quotations instead of names when presenting the findings in Chapters Five and Six. Additional information on the research participants is also presented in Tables 4.2 and 4.3, which indicates the participant type, however, every precaution is taken to ensure that none of the information could identify the research participants. Research participants were also assured that the interview data would only be accessed by the research team. This had an impact on the interviewing process as all research participants felt relaxed and were ready to talk about their feelings and experiences.

Also, it was considered important to “conduct interview in a setting that was reasonably comfortable and familiar to the interviewee” (Davies 2007: 154). Most interviews were conducted at the work place of the research participants, or at an alternate venue as suggested by them. They were informed that a quiet venue would be preferable.

Whilst slightly different issues were covered in both the phases, all the interviews focused on the UK NISP. However there were huge differences in the length of interviews, ranging from 32 minutes to 2 hours and 12 minutes. The average duration was 1 hour and 15 minutes.

#### **4.7 Data management**

All interviews were recorded using a digital Dictaphone. Every effort was made to transcribe the interviews as quickly as possible after the interviews, to ensure that originality, expressions, etc. were captured as best as possible. However, this was not always possible, due to limited time and resources, as a large volume of interviews were conducted over a short period of time.

The qualitative data analysis software ‘NVivo’ was used to manage the data. The software provided the possibility to import transcribed interviews (Microsoft Word documents) into NVivo. The transcribed interviews documents were prepared/edited prior to importing them to NVivo, which is a very useful tool that enables complex and large volumes of data to be organised efficiently and an in-depth and rich analysis of the data to be made. Another advantage of NVivo is the possibility of carrying all data in

just one NVivo file, which was extremely convenient when working in different locations. Specific approaches used for the data analysis are covered in detail in the next Section.

#### **4.8 Data analysis**

The approaches available for qualitative data analysis vary, based on the type of anticipated outputs. The data collected for this study was analysed using thematic analysis (see Ritchie and Lewis 2003), which is consistent with the interpretative and phenomenological strands adopted for this study.

As described earlier, data were collected, recorded, transcribed and imported into the NVivo for the coding purposes. Although data were present in NVivo to initiate the coding process, initially, it was more comfortable to read the data manually. Data were approached without any theoretical or other assumptions. Interview transcripts were read and re-read to ensure thorough familiarisation of the data. Some of the transcripts containing rich information were selected to be re-read and to identify any interesting themes. Interesting themes were recorded on the side of the selected transcripts and were then sorted to identify connections and assign them to relevant categories. After repeating the process with a number of transcripts, it was felt that no new additional categories/themes were emerging to the already identified categories/themes. This confirmed the principle of saturation and allowed the research to move on to develop a code sheet covering all categories, themes and sub-themes emerging from - and common to - the selected transcripts. Code sheet for Phase One is presented in Appendix C and for Phase Two in Appendix D. This required much deliberation in order to bring together themes and categories in a way that would make sense and allow describing the process as a whole when writing up the findings. The categories, themes and sub-themes within the code sheet were numbered in order to ease the process of coding the transcripts. An 'other' category and 'other' sub-categories within each category were assigned. This was to ensure that if any additional category or themes emerged, they could be easily assigned to the code sheet. Coding was then completed by assigning the number of each category, theme or sub-theme as required on the side of the transcripts. All interviews were coded using the code sheet and any new categories, themes or sub-themes were assigned to the code sheet. Once the manual coding process was complete, the numbered coding system was set up in NVivo to bring together text

from all relevant categories and associated themes and sub-themes from each of the coded transcripts. The coded data were revisited and reorganised a number of times after completing the coding process. This was to ensure that the coded data were well organised and ready to be presented.

The next key stage of the analysis process was presenting or writing up the research findings when the categories and themes were interpreted and explained. The process of interpretation was approached extremely carefully to ensure that the research participants' views and experiences were not ignored. An effort was made to ensure that the views and experiences of the research participants were presented in the findings, rather than my own. The analysis findings are presented in the Chapters Five and Six.

## **CHAPTER FIVE: THE UK NISP AND THE UK GOVERNMENT'S 'GREEN' MARKET STRATEGY**

### **5.1 Introduction**

This Chapter provides an overview of the policy context in relation to the UK NISP. In doing so, the views and experiences of the research participants are explored prior to discussing the topic, using the tenets of Ecological Modernisation theory for a better understanding of UK NISP policy context in Chapter Seven. The Chapter presents all the key elements of the policy context in relation to the UK NISP as recorded during the semi-structured interviews of policy and regulatory officers, civil servants, policy advisors, representatives of trade organizations, representatives of the economic development agencies, NGOs and the UK NISP executives.

This Chapter focuses on the six key aspects which emerged from the analysis. These include: research participants' views regarding the background and understanding of the UK NISP and its activities; research participants' opinion on environmental/waste policy and legislation in the UK; research participants' reflection on the policy/programmes in the individual countries in the UK; research participants' experiences of the decision-making process and the stakeholder involvement; research participants' opinion on the monitoring and reporting mechanism of the UK NISP; and, finally the research participants' overall assessment of the UK NISP policy context, including recommendations for policymakers.

The data within this Chapter has been presented in a way that ensures that the views and experiences of research participants are fully integrated. Tabulated quotations are used to provide detailed accounts of research participants' views and experiences. The use of tables is also made to illustrate the varied and similar views of research participants on certain issues. In order to maintain the confidentiality of research participants, research participant codes are used against each of the quotations presented, instead of their names. The details of the research participant codes are available in Chapter Four Table 4.2.

## 5.2 Background of the UK NISP

### 5.2.1 Reflection on the nature of the UK NISP programme

Most research participants had a different perception/understanding about the nature and intention of the UK NISP. There are several different ways in which the UK NISP was defined by the research participants. When research participants were asked their opinion on what kind of programme the UK NISP is, the following responses were elicited (see Table 5.1):

**Table 5.1: Views of research participants about the UK NISP**

Research participants	the UK NISP – kind of programme	Quotations
P1R01	Waste programme	“With the current definition of waste it becomes a waste programme”
P1R02	Environmental protection and resource efficiency delivery body	“they are an environmental protection and resource efficiency delivery body, ...”
P1R03	Resource efficiency programme	“Very much resource efficiency, ... because they deal with a whole range of resources ”
P1R05	Waste of money	“I consider it as a waste of money”
P1R10	Business opportunity programme	“I would contend it a business opportunity programme”
P1R11	Resource productivity programme	“It is very much a resource productivity programme”
P1R15	Waste exchange programme	“It is basically ... a waste exchange programme”
P1R16	Glorified waste exchange	“It is a glorified waste exchange”

Source: Author generated

The majority of the research participants categorised the UK NISP as either a waste programme, resource efficiency programme or a business opportunity programme. There was disagreement among the research participants on whether the UK NISP is a waste or a resource efficiency programme. Some research participants had strong views that the UK NISP is just a waste programme with a sophisticated name:

“It’s basically, it’s a waste exchange programme, that’s really what it’s about. I know one of targets is indeed, is business development organization, but really it’s about exchanging the wastes. I mean, I think that’s where it has struggled really in terms of what is its strategy, is it about waste exchanges or is it about wider things in that. My view is, it should be honest, we should say it’s about waste exchanges in areas which aren’t obviously natural.”

P1R07

However, as the following quote highlights others hesitate to call it a waste programme:

“... with the current definition of waste it becomes a waste programme. That’s a poor definition of waste, not NISP’s problem.”

P1R01

Similarly, there were research participants who with some hesitation thought the UK NISP to be a resource efficiency programme:

“I see it as a resource efficiency. But I have to say there is a lot of concentration on the waste, but it is a resource efficiency programme.”

P1R04

Some research participants had strong reasons to believe that the UK NISP is a resource efficiency programme:

“Very much resource efficiency, not just waste, because they deal with a whole range of resources. They don’t get too focused on a particular area and they’re looking at the moment for example, at how they can do more with water. So it’s a whole range of resources.”

P1R03

Whilst there was disagreement on whether the UK NISP is a waste or a resource efficiency programme, there was consensus among most research participants about the UK NISP’s claim to be a business opportunity programme:

“it certainly is an opportunity. It’s funded by the public sector to provide this opportunity and the fact that many thousands of businesses now do get involved with NISP suggests that quite a lot of them find that NISP gives them value”

P1R11

One of the research participants was very sceptical about the UK NISP and its existence. He strongly believed that the UK NISP would not be required if the right public policy is put in place. He considers the UK NISP:

“... as a waste of money. It’s meant to be about resource efficiency, it’s terribly well meaning but again, if the government puts in place the big things, the right fiscal framework, the right environmental taxes, the right economic instruments, where there are their environmental priorities, the right economic instruments, carbon trade schemes, things like that, the need for anything like NISP to the extent of what they want to do completely disappears.”

P1R05

To sum up, very few research participants had strong views about the UK NISP being a resource efficiency programme. That view may have arisen as most of the UK NISP focus has been on materials and in particular waste. Also, one research participant argued that it is the definition of waste which makes the UK NISP a waste programme. However, some of the research participants were sceptical about the use of the word 'waste' when a material has further use and suggested that the UK NISP should instead be called a resource exchange programme instead of a waste exchange programme.

In addition, most research participants did not dispute the UK NISP's description of being a business opportunity programme. However, some of them were not entirely sure of what the term 'business opportunity programme' meant in practice. Whether business opportunity relates to providing value to businesses, or assisting in the creation of new businesses was something research participants were unsure about; however, the majority consented with the former view.

#### 5.2.2 Ability to integrate environmental protection and economic growth

One essential aspect of the UK NISP identified during the interviews was whether it has the ability and/or potential to integrate environmental protection and economic growth through its activities/projects. Executives from the UK NISP and government claimed that there was no doubt that the programme was delivering both environmental and economic benefits.

"... can achieve high levels of environmental improvements in terms of reducing CO<sub>2</sub>, diversion of the landfill, reducing potable water use, you can do that at a relatively low cost because at the same time you are achieving massive economic gains in terms of cost reduction, additional sales, new business, new jobs..."

P1R10

"... the primary driver that NISP gives to businesses, you know, you can improve your profits and I haven't been aware of any situation where that has been to the detriment of its environmental objectives ..."

P1R03

In general, there was agreement among all research participants that the UK NISP activities have the capability to integrate environmental protection and economic growth. However, some of them were not absolutely sure that this could be true in all



cases or that the UK NISP would not undertake a project that generated economic growth, but could have been detrimental to the environmental health.

“The one concern is that you can imagine situations in which the activity would promote things like more lorry movements and longer transport. That’s where it could go wrong. But I don’t think it does. And I think it’s regional basis at the moment, and it makes it less likely but you can see somebody taking something a long way.”

P1R01

Another research participant P1R07 had a similar view as the research participant P1R01:

“I mean, no doubt there might be examples where there could be an unfortunate knock on effect but in general terms if you can do a symbiosis and somebody can use somebody else’s by-product and that seems to me to be a sensible thing.”

P1R07

Most research participants agreed that IS can be simultaneously beneficial, i.e. economically, and environmentally. However, P1R01 contended that work had not been performed to evaluate the negative impacts of IS projects on the environment. The requirement for a LCA of UK NISP projects was suggested by some research participants in order to be able to confirm their real impacts and to ensure that they have the ability to integrate environmental protection and economic growth.

“... NISP isn’t forcing itself through a full life cycle assessment of solutions ... I think they’re a long way away at the moment from driving solutions that would have a significant environmental impairment but I guess... yes, indeed they could be driving solutions that end up being not in the general interest of the environment...”

P1R02

Most research participants agreed to the possibility of the UK NISP having the capability to integrate both economic growth and environmental protection via their activities. The only concern raised in this regard was that there was not enough evidence to prove the majority view. In particular, no full LCA has been performed on any UK NISP projects that were implemented to ensure the integration of economic growth and environmental protection.

### 5.2.3 The UK NISP and the IS concept

During the interviews, the research participants' understanding of IS as a concept, was a key aspect that was explored. Research participants agreed that it is not an easy concept to implement, however most considered it to have potential to integrate economic growth and environmental protection.

“I think it actually takes environmental methodology and makes sure that they are not conflicting, so it doesn't ... undermine the other, provided that ... we stick to the true industrial symbiosis concept.”

P1R09

One of the research participant defined IS as:

“industrial symbiosis – is a non-regulatory route to assist businesses to be better environmental performance both in terms of resource efficiency and in terms of emission.”

P1R02

Some of the research participants tried to establish the relationship between what the UK NISP and IS both wish to achieve:

“they identify materials that one company no longer has a use for and then tries to identify an opportunity to use that material, but it isn't just about materials, it is about other resources, it could be equipment, it could be people, as far as I understood and at the moment it's mainly - tends to be mainly materials.”

P1R14

The above quotes illustrate that some research participants' understanding of IS and its boundaries was very much in line with IS theory. The research participants claimed that the UK NISP mainly deals with materials, but IS as a concept, is obviously much wider. The majority of the remaining research participants considered that the boundaries of IS were limited to the activities that the UK NISP engages in. The stakeholders' general perception that IS as a concept is fully implemented within the UK NISP, is likely to result from its name.

### 5.2.4 Early stages of development and stakeholder support

Section 5.2.1 discussed the specific aspect of whether the UK NISP was a business opportunity programme. It is therefore useful to evaluate the initial stages of the UK NISP development which may help to provide a better understanding of how that belief

was initiated. Most research participants agreed that the programme was bottom-up initially as it grew from interest amongst businesses:

“it came about largely as an initiative from business, it’s business led ...it was very much companies coming together, you’ve had problems to solve, waste that they wanted to dispose of, didn’t want to meet the cost associated with them, wanted to drive their own environmental agendas and were looking for other companies that could actually start to reuse their raw materials.”

P1R04

An example, provided by one research participant, of an IS project and how it stimulated the IS approach is quoted below:

“... waste tires that everybody wanted to get rid off, you had legislation that was going to ban them from landfill sites and nobody knew what to do with them and the penny dropped, but the calorific value of these materials is actually higher than coal. And that the ash that comes out of the tires is a substitute for the additives in cement, so if you burn tires in a cement kiln you avoid all your fossil fuel costs, you reduce your additive costs and your emissions, believe it or not, go down. So, again, why didn’t we do these ten years ago? There were no drivers to make people think outside the box. Once they started doing that the cement industry then started asking other questions like why do we use limestone from quarries as our core material? Is there a lime and silica in the waste streams that we could have for free? ... it’s got them thinking outside the box and then you have to start to think about could I get the raw materials I need from other than virgin stock? I think we’ve got one or two other companies doing that and that’s stimulated a whole symbiosis programme approach.”

P1R04

The indication is that businesses saw the IS concept, as an opportunity to deal effectively with their waste and resource efficiency issues, which perhaps led to the thinking and understanding that the UK NISP is a business opportunity programme.

The UK NISP initially developed in two regions of England, i.e. West Midlands, Yorkshire and Humber, and in a devolved administration, i.e. Scotland. The UK NISP received funding and support from the economic development agencies and other government bodies locally. In addition, the UK NISP was supported by businesses themselves and organisations such as the Environment Agency (EA):

“I think the businesses themselves ... have been helpful in promoting IS and NISP in Scotland.”

P1R14

“The [Environment] Agency was involved in the Midlands and Yorkshire in the early pioneering phases of NISP and ... provided ... offices to help facilitate the dialogue between the producing and the receiving companies and to try to help them understand some of the complexities of the law around the reuse of waste materials”

P1R04

Research participants believe that following this start, the value of the UK NISP were then noticed by the central government in England. The government, at that time, not only had aspirations for driving up the recovery and reuse of materials, but they also had disposable funds from the landfill tax escalators, which they had promised to return to businesses through business and environmental support programmes.

“I think the government’s then came along and said well, it’s been promoted at Parliamentary Sustainable Waste Group, I think they’ve come along and they’ve said ‘we like the look of what you’re doing, we have the Waste Strategy 2007, we have the aspiration to drive up recover and reuse of raw materials, you are a potential vehicle that we can use and therefore we will support the growth of your organization’.”

P1R04

The UK NISP was then funded initially for three years by BREW in England as one research participant said:

“Pre-BREW, NISP really was only active in certain parts of the United Kingdom, I’ve already identified that they grew out of ... the West Midlands, through BREW they had been given an opportunity to develop into a national network.”

P1R02

At later stages, funding to the UK NISP was offered in other parts of the UK. However, there were huge variations in the way capital was offered to the UK NISP in the devolved administrations. This aspect will be analysed in more detail in later sections of this thesis, where the devolved nature of government and variations in policy and funding are discussed.

### 5.2.5 Drivers promoting the UK NISP in the UK

The drivers promoting the UK NISP in the UK are both economic and environmental. Although there are some environmental drivers stemming particularly from the government and to a lesser extent from businesses, it is clear from the research participants' views that economic drivers are the key drivers for businesses to become engaged with the UK NISP. Drivers covered in Sections 5.2.5.1 to 5.2.5.5 are all economic, whereas drivers covered in Sections 5.2.5.6 and 5.2.5.7 are environmental.

#### 5.2.5.1 Increase in waste management costs (landfill tax escalator)

Most research participants agreed that the landfill tax escalator and therefore continuous increases in waste management costs, were the main drivers for waste producing businesses to engage with the UK NISP.

“ ... cutting costs by helping companies to avoid the spiralling cost of responsible waste management ... .So, really the main driver for bringing companies to NISP or helping NISP to spread best practice among companies is their desire to reduce cost.”

P1R02

“...there tends to be a focus on waste and waste issues, waste costs and cost of landfill, cost of hazardous waste disposal and people I think tend to look at it from that point of view as their first engagement with the programme.”

P1R07

#### 5.2.5.2 Increasing profit and cutting cost of inputs

Whilst realising the potential value of any waste and, at the same time, trying to combat the spiralling cost of waste management, the waste producing businesses also realised that IS activities have the potential to generate more profit by selling the by-products to other businesses which have use for these by-products as raw material for their own processes. Similarly, businesses at the receiving end of waste wished to cut their input costs, and thereby improve their profits by using the by-products of other businesses, instead of exploiting finite natural resources.

“I think they want to turn the profit”

P1R08

“The principal drivers are... for businesses it’s about being more productive, make more money or save more money whichever fits to the bottom line. So, I think the main driver for businesses is economic.”

P1R13

#### *5.2.5.3 Supply chain pressure*

Some research participants also believed that there are supply chain pressures for more environmentally friendly products:

“they want to save money, but also there is more and more supply chain pressure ... for more environmentally friendly products.”

P1R16

#### *5.2.5.4 Concern for future material security*

One research participant claimed that increasing worries for future material security was providing market momentum for the search of alternative resources:

“I think the issue of material security is coming up on the agenda as well, where, you know, our businesses are saying, well, if the developing from tiger economies got to suck in so much resource that means two things: the costs will go up eventually and the availability will become an issue, in which case, you know, should we be looking at alternate resources ...”

P1R10

#### *5.2.5.5 Potential for business opportunities (element of curiosity and novelty)*

Another driver identified by the research participants related to businesses’ natural interest in new ideas/concepts and related business opportunities.

“I would also say there’s an element of novelty and curiosity, all of the business people we meet have a natural interest in other businesses and technologies and ways of doing things. I think that’s the kind of it’s got a curiosity or a novelty value in that, a chance to explore other ideas.”

P1R10

This encouraged the big players from businesses to engage with the UK NISP in order to explore opportunities for them to exploit.

#### *5.2.5.6 Government endorsement / voluntary approach*

Initially, it was the government's intention to reinvest the landfill tax into businesses through the business and environmental support programmes. However, the government's main agenda was environmental in order to meet its own environmental targets. Notwithstanding this, the UK NISP was endorsed by the government and was able to assist businesses, at no net cost to them, to resolve any waste and resource efficiency issues. This was considered by the research participants as one of the key drivers promoting the UK NISP.

“... the principal driver promoting NISP is the fact that government are endorsing it. That to me is the one big driver.”

P1R04

#### *5.2.5.7 Sustainability and/or corporate responsibility agenda of businesses*

In addition to the above drivers (Section 5.2.5.1 to 5.2.5.6), sustainability and corporate environmental/social responsibility agenda of businesses also promoted UK businesses to engage with the UK NISP.

“Some of them have wider concerns of this whole sustainability agenda, corporate social responsibility, whatever you want to call it, they may be interested from that point of view, but the principal reason is in order to improve the cost management of the business.”

P1R11

However, research participants were cautious and suggested that although this agenda may have driven businesses to use the UK NISP to some limited degree, other drivers such as economic, were more significant.

### **5.3 Environmental/waste policies and legislation in the UK**

#### **5.3.1 Policy context of the UK NISP**

Most research participants felt that environmental/waste policies and legislation have played an important role in the development of the context enabling the IS initiative within the UK. This section therefore explores the policy and legislative context

underlying the UK NISP. The main emphasis of research participants was on the European directives and the Waste Strategy in England and other devolved administrations. However, there were also comments made in relation to the shift in the way policy development was approached.

In order to analyse the policy context of the UK NISP, it is important that the type of government in the UK is discussed. Waste policy development and enforcement lie with central as well as devolved administrations; but since devolution in the UK is asymmetric, these powers among devolved administrations differ to some degree.

Most research participants highlighted the waste strategy in each of the UK countries as the main policy supporting the UK NISP, however, additional emphasis was placed on economic development policies. The policies referred to by research participants in relation to the IS initiative are outlined in Table 5.2:



**Table 5.2: Policies that support the IS initiative in the UK**

<b>Research participants</b>	<b>Policies/Strategies (Country)</b>	<b>Quotations</b>
P1R02	Waste Strategy 2007 and the Sustainable Consumption and Production Strategy (England)	“the policies in the waste and resource management strategies and the SCP strategy.”
P1R04	Waste Strategy 2007 and the BREW Programme (England)	“The main drivers are coming from the Waste Strategy 2007 and from the business resource efficiency and waste programme”
P1R04	Improve resource efficiency through a factor of four or a factor of ten (England)	“there is a clear fiscal driver or economic driver to improve GDP performance, behind this as well”
P1R12	Regional Economic Strategy (England)	“On a regional level we have a similar type of policy requirement, you know, regional economic strategy”
P1R07	Waste Management Strategy and Sustainable Development Strategy (Northern Ireland)	“two things are supposedly... Waste Management Strategy and ... Sustainable Development Strategy”
P1R07	Economic Strategy (Northern Ireland)	“then we have the ... Economic Strategy as well”
P1R13	Going for Green Growth: a Green Jobs Strategy (Scotland)	“the most important government policy was the Going for Green Growth: a Green Jobs Strategy for Scotland”
P1R15	National Waste Plan and Business Waste Framework (Scotland)	“obviously, we have our own national waste plan, we have our own Business Waste Framework”
P1R16	Waste Strategy (Wales)	“in Wales we have the Wales Waste Strategy”
P1R16	Wales: A Vibrant Economy (Wales)	“plus we’ve also got economic development strategy, Wales: A Vibrant Economy”

Source: Author generated

Table 5.2 demonstrates that the policies supporting the IS initiative are both environmental and economic. Most research participants felt that this observation has been quite consistent throughout all the countries within the UK. However, within the UK, differences were experienced in the methods by which the environmental and economic policies had been integrated to provide support to the IS initiative.

The key environmental policy/strategy identified by research participants as underlying the UK IS initiative was the country-specific waste strategy, i.e. Waste Strategy in England, National Waste Plan/Business Waste Framework in Scotland, Waste Management Strategy in Northern Ireland and Wise about Waste: The National Waste Strategy in Wales. Although, the waste strategies developed individually in each of the UK countries, they are broadly similar. Similarly, the key economic development policies, underlying the IS initiative, were developed in each individual country, with

similar priorities assigned to the areas of sustainable consumption and production, with a particular focus on resource efficiency.

### 5.3.2 Policy criticism

Although research participants were positive about the direction of the changes taking place in the policy development, policies were criticized for the following drawbacks:

#### 5.3.2.1 *Main focus on municipal waste*

One main criticism of the waste policy/strategy, mentioned by many research participants, concerned the imbalance in policy focus and the greater attention paid to municipal waste compared with industrial and commercial waste. Targets are set for reductions in municipal waste, however no effective goals are set for diverting industrial and commercial waste from landfills. Some indicative targets for industrial and commercial waste have been outlined, they are not obligatory.

“for businesses, the government hasn’t got those targets that are in the Landfill Directive that they’ve got for municipal waste. So they are busy box ticking the municipal waste, but they are not really box ticking in NISP [commercial and industrial waste] area.”

P1R04

“... the waste policies are far too focused on municipals waste”

P1R13

Research participants felt that focus on municipal waste is mainly due to targets:

“...most of the focus is municipal and that’s only a quarter of the waste stream, so we’re focusing a lot of energy on a quarter of the waste stream ... because of the targets... the business agenda doesn’t really come to as far to the forefront as I would like to see it in all of waste, in all of waste legislation.”

P1R15

#### 5.3.2.2 *Focus on increasing recycling than on the whole of waste hierarchy*

Another criticism was the inability of the policy to concentrate on the whole of the waste hierarchy, rather than just focusing on increasing recycling:

“previous strategies can be easily criticized for having focused too much on reduction of disposal of the landfill by just increasing recycling”

P1R02

#### *5.3.2.3 No concentration on very rare materials*

One of the research participants had particular concerns regarding the policy’s inattention to rare materials. As the research participant said:

“there are certain aspects of resource efficiency that we have forgotten to concentrate on. And that’s actually one of my criticisms of the English Waste Strategy. We’re pretty good on concentrating on paper, glass, metals and they are there as priority items, priority material streams in the strategy. No concentration on very rare materials ... those materials are going to be key to some of the technological fixes that we are going to rely on in the future.”

P1R02

#### *5.3.2.4 Policy encourage resource efficiency in a very general way*

Research participants also tended to think that, to some extent, policies are encouraging resource efficiency and attempting to push the materials through the whole waste hierarchy. However, this is happening at a general (rather than specific) level.

“there are a lot of policies that are moving materials away from landfill, away from disposal and generally, pushing them into recycling, recovery, reuse or away from waste status at all. it does in a very general way, but not very specifically.”

P1R02

Research participants also saw landfill tax reinvestment through bodies like the UK NISP, as a very direct way to encourage resource efficiency.

“the reallocation of landfill tax take through BREW and reapplying it through bodies like NISP and the regional development authorities, that acts in a much more specific way.”

P1R02

### 5.3.2.5 *Lack of strong economic drivers*

There was mention of companies that are moving from being a commodity provider to a service provider. Research participants believed that when this business model was adopted, it would reduce the volume of raw materials used, reduce the volume of waste, increase profit and cut cost. However, it has been difficult to persuade businesses to change their model due to the lack of economic drivers. As one research participant said:

“not enough companies are taking the opportunity and leaping into that new business model, because of the uncertainties around it and because the economic drivers are not strong enough yet.”

P1R04

### 5.3.3 Praise for the policies/strategies

#### 5.3.3.1 *Set targets for local government to divert waste from landfill*

The use of local government targets for diverting waste from landfill was widely supported by the research participants. Their view was that setting targets has positively influenced on a number of business aspects. These included having an increased focus on waste treatment systems and the development and use of new technology to deal with that, which were all viewed as potential business opportunities. In addition, the reluctance of local governments to collect commercial waste has triggered the businesses into thinking more about their options.

“making them ask the question they’ve never done, what once the council picked it up for you, it wasn’t a problem, when you’ve got to think about why you’re producing it, where it’s going and who’s going to take it away for you, it is a problem. So, it’s making industry start to think as well.”

P1R04

#### 5.3.3.2 *Business support simplification agenda*

The UK government’s business support simplification agenda was also welcomed by most research participants:

“The DTI are reviewing the number of support organizations that support business, so I think they have calculated several thousand different business support bodies, across the UK. They want to reduce it to two hundred ... because it’s overhead for us ... and also, because, more and more, these services need to be integrated.”

P1R16

#### 5.3.4 Policy drivers

This section covers the research participants’ views regarding the key policy drivers. Policies provide the background and rationale for the required support and funding for programmes such as the UK NISP. It is therefore essential to explore the drivers behind the policies. Having an understanding of these drivers will provide insights into the extent to which they influence policy and the development of IS initiatives.

It is perhaps inevitable that research participants referred to European legislation as the most important driver for the related policies

“There’s no doubt European legislation has driven major change in the UK”

P1R04

Some research participants were very specific about EU directives being one of the main drivers. The directives that were mentioned by most research participants included the Landfill Directive and the Waste Directive:

“the Landfill Directive in particular and the environmental imperatives behind the Landfill Directive and a whole suite of associated directives down to including things like the Packaging Waste Directive ... is the real driving force behind, pretty much the whole of the national waste strategies and the law that underpins them. So, it’s all about environment.”

P1R02

“The Waste Framework Directive which requires us to take measures to reduce waste and recover waste”

P1R16

However, one of the research participants contended that the Landfill Directive is more of a driver for municipal waste and less of a driver for industrial and commercial wastes:

“...the driver for municipal waste is certainly the Landfill Directive. The driver for commercial industrial waste is a bit different, it’s really to reduce CO<sub>2</sub> emissions, to make sensible use of resources, rather than just sending it to landfill, to see if

value can be extracted from using those resources rather than sending them to landfill but the drivers are not quite so immediate for commercial industrial waste as they are for municipal waste, where we have the EU directive targets...”

P1R15

It was also contended by one research participant that, as these directives highlighted the general legislative trends and aspirations, they also served as drivers for the development of industrial and commercial waste policy. The above quote from research participant P1R15 also demonstrates that the economic drivers were equally important for policies with regard to industrial and commercial waste. This is illustrated by assertions made by several research participants:

“landfill is running out and landfill tax and all the other costs to business are rising, so businesses need support to help them become more environmental ... the recognition that businesses do need support to address their environmental policies, their charges, their competitiveness in the global market. They do need to become more resource efficient.”

P1R09

“I think the drivers have to be, you know the UK commitments on ... better regulation, competitiveness and I’m not sure that fewer environmental drivers are sufficient to promote this type of activity.”

P1R10

“I think there is a another economic driver, which is about trying to improve resource efficiency

P1R04

In summary, most research participants believed that EU Landfill and Waste Directives were the main drivers behind the policies. There were a few research participants who contended that the government’s desire to improve resource efficiency has also acted as a significant driver. However, it is important to note that research participants who supported resource efficiency as being the predominant driver belonged to delivery bodies such as the UK NISP.

### 5.3.5 Consistency of the UK NISP objectives to policy objectives

Having considered the policies in the context of the UK NISP, it is also important to evaluate the research participants’ views on whether, and to what degree, the UK NISP objectives were aligned with policy objectives. One civil servant from a decision-

making body commented that the UK NISP activities are quite consistent with policy objectives:

“In terms of wider policies, they are very prominent in the Waste Strategy review, ... and what they do is very consistent with what we’re doing on SCP policy and climate change more generally.”

P1R03

Other research participants also asserted that the UK NISP objectives were aligned with what government wants to achieve:

“NISP has very clear objectives through the performance targets that DEFRA have set”

P1R11

“I think the government’s then come along and said well ... ‘we like the look of what you’re doing, we have the Waste Strategy 2007, we have the aspiration to drive up recover and reuse of raw materials, you are a potential vehicle that we can use and therefore we will support the growth of your organization’.”

P1R04

There were, however, some research participants that felt that the UK NISP was driven as a business opportunity programme whereas policies were more environmentally driven. An example relating to England is quoted below:

“NISP would say that they are there to benefit business but by providing business opportunities and reducing costs above the ... consequential environmental performance of business. But having said that, they are funded by BREW and therefore they have to report back on the basis of the BREW metrics; it is all about landfill diversion, all materials, CO<sub>2</sub>. So, you know, there is a fine environmental metrics. And the two kinds of business metrics...”

P1R12

Whereas, for example, the funding for Scotland was more focused on economic aspects, e.g. resource efficiency:

“... the objectives are to help businesses in Scotland to become more resource efficient and to exploit the business opportunities that arise through that process”

P1R13

One UK NISP executive commented:

“I think it has to be positioned as a business opportunity programme to achieve the level of engagement it has to achieve some of the harder outputs it has, but behind that there is an absolute enthusiasm and dedication for improving

environment and social conditions. But we have to put the business opportunity first because we think it's the best way of delivering those other items.”

P1R10

Although the UK NISP had various funders' requirements to fulfil, research participants felt that the UK NISP acted as a business support/opportunity programme, with consequential environmental performance improvements arising from its activities. One of the research participants asserted that, initially, economic objectives were the main drivers for the UK NISP. However, environmental objectives that became more important in order to ensure harmony with the policy objectives and the long term survival of the programme.

“the two business ones were XYZ's initial driver but the environmental ones become now more important to the long term survival of the programme.”

P1R12

It is clear from the research participants' views that the funding arrangements for the UK NISP differed among each of the UK's individual countries. The UK NISP has been funded by different national and/or regional government bodies with requirements to deliver different targets. This has likely hindered, to some extent, the UK NISP from developing an effective UK-wide strategy. Variation in the funding and support of the UK NISP throughout the UK is explored in detail in Section 5.4.

#### **5.4 Policies/programmes and devolution in the UK**

The UK NISP was supported and/or funded individually in each of the UK's individual countries. Given the individual powers of each of the country, there are differences in the way policy is developed and implemented. In particular, there are differences in the way that the UK NISP has been supported and funded in each of the UK's countries. This topic deserves attention in order to gain a holistic understanding of the UK NISP policy context, as below.

##### **5.4.1 Devolution and its influence on the policies and programmes**

With few exceptions, most relevant policies are designed and driven at the individual country level. For example, as many research participants pointed out, policies that relate to taxation are developed by UK central government. However, the freedom of



how these policies are implemented in each individual country lies with each devolved government.

Regarding the increased desire towards developing and implementing local solutions, one research participant commented as follows:

“... growing pressure behind devolution and that the Welsh want Welsh solutions for Welsh issues, the Scots want Scottish solutions for Scottish issues. So, I think it’s gaining momentum and I think that the pressure is only going to grow.”

P1R02

The data presented in Table 5.2 demonstrate that each of the UK’s countries has its own policies to deal with waste and resource efficiency matters. Furthermore, the research participants asserted that there are slight differences in the policies and their application to the legislations in each of the country.

“Slightly different applications to the legislations, slightly different time scales, a desire to make sure that the differences, when it’s implemented don’t cause problems for business, because clearly ... we’re operating in the UK market place but there is some tension that the devolved administrations want to do things slightly differently, to reflect their historic... historically, they have a different industrial base.”

P1R04

#### 5.4.2 Landfill tax and its reinvestment

Introduction of the UK landfill tax in 1996 predates the EU Landfill Directive. It was the first environmental tax, which as one research participant said:

“The landfill tax was announced by the then Tory government, the first tax I have ever heard was announced by the environment minister John Gummer in the last year of the Conservative government and it was announced as the first environmental tax in the UK.”

P1R01

Since tax matters are dealt with at the central government level, the landfill tax escalator was also applied throughout the UK. However, the reinvestment of this tax was approached differently in each country. For example, England and Wales had a structured approach to use part of the landfill tax money to fund the business environmental support programmes such as the UK NISP whereas, Scotland and

Northern Ireland were approaching funding of programmes in a very fragmented manner.

“What we are trying to do within England and Wales to the BREW and the MAP fund, we can’t roll them out with partners in Scotland and Northern Ireland because they don’t have the funding.”

P1R04

However, one of the research participants from the Scottish government commented:

“we would recycle the increases in landfill tax back to business ... NISP is one of the initiatives we are funding using partially landfill tax money but also using other money that’s available across the Scottish government and indeed in Scottish Enterprise, and SEPA. ...”

P1R15

It is therefore clear that whilst the UK NISP was also funded in Scotland and Northern Ireland, in these countries it lacked a structured approach in comparison with approaches taken in England and Wales. One research participant confirmed this observation:

“DEFRA has got BREW, no, we didn’t set up something like BREW, it’s more informal like that. In essence, the money we use to pay NISP is coming out of various waste budgets. That is not a formalized programme as DEFRA’s BREW programme; actually it’s less structured than that.”

P1R15

Furthermore, the research participant was critical about the BREW type approach and why the Scottish government did not adopt a similar approach:

“... BREW looks quite bureaucratic from here. It doesn’t cover all of the work done by all of the bodies and it does seem quite a complicated way of doing things. What we haven’t done by and large in Scotland is, BREW has also scattered the money around quite a large number of initiatives. We’ve tried to restrict the number of initiatives, so on the basis in fact that some of the initiatives which DEFRA are funding, to be perfectly blunt, if they work the benefits will extend probably across the UK, if they don’t work then they’re not worth funding. So, we have tended to exercise a different approach to DEFRA ...”

P1R15

Northern Ireland appeared to have no structured funding and, in addition, it is noteworthy that no funds were allocated to business environmental support programmes

from the landfill tax revenue. One research participant from Northern Ireland commented:

“that’s the big difficulty for us, we don’t have a BREW fund or anything like that, I have been bidding for the past three years to get landfill tax revenues, ring fence in Northern Ireland and that hasn’t happened, the money just disappears and the explanation is that the secretary of state has discretion to do whatever he wants with the revenues.”

P1R07

However, the research participant appeared hopeful to be allocated some landfill tax money to fund programmes such as the UK NISP in later years:

“We have a commitment on landfill tax revenues more as I say 9/10, or 10/11. And if we can build on that, get more of that landfill tax money ring fenced for environmental programmes ...”

P1R07

In addition to the lack of a policy framework such as BREW, funding was only guaranteed in Scotland for a limited period of time. Whereas for the BREW Programme, funding was only committed for three years. Other variations in the approaches to funding and support across the UK are covered in more detail in Section 5.4.3.

#### 5.4.3 Variation in the supporting/funding approach

The approaches used to fund the UK NISP and the funding bodies have varied across the UK. Therefore, it is perhaps inevitable that research participants felt that this variation may have had some impact on the performance of the UK-wide NISP programme.

The UK NISP and the Scottish Industrial Symbiosis Programme (SISP; the Scottish partner of the UK NISP) originated as a business led programme mainly funded by economic development agencies as a means for them to meet their key objectives concerning resource efficiency. It is worth mentioning here that the funding from the economic development agencies was withdrawn in most regions, because the funds were primarily available for waste reduction at source, but the UK NISP promoted reuse of wastes. In 2005, the DEFRA’s BREW was introduced in England to return the landfill tax revenue to businesses, by providing business environmental support through

a range of delivery bodies. The objective of BREW was to meet targets that were predominantly environmental with some economic elements. The UK NISP was chosen as one of the delivery bodies to receive the landfill tax revenue. In the research participants' view, it would have been difficult for the UK NISP to have received government funding if there was no provision for BREW:

“If we didn't have the BREW programme in England, it would be much harder for NISP to make the case for government funding.”

P1R04

The UK NISP was additionally funded by some of the regional economic development agencies which appeared to have allowed the regions to meet some of their targets through the UK NISP. This was an important dimension of the UK NISP funding. Further details on the NISP funding are provided in Chapters Six and Seven where the UK NISP's relationship with Regional Development Agencies (RDAs) is fully explored.

Devolved administrations - Wales, Scotland and Northern Ireland, on the other hand, had different contexts that made it difficult for the UK NISP to engage as effectively as it had done in England.

“it's that variation there and that makes it quite difficult for a national programme to engage on an even basis with all those devolved administrations. In Wales, Scotland and Northern Ireland the structure is different, the funding levels are typically smaller but the geographic areas are bigger. So, that in itself brings across you know, can you... sense we're trying to cover a big geographic area with vast resources. So there are some problematic issues in those areas”

P1R10

Wales had a Materials Action Programme that is considered to be equivalent to BREW. However, one research participant pointed out that:

“It's not a strategy or an action plan; it's a collection of projects. It could be pulled together a bit better, ... it will be the action plan that will include industrial symbiosis activity.”

P1R16

Scotland and Northern Ireland had no formalised programme such as BREW in England and MAP in Wales. Research participants from Scotland felt that there were some advantages of having a structured approach as BREW,

“... there are certain useful things that come out of BREW, such as for example, how to measure the effectiveness of various bodies and we have borrowed some of those BREW initiatives and probably there’s a degree of consultation with stakeholders,... “

P1R15

However, in Scotland, it was not considered appropriate to have an overarching programme due to a number of concerns shared by research participants. Notwithstanding the advantages and disadvantages of BREW type initiatives, research participants from the Scottish government also demonstrated their concerns regarding resource limitations.

“I think the DEFRA approach needs a fair amount of investment in staff time and we are now a team of three so we don’t have a great amount of staff time to do it.”

P1R15

Three different bodies, i.e. Scottish government (previously Scottish Executive), Scottish Enterprise and the Scottish Environment Protection Agency (SEPA) were involved in funding the UK NISP. It was felt that the UK NISP cuts across many government departments and therefore receiving funds from various streams was considered a strength by one research participant:

“... all of our money comes from different pots, if you like, sure have different policies and strategies overarching them. So, for me it’s the economic resource efficiency driver, new business opportunity driver, for ... [Scottish government] and for SEPA it’s much more the waste driver, waste and environmental driver. You know, so you could see that it goes from different angles. In a way I actually think that’s strength, but it makes it messy for NISP.”

P1R13

The major issues pointed out by research participants included: (1) no guarantee of funding in subsequent years; and, (2) no common sense of direction due to the different targets between funding bodies. One research participant from the Scottish government commented that it was very unusual to fund a programme in this way and expressed his concerns about the UK NISP’s struggle in Scotland due to these funding arrangements:

“I think funding it from four different funding streams is not the best way to fund it. I think because you then get into a question about who leads to that different targets objectives, how do you get everybody involved and how you’d give an effective steer to NISP and I think NISP in Scotland has struggled and part of that

is probably down to the fact that there are different funding streams and also the money tends to come at different speeds.”

P1R15

On the other hand, in Northern Ireland, the UK NISP was able to embark very late when compared with other parts in the UK. As one research participant pointed out:

“In Northern Ireland they don’t have a programme at all, ...”

P1R01

This was particularly due to the absence of formal arrangements for the return of landfill tax to businesses or to fund ring fenced money to the UK NISP type activities. One research participant from Northern Ireland shared his frustration for not getting access to landfill tax revenue to fund the UK NISP:

“We should have proportionate to the rest UK, we should have approximately 6.3 million a year available to fund environmental programmes, you know, set up of a fund like BREW but we don’t get anything. It just disappears and is spent on stupid things.”

P1R07

He believed that it was an obstacle and that the UK NISP would have launched much earlier in Northern Ireland if money had been made available as in other parts of the UK. Funding was finally agreed in 2007 and the UK NISP was funded in Northern Ireland by Invest Northern Ireland (NI), the EDA in Northern Ireland. However, this funding initiative lacked a structured approach as expected by one research participant.

“The recommendation out of that was that – assuming that we did get the landfill tax money – that, again it should be ring fenced into a programme, there should be a delivery organization established to monitor and to allocate funding from that, but unfortunately none of these things have happened. ”

P1R07

In addition, research participants complained that the level of funding was not even close to the funding levels provided in other parts of the UK.

“I say the level of funding here is not proportionate with the rest of the UK, so the companies are getting lay aside of the programmes than they were if they were anywhere else in the UK, so the sort of market penetration by the programmes is at a lower level.”

P1R07

It is perhaps inevitable that research participants pointed out that the UK Treasury promised to reinvest the landfill tax money back into businesses. This reinvestment was

transparent in England and Wales, but not in Scotland and Northern Ireland as the quote below highlights:

“One of the things that fascinates me is that the Treasury had to be said the money will play back into supporting the business on resource efficiency. It’s transparent in England, it’s transparent in Wales, question marks in Scotland and Northern Ireland.”

P1R04

These variations and lack of appropriate funding across all of the UK’s countries could have resulted in a negative impact on the businesses, particularly those who operate across the UK. As one research participant commented:

“... a company registered in the UK, if it’s operating in Scotland, Northern Ireland it doesn’t really differentiate between them and we are trying to support all industry, wherever it is in the UK and if the programme, for whatever reason is unable to do that then, I think that is just a shame for the companies involved.”

P1R10

Notwithstanding this, the main issue lies with the potential for continuity and certainty of the UK NISP funding throughout the UK as highlighted by one research participant:

“I think what’s more of a problem is continuity and certainty”

P1R13

The research participants’ views relating to the continuity and certainty of the UK NISP funding will be explored in further detail in Section 5.7.6.

It is obvious that initially, the fundamental driver for funding the UK NISP was purely economic. However, the English government’s realisation that the UK NISP capability could assist with achieving environmental targets, added the environmental dimension to it. Therefore, achieving environmental targets became the priority in England; whereas in Scotland due to the funding arrangements, both economic and environmental elements were equally important. Similarly in Wales and Northern Ireland, although the UK NISP was funded by the economic development agencies the agenda was both economic and environmental. Although it is clear from the views of majority research participants, that drivers were both economic and environmental, funding was made available to achieve different targets set by the various funding bodies across the UK.

## 5.5 Government's decision-making process and stakeholder engagement

Having set out the policy context of the UK NISP, it is important to explore the decision-making process of the government and the stakeholders involved in the funding of business environmental support programmes such as the UK NISP. The range of research participants involved in this study included representatives from the majority of the steering group members who advised the government on this matter. The author therefore considers that the interviews contained very thorough information regarding the process involved initially as well as in later years.

### 5.5.1 Reinvesting landfill tax and the UK NISP funding in the early days

The government initially promised that the landfill tax would be returned to businesses. In order to do so, the central UK government decided to spend the steadily increasing budget from the landfill tax escalator to fund the business environmental support programmes. It was through the development of the structured BREW Programme, that the government managed to return the landfill tax to businesses. Whilst this was the case in England, there was also limited evidence of a structured approach also being used in Wales through the Materials Action Programme (MAP). The Welsh MAP lacked the BREW type structured approach and instead acted more like group of projects). Scotland and Northern Ireland were also involved in funding such programmes, however, an unstructured approach was also adopted and the use of landfill tax revenue was not transparent in any of these countries.

Most research participants believed that, in the first year of BREW, there was limited time to make a decision on how to spend the BREW money. Indeed, a civil servant from DEFRA commented:

“At the very beginning of the programme, there was a very short lead in time to decide who we should fund and to what extent ...”

P1R03

Many of the research participants felt whilst there was money available, there was no/insufficient planning performed on how the money should be efficiently spent. The situation arose where the government actually had to find programmes and projects to spend its money on. Whilst the process involved some stakeholder consultation, it was not a thorough consultation process as stakeholders only had the opportunity to vote for



the programmes that they would like to see funded. Given the shortage of time, it was decided that the existing delivery bodies would be funded, as research participants said:

“It was decided at that time that because we had very little time to set the programme up, we would stick with the existing delivery bodies and then we wouldn’t want to set up new ones.”

P1R03

“It had money to spend and at that time it had to find people to spend it.”

P1R01

There was much criticism of the decision and the steering group members, in particular, were not satisfied in the way the money was allocated to the delivery bodies, as research participants commented:

“When you’ve got increasing sums of money to spend like that what you do is you find, you call for bids and you get a good business plan and you take all the good and valuable business plans that you can get and you hope that they at least reach the money you’ve got to spend. That’s not the best way of spending your money most efficiently. We had all this money to spend, but we didn’t have to make a decision between this man and that man because we had enough money to pay both.”

P1R01

“the allocation of BREW cash to the various delivery bodies has not met with universal satisfaction of steering group members.”

P1R02

In Wales, a very fragmented approach to decision-making was used as commented by one research participant:

“It’s been done ad-hoc in the past.”

P1R16

In Scotland, the initiative to fund the UK NISP was supported initially by SEPA as they had funding available at the time of the UK NISP launch. The Scottish government and Scottish Enterprise also joined forces to fund the UK NISP. So the UK NISP funds came from 3 different pots with expectations from the UK NISP to satisfy the requirements of each of the funding bodies. For example, Scottish Enterprise funded the UK NISP based on its ability to contribute to their overall strategies and targets:

“does it fit with what we’re looking for within the economic development agencies. So the main strategy for this area is Go for Green Growth Green Jobs Strategy for Scotland, does it contribute to that? then I would look at who are the

other partners involved, what is it they're looking at for and then you get down to outputs for the money and it's competitive and it's increasingly competitive.”

P1R13

In contrast, Northern Ireland decided to fund the UK NISP at a very late stage and that initiative was taken by Invest NI.

#### 5.5.2 The UK NISP funding in the later years

After the first year, the approaches to decision-making for UK NISP funding changed. Most research participants believed that the requirements became more stringent and that further funding decisions were based on the performance of the delivery programmes. This was definitely the case in England for BREW funding. The government, along with other stakeholders, realised the need for a longer term funding arrangement outlined for the next three years and which would allow delivery bodies to plan more effectively. In the second year, a comprehensive stakeholder consultation took place to discuss the future of the BREW, as one research participant from DEFRA commented:

“In the second year, we had a little bit more time to think about what we wanted to do for the next year, so we had a full blown stakeholder consultation which I think would have been in around April-May time. We had a stakeholder event in April-May time, where we got some initial views as to where BREW was going, what the particular successes were and what we can improve.”

P1R03

The consultations were then followed by an information event to inform delivery bodies of the future plans and requirements:

“We then used the feedback from that event ... to inform delivery bodies as they prepared their proposals for the second year.”

P1R03

These proposals were evaluated using set criteria, for example, the ability of the delivery body to divert waste from landfill was used to rank the proposals. Public consultation for reviewing the ranking constituted the next stage and, following ministerial approval, funding for the second and the third year were put in place. The research participant from DEFRA also believed that on the basis of stakeholder feedback, delivery bodies were offered different sums of money than initially planned by the government and expected by the delivery bodies.

Some of the steering group members were positive about the approach taken in later years when compared with the first year. One research participant commented:

“I think 80-90% of the programme that comes out of it has been recommended by the advisory board. It’s transparent, it’s open and it’s clear. So, you know, I’m quite comfortable with that as an arrangement and I think they only think that they’re doing increasingly is that judging future bids by what you delivered on your past bids, so performance is beginning to matter a lot and they’re getting the metrics right. Now they’re looking at diversion from landfill, CO<sub>2</sub> reduction, value given to business, cash benefits to business and contributions to the strategy and I think the thing is starting to join together, from a messy start probably.”

P1R04

However, many others were sceptical of the way in which the decision-making process regarding allocations was approached. This is illustrated through the assertions made by two research participants:

“... I think DEFRA has been virtually instructed to give particular masked funding to the Carbon Trust and I think it is political horse trading ... It’s political reality, the Carbon Trust has given the most aggressively weak justifications to the steering panel of the money, it just comes in and says we are Carbon Trust and you owe us the seventy million pounds. So, that’s the reality. Now, I’m not saying the Carbon Trust doesn’t do good work, it may very well be that seventy million pounds goes to very valuable things, but it has never been properly justified in the context of this process.”

“XYZ”

“the allocation of BREW cash to the various delivery bodies has not met with universal satisfaction of steering group members.”

“XYZ”

One particular criterion adopted by the Welsh Assembly to make decisions about UK NISP funding was based on whether the UK NISP activities fit within the policy/strategy in Wales. Although the funding decisions in Wales were made in conjunction with a range of stakeholders (including a steering committee for the MAP), over the next few years Welsh funding continued in a similar ad-hoc approach to that used in the first year. However it was also pointed out by one research participant that the services the government would like delivered would be put out to tender, that

funding would be based fully on the tenders and that there was no guarantee that a particular programme would be funded:

“... we have a service that we want delivered, we might put that to tender. So, you know, nobody, none of those bodies ... can [be] guarantee[d] funding next year ...”

P1R16

With regard to decision-making in Scotland, decisions were made by three different bodies and each of them funded the UK NISP based on how it fit with their individual strategies. The process did not change much during the course of the first three years and funding arrangements were approached on an ad-hoc basis.

“I think it probably is fair to say that this wasn’t a fully constructed discussion, it was rather more how much was available in the relevant pot, rather than any other sort of formal discussion.”

P1R15

Despite all the support and funding, the major drawback to the UK NISP was that in Scotland funding was decided on a year by year basis. Furthermore, on a number of occasions decisions were delayed which made it extremely difficult for the UK NISP to make long term plans. However, in future years, efforts will be made by the Scottish government to fund the UK NISP using a single pot of money and for a minimum of two years at a time. Initially, there was very limited stakeholder involvement even when the three different funding bodies came together to fund the UK NISP. The plan to fund from a single pot will result in decisions being made by fewer government officials with no public consultation. This area will be explored in more detail in Section 5.5.3.

The decision-making process was also not transparent in Northern Ireland and it was also not clear whether the landfill tax revenue was used to fund the UK NISP in Northern Ireland. One of the research participants described the decision-making process:

“The secretary of state ... makes the case for so much funding for Northern Ireland ... It is now down to the assembly of the Executive to decide how that money will be spent across Northern Ireland and so, we have to make a case to the Executive to get that funding.”

P1R07

### 5.5.3 Decision-making and stakeholder engagement

With regard to supporting and funding the UK NISP and other delivery bodies, stakeholder participation in the decision-making process is another key element that deserves attention when exploring the policy context of the UK NISP. This section outlines the types and extent of stakeholder engagement adopted during the decision-making process for the allocation of funds to various delivery bodies including the UK NISP (in all the individual UK countries). All aspects of stakeholder engagement, including its influence on the outcomes and satisfaction of stakeholders, have been covered and compared across all countries comprising the UK.

As outlined earlier, England had the most formal approach to stakeholder engagement when making decisions to fund BESPs. In contrast, the other countries comprising the UK approached it on a more ad-hoc basis with limited, or no, formal consultation process.

#### *5.5.3.1 Key stakeholders, their role and extent of involvement*

In addition to having different policy mechanism in each of the UK's countries, different arrangements have also been put in place, in order to engage stakeholders in the decision-making process. It is however noticeable that it is not just the stakeholder engagement process but also the consideration of identifying which key stakeholders should be involved.

In England, a full blown stakeholder consultation was implemented and an extensive range of stakeholders (including delivery programme representatives and steering group members) were involved. Some of the research participants commented over the role of steering group members in England:

“... BREW steering committee or steering group which can only make recommendations.”

P1R01

“the steering group is doing a job in at least helping DEFRA to think about the allocation of BREW cash amongst the delivery bodies.”

P1R02

These assertions, which were also supported by other research participants, appear to indicate that the steering committee members only had an advisory role and that the overall decisions were made by the government minister. Furthermore, it was at the

discretion of the minister on whether or not to take the advice of steering committee members into consideration. However, one of the civil servants commented:

“The steering group only gives its view which we treat very seriously because they are the people who are paying us the money in the first place, they’re the members and they are significant chunk. So, we take their views very seriously, then we have the decision-making role as such. The programme board within government has the decision-making role, which then gets a ministerial approval or any modification.”

P1R03

According to the government, the stakeholders involved in the steering committee were quite relevant according to the government, since most of the stakeholders involved are trade associations that represent business. It was therefore considered right to involve these parties, thereby ensuring that business views are taken into consideration on how their money was being used.

Membership of the steering committee consisted of representatives from industry and trade associations (e.g. CBI, FSB, EEF), environmental and resource management NGOs (e.g. CIWM, ESA, Green Alliance), and government departments (e.g. DEFRA, DBERR). Most of the research participants were quite positive about achieving the right mix of stakeholders to inform the decision-making, as one of them commented:

“fairly broadly based group of interested parties to at least help inform decision-making within DEFRA”

P1R02

Similar stakeholder involvement was apparent in Wales, where a range of representatives from the EDA in Wales, and members of the MAP steering committee (which include representatives from CBI, FSB, EA, etc.) were involved. However, the representation was stronger on the economic development side with limited involvement of actual businesses and environmental and resource management NGOs. As one research participant commented regarding the relevance of stakeholder participation:

“It could have been stronger I guess.”

P1R16

When compared to the: (1) approaches adopted; and, (2) stakeholders involved during the decision-making processes in Scotland and Northern Ireland, a very different picture was painted. The BREW Programme was seen as being quite bureaucratic by the

Scottish government. Whilst at the same time, some of the BREW initiatives were adopted in Scotland, as one research participant commented:

“we have borrowed some of those BREW initiatives and probably there’s a degree of consultation with stakeholders, but equally BREW looks quite bureaucratic from here.”

P1R15

Although there was mention of a degree of consultation with Scottish stakeholders, the consultation was largely amongst the government departments and a representative from the private waste industry. The government departments involved in this consultation included Scottish Enterprise, Scottish government and the Scottish Environmental Protection Agency which were all involved in funding the UK NISP from their individual budgets. The quote below clearly illustrates this point:

“we reach decisions quite early on about how much we were going to give to NISP and this was based really on the amount available in the respective budgets. In the budget line I hold in the Sustainable Development Budget around the corner for me in Scottish Enterprise and in SEPA and I think it probably is fair to say that this wasn’t a fully constructed discussion, it was rather more how much was available in the relevant pot, rather than any other sort of formal discussion.”

P1R15

One research participant mentioned that, in their opinion, more could have been done about having relevant stakeholder participation. However, he believed that the main difficulty was in terms of getting sufficient interest from the trade associations and the NGOs:

“The FSB have shown some interest in certain subjects, but bodies such as the CBI aren’t terribly interested really, so it’s been a struggle on the whole to get business waste producers interested in the process. We don’t have environmental NGOs in relation to NISP. The Environmental NGOs in Scotland aren’t terribly active on waste matters and when they are active they tend to concentrate on municipal waste primarily, rather than on commercial industrial waste,…”

P1R15

Other research participants had similar views about the range of stakeholder involvement, as one commented:

“It’s down to the three funders, we talk to each other, we work with each other all the year ...”

P1R13

However, one research participant was sceptical of the outcome arising from these consultations:

“... unfortunately, decisions are wholly taken within the Scottish government and it’s very little opportunity to influence where that money is spent.”

P1R14

In contrast, the stakeholder process in Northern Ireland is not very transparent. This was especially the case, when it concerns the activities of the Department of Enterprise (which has funded the UK NISP), where business involvement has been channelled through trade associations and there is almost no involvement of NGOs and other stakeholders. However, even the involvement of the trade associations was not very transparent. One of the research participants commented on the decision-making process:

“I mean he [Secretary of State] makes the case for so much funding for Northern Ireland and that will be so many billion pounds a year. It is now down to the assembly of the Executive to decide how that money will be spent across Northern Ireland and so, we have to make a case to the Executive to get that funding.”

P1R07

So, in summary, the research participants felt that a very structured approach to stakeholder involvement was adopted in England. However, disappointment was raised by research participants regarding a government decision to allocate funds to a delivery body which was not even brought up for discussion during the consultation meetings. Similar efforts to achieve stakeholder involvement were apparent in Wales, although there was scope for further improvements to bring together relevant stakeholders. However, in both cases, the role of stakeholders in the final outcome was unclear as they only had an advisory role and the government minister had considerable discretion on whether or not to consider the stakeholders’ views. In contrast, the research participants reported disappointment regarding the very limited involvement of relevant stakeholders in Scotland and Northern Ireland. Furthermore, the process did not appear to be as transparent as in England and Wales; with most decisions about funding allocations made among the government departments, with limited, or no involvement of businesses and NGOs. The research participants recommended that governments ought to do more to facilitate the involvement of relevant stakeholders in the decision-making process.



### 5.5.3.2 *Government as a facilitator to bring together stakeholders*

In response to the question - to what extent does government act as a facilitator to bring together different stakeholders? The research participants' views were different in each of the UK's individual countries. Satisfaction was felt among most research participants in England for the efforts that government makes to bring together a wide range of interested stakeholders. For example, it was commented that:

“you'd have to say that they are striving to work with a fairly broadly based group of interested parties to at least help inform decision-making within DEFRA. So, you have to say they're trying.”

P1R02

“they do make a genuine effort, I mean, you know, the meetings of the stakeholder group are regular, they have papers to talk about. They have a very senior official chair in it, so I mean it's entirely general in that sense and then, there is a much wider meeting effectively public meeting, once a year.”

P1R05

In Wales, the government was reported to have made very similar efforts - as in England - to facilitate the involvement of a broad range of interested stakeholders, as one research participant said:

“That's a big role for us to do that, to bring all parties around the table, it could help what kind of solutions to think of.”

P1R16

However, it was clear that those efforts were not structured to the same extent as observed in England and most of stakeholder involvement was through the steering groups of individual programmes, for example, the Materials Action Programme in Wales.

It is apparent that, in Scotland, there was no, or only a very limited effort made by the government to bring together stakeholders to inform their decision-making process. Although one research participant commented that BREW has some degree of consultation, he equally believed it to be quite bureaucratic. All research participants from Scotland agreed that there was hardly any evidence of government facilitation in order to bring together stakeholders in the decision-making process. They considered

that it was for the individual programmes being funded to bring together stakeholders, as one of the research participants commented:

“We would see it as NISP’s job is to do that”

P1R13

One of the research participants also outlined the process that is followed when making decisions and it was apparent that there is no structured approach to stakeholder involvement. Rather, most decisions are made between the three main funders with hardly any other involvement:

“It’s down to the three funders we talk to each other, we work with each other all the year, through things like the programme advisory group for NISP in Scotland, ... We will talk more widely than NISP about what’s going on in waste generally, what’s happening in economic development generally, so through that we will all talk to other partners and other bodies who work with us in sustainable development, for example, some of them who might be NGOs but when it comes down to do we fund it or not, the three of us talking to each other and then it’s into our own internal approval’s process to get an approval.”

P1R13

In Northern Ireland, research participants agreed that it was the role of the government to facilitate the involvement of stakeholders which, again was unstructured and quite limited to business:

“... they’ve all had the opportunity to advice us or express their views to us and so develop our engagement. ... the engagement is may be a lower level, not as extensive. It would be more with businesses I think they would be less inclined to bring NGOs or other stakeholders into to the discussion.”

P1R07

In summary, between the UK’s individual countries the approaches taken by each of the governments in order to facilitate stakeholder involvement were significantly different. It was felt by the research participants that a very structured approach was taken by the government in England. Furthermore, despite realising the need to be structured and the need to put more effort to bring together different stakeholders, the governments in devolved administrations demonstrated limited evidence of actually pursuing this approach. A particular example was noted in Scotland, where the government was relying on the programme being funded to bring together the stakeholders in order to inform the decision-making process.

### 5.5.3.3 *Extent of business engagement*

Exploring the extent of business engagement also appeared to be quite crucial in the decision-making process since businesses were paying the landfill tax and they were also the ones likely to receive support services from the UK NISP. The research participants were very positive about the efforts that were being made in England to engage businesses. It was clear from the research participants' views that, along with the representation of trade bodies, individual businesses were encouraged to engage in stakeholder events.

“the CBI's and FSB's views are important as they are, we try and go wider ... we try to engage individual businesses through the stakeholder consultations that we have had ... so any business can come along”

P1R03

However, one research participant was sceptical of the involvement of businesses as he believed that most businesses who engage are those which are interested in making money (e.g. consultants). One other research participant also felt that the government makes very limited effort to communicate to small businesses:

“the government I don't think does enough to communicate and engage with small businesses. Yes, we know, it's difficult, but I think with a big government machine they could find better ways of doing it.”

P1R06

The research participants suggested that there is some business sector involvement in Wales. One of them raised a particular concern that most business representatives represent their own business rather than all businesses, as he commented:

“The engagement with businesses is tricky because usually when we have a business representative, they represent their company. They are not all businesses, so you never get the true picture from them, and so there is a bit of a quandary, if you can find people who can truly represent all of businesses, then great. Trying to consult every business, you know, is impossibility.”

P1R16

However, one research participant asserted that the government consults businesses through the Economic Development agencies concerning the kind and quality of

support offered to businesses. Regarding business involvement in Scotland, there was hardly any sign of a structured approach towards engaging businesses:

“Occasionally you can speak to individual businesses and I do that on an ad-hoc basis, but I think the question is are we effective at doing that? Probably not. We need to think a bit more about getting the Trade Associations involved”

P1R15

However, some research participants made mention about events which they felt provided opportunities for businesses to air their views

“the Scottish Waste Management Liaison Group. Now ... I’m not sure how much industry assists on that, ... but apparently it’s not very effective, they meet about three times a year, ... they may have a meeting, but there is very little progress, very little influence in terms of decisions or what is going to happen.”

P1R14

Overall, the research participants reported that whilst some effort had been made to engage business stakeholders in Scotland in the decision-making process, it was very limited and the research participants admitted that there was a need for the government to be more active in engaging businesses in decision-making processes.

## **5.6 Reporting and monitoring mechanism**

The initial planning in terms of ‘on what basis funding should be allocated to delivery bodies’ was widely criticised by the research participants. Most research participants expressed some dissatisfaction regarding the planning in the earlier stages and the evaluation of the outputs from the activities of the delivery bodies. For example, it was stated that:

“year one we were all kind of starting from a standing stop and having to unfortunately spend quite a bit of money without any kind of reference points and without knowing what we were going to make it against.”

P1R12

Later in the first year, a reporting and monitoring mechanism was developed in conjunction with the delivery bodies. However, this mechanism was not implemented until after the decision was made on the second year’s funding, as one research participant commented:

“the first year we couldn’t have any metrics because nobody had done anything and the second year they couldn’t tell you what their performance was for the

whole of the first year because you had to make the decision before the end of the year, so they could continue and so on. So, we're really only just beginning to get to grips with this now."

P1R01

The BREW programme was in its third year before any evaluations were performed, using the agreed metrics, to inform the decision-making process. However, further dissatisfaction was reported by the research participants in terms of the effectiveness of these metrics. In particular, research participants expressed dissatisfaction with regard to the inability of the metrics to capture the real environmental costs of the UK NISP projects, and to calculate soft deliverables, as well as weaknesses in the metrics, which allowed the UK NISP to report very general aspects of their activities and performance. The quotations in Table 5.3 illustrate the above points.

**Table 5.3: Negative comments about the metrics**

<b>Research participants</b>	<b>Quotations</b>
P1R02	"I'm a great advocate of life cycle assessment and careful measurement of the whole environmental cost of decisions, I'm not satisfied that the availability of data decision support tools and the science behind them is anywhere near good enough yet to allow people to apply that sort of rigour to thousands and thousands of individual decisions. ... So, is it realistic that NISP should be required to measure a report on their performance to anything like that sort of degree."
P1R08	"Everything is driven by hard deliverable, they have no way of measuring soft deliverables and because they can't measure soft deliverables they won't... I mean, they can't count them, then they don't carry any weight"
P1R02	"Early reports out of bodies like NISP have been far too general for my satisfaction. It's not enough to count the number of businesses that you've contacted, it's not enough to come up with general good news stories."
P1R06	"although the people that work for these programmes claim, you know, that for every pound of public expenditure you get a trillion pounds in environmental savings, when you start to look at what's behind this figures, there isn't very much left and certainly in the context of other initiatives"

Source: Author generated

Two research participants from the BREW steering group also considered that the metrics used by the government were weak:

"as a steering group member of BREW, that's what I want proof of and I'm not satisfied that the metrics behind all of the individual projects are good enough to give that certainty back."

P1R02

"the metrics we've seen justifying NISP's activities, are pretty weak"

P1R06

It is striking to note that the government realised that there are benefits that cannot be captured using the developed metrics, as one government representative commented:

“there have been some views that there are benefits that are not captured and we are clear about that”

P1R03

This is followed by a contradictory statement from the same research participant who stated:

“We haven’t got any intentions to change the metrics at the moment, we’re happy with that developing and there haven’t been any strong views expressed that these are inappropriate or these large things were missing.”

P1R03

On the other hand, there was one research participant P1R07 who was quite positive about the metrics being based on achievements of the delivery body instead of the one used in the past that focused on targets for the level of engagement achieved with companies.

Thus, whilst the government was not keen to modify or make additions to the metrics, they did admit the need for greater consistency in the reporting by delivery bodies. Given this inconsistency, it was difficult to benchmark and/or compare the performance of the respective delivery bodies. There were various research participants who suggested that a mechanism that boils down to one environmental impact could have been the best way forward. This suggestion is illustrated using the quotes in Table 5.4:

**Table 5.4: Expectations of stakeholders with regard to the metrics**

<b>Research participants</b>	<b>Quotations</b>
P1R01	“... if you really want, you could take those and convert them through some complex consultant reduced formula to go, the amount of global warming gas saved per pound of money spent and reduce everything to global warming.”
P1R02	“wouldn’t it be lovely to have all that boiled down to a single unit of carbon or environmental impact. No, I think that they are probably stuck with the very simplistic reporting measures that they’ve got. I wish it was different”
P1R16	“government always sets reduced tonnage to landfill. If it is set to reduce the carbon footprint or Carbon, the CO <sub>2</sub> aspects would enable NISP to focus more strategically, hopefully.”

Source: Author generated

Overall, there was some disagreement between the research participants about the strength of the metrics where particular issues included: (1) whether reporting should be based on achievements or the level of engagement with businesses; (2) no direct policy for small businesses; (3) a lack of soft deliverables; (4) consistency of reporting among all delivery bodies; and, (5) achievements measured against a single environmental/economic impact. In particular, many research participants recommended calculating the performance of delivery bodies as a single unit of environmental/economic impact as a means of benchmarking performance and to inform decision-making for future funding. Delivery bodies can equally benefit from a clear and effective policy and a strong and consistent metric to plan strategically for the future. However, there were no particular recommendations offered by the research participants on how the government could incorporate soft deliverables into the metrics.

## **5.7 Overall assessment of the government approaches**

This section explores the views of research participants in relation to the overall strengths and weaknesses of the government's decision-making processes. This is, in itself, a very broad area of research. However, the focus of this section remains on exploring the views of research participants with regard to the decision-making process that is relevant to the policy context that influences, or interests, the UK NISP and its key stakeholders. The decision-making process differs in the different countries within the UK and therefore, strengths and weaknesses are analysed under the same headings to provide a comparison of the individual processes in each country. Most of the content in this section reflects on the analysis undertaken in the earlier sections of this Chapter.

### **5.7.1 Landfill tax, its reinvestment and BREW**

The government's initiative to impose landfill tax on businesses and to use part of the revenue to provide support to businesses - in order to assist them in their effort to divert waste from landfill - was commended by most research participants. There was consensus amongst the majority of research participants that firstly, landfill tax was one of the main reasons for companies becoming more attentive towards resource efficiency issues (e.g. diverting waste from landfill). Secondly, the availability of landfill tax revenue to provide advice/support to businesses to find alternative ways of disposing of waste was making businesses more resource efficient, whilst reducing their waste

management costs. Thirdly, it was also encouraging innovation and the development of new technology. This is illustrated through the assertions made by several research participants in Table 5.5:

**Table 5.5: Positive comments about BREW**

<b>Research participants</b>	<b>Research participant type</b>	<b>Quotations</b>
P1R02	Advisory	“I think peeling off an element of that tax take and turning into a mechanism to support businesses in general was well-intentioned and it’s the right thing to do and using the landfill tax to fund that is about the only way that it could have been done.”
P1R03	Decision-making	“... it’s good to have a link between the carrot and the stick, so the stick first of all is increasing tax, means the businesses are less likely to want to send their waste to landfill, and the carrots in the sense is using the receipts to encourage businesses to find other ways of disposing off their waste and being more resource efficient.”
P1R11	Delivery	“the landfill tax is a very important reason why many managers are paying more attention to these issues than they used to. The landfill tax obviously raises quite a lot of money and part of the political settlement was that some of that money should be returned to business. I think that the BREW programme is quite a good way of returning it to business because it helps businesses to reduce their bills on waste disposal and at the same time I think as I said it does encourage the development of new technology.”

Source: Author Generated

It is evident from the above quotes that all the advisory, decision-making and delivery bodies have been positive about the BREW approach in England, both with regard to landfill tax and its reinvestment, and consider it a significant strength within the whole process.

In contrast, no other UK countries (e.g. Northern Ireland, Scotland and Wales) adopted the BREW type approach. In response to the question “why not”, a representative of the Scottish government commented that “BREW looks quite bureaucratic from here” P1R15. However, this contradicts the comments made by several research participants with regard to BREW being the most efficient part within the overall process, as illustrated in Table 5.5. A quote from another research participant, who is a representative of the regulator, stresses the positive position of BREW:



“If we didn’t have the BREW programme in England, it would be much harder for NISP to make the case for government funding. It is a relatively straightforward process to bid for the funding. It is relatively bureaucratically free, in terms of its reporting and auditing processes, it’s quite slick.”

P1R04

It is clearly evident from the above quotations that the BREW type approach was quite effective and it could have been successful in other countries too if implemented correctly. Wales had been environmentally active earlier on, compared with other countries, and had a mechanism in place that was working for them. Although their approach was not similar to BREW, it seems to have worked for them. Moreover, Scotland and Northern Ireland could also have benefitted from a BREW type approach. One research participant from Northern Ireland described his struggle to secure funding and expressed his disappointment at not having a programme like BREW:

“that’s the big difficulty for us, we don’t have a BREW fund or anything like that, I have been bidding for the past three years to get landfill tax revenues, ring fence in Northern Ireland and that hasn’t happened, the money just disappears and the explanation is that the secretary of state has discretion to do whatever he wants with the revenues. We should have proportionate to the rest UK, we should have approximately 6.3 million a year available to fund environmental programmes, you know, set up of a fund like BREW but we don’t get anything. It just disappears and is spent on stupid things.”

P1R07

Similarly, the approach taken in Scotland for funding the UK NISP was criticised by the funders themselves. For example, it was stated that:

“it would be effective if all funding came from one single pot, because at the end of the day they are all coming from exactly the same source.”

P1R14

“we will need to review that. It’s not a great way of funding an organization. I think funding it from four different funding streams is not the best way to fund it. I think because you then get into a question about who leads to that different targets objectives, how do you get everybody involved and how you’d give an effective steer to NISP and I think NISP in Scotland has struggled and part of that is probably down to the fact that there are different funding streams and also the money tends to come at different speeds.”

P1R15

A common theme within the above quotes, was that the approaches adopted in Northern Ireland and Scotland were not preferred by the research participants and that there was a degree of criticism coming from the decision makers themselves on the way that they had approached the funding arrangement.

### 5.7.2 Key stakeholders in the decision-making process

Based on the analysis of research participants' views in Section 5.5.3 regarding the relevance of stakeholders involved in advising and decision-making, it was found that England, in particular, and to some extent Wales, had relevant stakeholder engagement processes. However, it is important to note that stakeholder engagements became available for BREW in later years, as one research participant commented:

“In terms of stakeholder development [by] NISP and BREW system on a national basis is relatively news to all in my opinion and I know it sounds silly because we're getting near to the end of the third year”

P1R01

In contrast, Northern Ireland and Scotland had relatively limited stakeholder engagement. The evidence presented in this study suggests that there was hardly any stakeholder consultation or signs of any advisory committees influencing the decision-making process. The research participants' views illustrated in Table 5.6 below support this position:

**Table 5.6: Level of stakeholder engagement in all UK countries**

Research participants	Country	Quotations
P1R02	England	“The parties on the steering group are probably the right ones, particularly going back to the original promises made to tax paying businesses when the escalator was increased and actually it's probably commendable that the steering group also includes representatives of the waste management industry”
P1R16	Wales	“We have involved our economic development colleagues; we have our materials action programme steering group, CBI, FSB, and Environment Agency, but mainly economic development colleagues. ... [however relevance of stakeholders] ... could have been stronger I guess”
P1R15	Scotland	“... it has been a struggle on the whole to get business waste producers interested in the process... the environmental NGOs in Scotland are not terribly active on waste matters ...”
P1R07	Northern Ireland	“the engagement is may be a lower level, not as extensive. It would be more with businesses I think they would be less inclined to bring NGOs or other stakeholders into to the discussion.”

Source: Author generated

One of the research participants from Scotland, (a representative of Scottish government) believed that the degree of stakeholder engagement in BREW in England was useful as the following quote stresses:

“there are certain useful things that come out of BREW, such as for example, ... probably there’s a degree of consultation with stakeholders”

P1R15

However, there was limited evidence of any efforts made by the Scottish government towards facilitating such stakeholder involvement.

#### *5.7.2.1 Extent of stakeholder satisfaction*

Although the involvement of stakeholders in advising the government, with regard to funding the delivery bodies in England, is clear, most members of the BREW steering committee felt that the process was unfair.

“the allocation of BREW cash to the various delivery bodies has not met with universal satisfaction of steering group members.”

P1R02

Most research participants expressed dissatisfaction with the advisory and decision-making process, as illustrated in the quotations listed above. In particular, as stated by several research participants, dissatisfaction was related to the funding of those delivery bodies which – although not part of the discussion during the BREW steering committee meeting, - were allocated BREW cash:

“some large elements of BREW cash were automatically allocated to some delivery bodies which probably weren’t ever up for discussion. They were faits accomplis presented to the steering group”

P1R02

“I think the support for Carbon Trust comes from the highest level of government. Other bodies, they don’t have quite the same liberated political patronage, they have to fight a little harder for the money ... I think DEFRA has been virtually instructed to give particular masked funding to the Carbon Trust and I think it is political horse trading.”

P1R05

“an organization like the Carbon Trust, it does very little for a small business, have to have a minimum level of funding as agreed by the Treasury. The Treasury

insisted that the Carbon Trust was funded from the BREW programme, in part funded, and that doesn't help small businesses”

P1R06

### 5.7.3 Importance of metrics

Although the research participants felt that there were some flaws in how BREW and other funding arrangements in the devolved administrations were initiated, it became more effective when metrics were put in place, in order to enable the performance of the programmes to be monitored and reported against a set of indicators.

“I mean clearly after the first year when they established the BREW metrics and we all know what we all have to perform against... that has improved the effectiveness”

P1R12

The development and implementation of metrics to monitor and report the performance of the delivery bodies was significant and provided useful insights. This is evident from the fact that although the Scottish government did not want to adopt a BREW type approach, they did adopt the BREW metrics to monitor and evaluate the performance of delivery bodies, as one research participant commented:

“there are certain useful things that come out of BREW, such as for example, how to measure the effectiveness of various bodies and we have borrowed some of those BREW initiatives ...”

P1R15

Also, there was consensus amongst most research participants that the metrics was considered a good idea, as it enabled the performance of BESP programmes to be monitored and helped the decision-makers to make informed decisions, with regard to the level of future funding based on the previous year's performance. However, a number of research participants also reported that the metrics were underdeveloped.

### 5.7.4 Integrated approach among government departments to fund BESP

The activities of most BESP cut across many of the government's departments, thereby presenting an opportunity for them to come together to fund and support the initiatives in order to meet their individual targets. For example, in Scotland, all three government bodies (e.g. the Scottish government, Scottish Enterprise and the Scottish

Environmental Protection Agency) had an interest in the activities and outcome of the UK NISP, as one representative from the UK NISP commented:

“this programme just cut across everything, learning and skills, innovation, environments, business innovation, competitiveness, so very realistic programmes cutting across all government departments.”

P1R10

It is an advantage to have integrated policies and funding to suit such programmes in order to reduce overlaps, duplication of effort and to be more effective and efficient. However, the evidence available in this study suggests that (1) delays in the decision-making process; and, (2) the fact that all government bodies involved focused on their individual targets in this situation, which made it extremely difficult for the delivery bodies to undertake strategic planning. This was a major disadvantage as the delivery bodies were vulnerable to funding cuts if the targets of one of the government bodies were not met. This has been illustrated below, using a quote from one research participant from Scottish Enterprise (the EDA in Scotland):

“all of our money comes from different pots, if you like, sure have different policies and strategies overarching them. So, for me it’s the economic resource efficiency driver, new business opportunity driver, for [Scottish government] ... and for SEPA it’s much more the waste driver, waste and environmental driver. You know, so you could see that it goes from different angles. In a way I actually think that’s strength, but it makes it messy for NISP.”

P1R13

This clearly demonstrates the difficulty that the UK NISP may have encountered across the UK as a result of different funding bodies having inconsistent targets, variations in funding arrangements and differences between the legislations/regulations of the UK’s individual countries. Notwithstanding this, it is obvious that it is more efficient for government departments to be able to integrate their programmes and policies for the best possible outputs arising from the government’s spending. However, there is definitely a need for more consistent policies and programmes throughout the four UK countries, as well as more consistent and better coordinated funding arrangements to allow the UK NISP type programmes to plan for the long term.

#### 5.7.5 Coordination of BESP’s at regional level

The devolved governments of the geographically smaller countries, such as Wales and Northern Ireland, had an advantage in terms of being ‘close to the people on the

ground', their involvement in the day-to-day activities and monitoring of their progress. One research participant from Wales considered this as a strength as there was a greater chance of interaction and gaining knowledge of particular issues in their country.

“Wales is equivalent to an English region, but there's more chance of a coordinated, integrated approach at the regional level.”

P1R16

Although, initially, BREW funded a range of delivery bodies in England, the efforts of these vehicles were not integrated and action was not coordinated to achieve the best possible results from their activities. Businesses were unsure who to approach when they needed help, and there was an overlap of similar services which created tension/competition between the delivery bodies. In addition, each region had different dominating industry sectors, each with varied issues to deal with. However, following the plea to allow the Economic Development Agencies in each of the regions to coordinate the efforts of all delivery bodies through Business Link (which was an existing body of the Economic Development Agencies) a model was launched to provide guidance and advice to businesses. In this way, businesses were referred to the appropriate delivery body which could help with their specific circumstances and/or issues. The below quote illustrates the view of one research participant:

“The RDAs have been given a much bigger role in providing guidance and advice to business, through Business Link, ... They started to grow teams of people in the regions that can talk to businesses across the board, but making environment one of the aspects of that resource efficiency, one of the aspects of that, a bit like a GP, they have a generic knowledge of a lot of things, in detail knowledge of nothing. I think I insulted the GPs here a little bit, but they know where to go to get issues resolved and that's the logic that's been outlined by the RDAs. They will open the door for the NISP, the Envirowise, the regulators as required to talk to companies and that's a good model.”

P1R04

The coordination of efforts on a regional basis has clearly been useful and most research participants considered this model to be a strength. However, in Scotland no such model has been adopted as Scotland's geographic area is relatively smaller than England and larger than Wales and Northern Ireland. There is limited evidence of any government initiative to coordinate the efforts of the various delivery bodies in Scotland, which has resulted in the limited penetration of delivery bodies among businesses, particularly in some parts of Scotland. A representative of the Scottish government indicated that,

when compared with the RDAs in England, the Scottish Enterprise hardly plays any role in coordinating the delivery bodies despite funding them:

“Scottish Enterprise is notoriously bad at sign posting to organizations. Obviously, Scottish Enterprise do know, that they part fund NISP and they do know that there are various resource efficiency organizations out there, but it’s been a long struggle to try and get Scottish Enterprise to sign post. And Scottish Enterprise also aren’t very good at main streaming resource efficiency into their other work.”

P1R15

This appears to be a weakness in the part of policy context and process of decision-making in the Scottish government and the above quote clearly demonstrates that there is some degree of disagreement between the government departments that are jointly funding the delivery bodies. Consequently, it is inevitable that limited efforts have been made to integrate environmental concerns in economic policy and vice versa.

#### 5.7.6 Certainty, continuity and stability of BESP’s

Certainty, continuity and stability have been the BESP’s other key issues. In addition to the programmes’ concern, with regard to their survival and associated high staff turnover, competition among the delivery bodies has been high as they were expected to achieve their targets, which meant they ended up competing with others to secure their own futures. Notwithstanding this, the high number of delivery bodies funded by the government also became a cause of concern just after the BREW programme was launched. One reason for this, was that the high number of support organisations was causing confusion among businesses with regard to who they should approach to seek advice. Most of the delivery bodies were ready to help any businesses, regardless of the fact that there were other more appropriate delivery bodies with expertise in that particular area of concern, or that they were simply doing similar things. This is illustrated through the quotes below:

“BREW has also scattered the money around quite a large number of initiatives.”

P1R15

“I don’t think it’s effective because we’ve got different bodies doing similar things. And that needs to be rationalized.”

P1R16

“... businesses saying ‘well I think I could do with a bit of help but I don’t know who it was I’m supposed to ask. Do I ask NISP, do I ask ENVIROWISE, do I ask WRAP?’”

P1R01

The UK government listened to the businesses’ plea regarding this confusion and proposed a Business Support Simplification Programme (BSSP) where they decided to reduce the number of delivery bodies on the ground and improve coordination (as highlighted in the previous section). The impact of the decision to reduce the number of delivery bodies brought some stability (e.g. in BREW) as well as more cooperation among the delivery bodies in the devolved administrations, as stated by one research participant:

“The very fact that they’re doing things like business support simplification, transformation of government, future environment support for business is because they’re responding to businesses plea to all too complicated, simplify it down please. So, they are listening. ... The view is they’ve probably got the delivery bodies they want and therefore there is a bit more stability coming around the programme. When you get stability, you more likely get co-operation between the delivery bodies.”

P1R04

In addition to providing a degree of stability, with regard to specific programmes, the certainty of funding was also considered a key issue by research participants. Given that the money was ring-fenced due to the structured BREW programme in England, it offered a level of certainty with regard to funding for the next three years in England for all BREW funded programmes. This was illustrated by the following quote:

“I think it’s [BREW] evolving fast, it’s moving in the right direction, it’s been a big driver for change, there’s no question on that. And it’s also ring fenced which is quite nice, because that it means that, you know, every three years you get some certainty around the amount of money the government’s going to put into this area and we can start to build relationships with Regional Development Agencies, business sectors, regulators and delivery bodies including local government.”

P1R04

The above quote also indicates that certainty about the programme’s continuity for a relatively long time period, also allowed delivery bodies to build relationships with key stakeholders, e.g. regulators and other delivery bodies, for mutually beneficial co-



operation and collaboration. A member of the steering group emphasized the need for more certainty and commented:

“we have been telling DEFRA and indeed occasionally the Treasury is that a delivery body cannot run without being able to do some sensible business planning ... and that all the delivery bodies who rely on it and indeed those who don't rely on it but are partly funded by it, like WRAP, need to know what money they've got.”

P1R01

However, this has not been the case in any of the UK countries, and to a larger extent in Northern Ireland, Scotland and Wales, where the programmes were only funded on a short term basis, giving rise to uncertainty among the delivery bodies' staffs about the continuity of the programme. This uncertainty also appeared to be a barrier to the development of a medium to long term strategy for delivery bodies, resulting in unusually high levels of staff turnover. As a result, delivery bodies appeared to lose many existing contacts with businesses and partnerships with key stakeholders.

#### 5.7.7 No direct policy for small businesses

The metrics used for reporting and monitoring purposes were particularly focused on achieving the required tonnages in terms of landfill diversion, carbon reduction, etc. Since the government set out the required criteria (with no specific conditions demanding at least a partial focus on the inclusion of small businesses by delivery bodies), it was perhaps easier for the delivery bodies to achieve their targets and outperform by specifically concentrating on industry conglomerates. The following quote highlights the disappointment of one representative from a trade organisation:

“the problem is that because the government put down criteria for achievement and for how the money is being used it's far easier for all organizations, Carbon Trust , NISP, WRAP, Envirowise, all of these are funded by the BREW funds, it's easier for them to work with big companies because they can get gains and what we're saying is that there must be a direct policy to deal with small businesses.”

P1R06

Another research participant expressed his surprise about the unusually limited conditions attached to the BREW funding:

“Money usually comes with conditions attached to it. I guess you would say that the BREW money has been applied surprisingly openly with very few conditions.”

P1R02

This particular aspect is where the government’s approach was criticised as small businesses were ignored in terms of the government’s promise to return part of the landfill tax revenue to all businesses. Therefore, there has been little effort on the part of the delivery bodies to provide support to small businesses. Instead, their focus is on ‘big wins’ that will assist in the achievement of their targets and perhaps future funding security. Since small businesses make up the largest proportion of UK’s industry, it is important that their needs are not ignored and that there are direct policies to deal with the needs of small businesses. It is essential to note that the landfill tax revenue is collected from a range of different businesses and it is simultaneously disappointing that only big businesses reap the benefit of the reinvestment of this money. However, one research participant was sympathetic about the position of the government on this issue:

“Certainly the major drive has always been to try and push innovation into the SME sector which is fair enough, the problem is government doesn’t like dealing with the SME sector because it gives them a lot of hassle, they like dealing with big companies, but unfortunately, they don’t really want to give big companies money if they do it themselves. So, that’s a bit of a catch 22, really.”

P1R06

It is evident from the above quotation that there are serious difficulties in determining how to provide adequate support to small businesses. One research participant’s recommendation, for ensuring that small businesses are not ignored when it comes to the UK NISP type advisory services, is illustrated through this quote:

“... we could set banded targets, based upon the size of business, you know, so that we could have x number of businesses, you know from 0 to 10 SMEs whoever targeted a certain tonnage associated with that banded businesses and then you know another tonnage associated with the, you know, ten to fifteen employees and that seems a much smarter way and it ensures that the activities of NISP ... is spread across the spectrum”

P1R07

### 5.7.8 Lack of focus on integrating technological innovation

Another commonly identified weakness was the limited/lack of ring-fenced money coming out of BREW for technological innovation. Most of the BREW funding was aimed at the advisory services and there were no/limited funds to assist with any R&D that may have been identified as bringing about real change. The following quotes demonstrate the frustration of many research participants regarding the lack of technological innovation:

“I would like to see all the BREW money leave it back into industry, into industrial R&D which certainly isn’t the case at the moment.”

P1R08

“... we’d rather put our money into projects that deliver real change, rather than just projects that give advice to businesses.”

P1R16

Two other barriers that were highlighted by the research participants, with regard to technological development, include certainty about policy direction and the availability of waste data:

“one of the big messages that came from waste was we need to be certain about government policy direction for the long term, because these are big, long-term investments, you know, if you want to develop a new bit of kit or if you want to develop some large infrastructure, you’re talking about a lot of money over quite a period of time, so you want to be certain that the policy direction is going to continue in the direction it’s going in at that point of time”

P1R13

“If you want to develop a new technology, you want to know how much of that type of waste, to what specification is produced, where, when. Don’t know. Huge difficulties in waste data, particularly on the commercial and industrial side.”

P1R13

Three specific issues were identified in terms of technological innovation. Firstly, inadequate government focus with respect to the integration of R&D activity and the advisory services coming out of BREW. The lack of funds in this area may act as a barrier for projects with real potential for change. Secondly, a lack of certainty about the longevity of a policy (or its focus) discourages industry from investing in technological innovation. Thirdly, the unavailability of waste data - particularly in the industrial and commercial sectors - acts as a barrier in the development of new technology.

## **5.8 Concluding summary and recommendations**

One area, where there was absolute consensus amongst the research participants, was the need for a clear definition of waste. The research participants suggested that it would be necessary and beneficial for a set of criteria to be laid out which specifies, under what circumstances a by-product is considered waste and when a waste ceases to be a waste. Additionally, more flexibility and consistency in the way by which legislation is interpreted was recommended to ensure that any activities, with obvious potential for both economic and environmental benefits, do not face obstacles. The development of new protocols and standards to support such activities were also considered crucial.

The research participants' views clearly underline the need for more appropriate public policies, including having the right fiscal framework, economic instruments, environmental taxes and regulations, which could even negate the need for, or replace programmes such as the UK NISP. Whilst a number of research participants did support the idea of the UK NISP and were complimentary about what it has achieved in recent years, most research participants expressed their doubts about the reliability of data reported by the UK NISP and considered the BREW metrics to be weak. Some research participants believed it to be well thought out as it focuses on the actual achievements of the delivery body, rather than just concentrating on the level of business engagements. However, others considered it to be weak as it is unable to capture soft deliverables. Additionally, there is inconsistency in the way it is used among the various delivery bodies, which makes it impossible to benchmark its performance or to compare 'value for money' amongst the various delivery bodies. One common recommendation from the research participants was to measure performance against a unit of environmental/economic impact in order to more effectively inform decision-making.

Given the claims concerning UK NISP's output, research participants believed that the UK NISP has the ability to sell its services to the market instead of relying on public funding for its survival. Research participants also felt that government funding would be detrimental to the UK NISP's long term survival. Additionally, if the private sector were to start offering the same services to the market, it would be impossible for the UK NISP to remain fully government funded/subsidized.

It is apparent from the research participants' views that the government as well as trade organisations, find it very difficult to engage small businesses. As the research participants suggested, there is definitely a need for the government to focus on this area in order to find more effective methods, some of which were recommended earlier in this Chapter.

Regarding the various aspects of the UK NISP policy and decision-making context in all countries within the UK, England and Wales utilised some degree of stakeholder consultation. The research participants identified complaints in the former and scope for improvement in the latter. There is limited evidence to suggest that the devolved governments in Northern Ireland and Scotland effectively facilitated stakeholder engagement to inform decision-making, where the decisions in Scotland were made by the three funding bodies with no formal consultation whatsoever. Although errors occurred during the earlier stages of the BREW programme, most research participants were positive about the adoption of such a structured approach and suggested that similar approaches should be used in devolved administrations in order to ensure consistency and certainty of funding, relevant stakeholder involvement and effective coordination of delivery bodies.

Funding for technological innovation was not well integrated into BREW and other programmes in the devolved administrations. There were no funds set aside for technological innovation or R&D that may be required for future projects, identified by the UK NISP or other delivery bodies. Although evidence presented in this thesis suggests better funding arrangements for some technological innovations in England, compared with other countries, it was not well integrated with other programmes.

Contradictory views were also expressed about the level at which policies should be developed and implemented. The majority of research participants recommended that policies should be designed for the whole of the UK having sufficient flexibility to implement these more effectively, based on the diverse industry sector and culture of devolved administrations and regions. More consistency in policy formulation and implementation throughout the UK was considered to be advantageous to UK plc. In addition, it was believed that policy development and implementation at the devolved administration, or regional level, is an inhibitor of knowledge transfer. Furthermore, the

knowledge transfer would be particularly effective if there were greater consistency in policy formulation and implementation throughout the UK. There is clear evidence that the level of funding was much lower in the devolved administrations, compared with funding in England. A lack of structured approach in the allocation of funding and in planning the coordination of delivery bodies was also observed. As such, there is a need to further integrate the policy amongst different government departments to ensure that there is no overlap, or duplication, and that the policies complement each other. A more structured approach to funding, stakeholder involvement and coordination of delivery bodies was also highly recommended. Above all, the need for a more consistent and flexible interpretation of the legislation and development of appropriate public policy which would let the market deliver itself, was viewed positively.

## **CHAPTER SIX: MANAGEMENT AND ORGANISATIONAL DESIGN OF THE UK NISP**

This Chapter provides an overview of the management and delivery of the UK NISP. In doing so, the views and experiences of the research participants are explored for a better understanding of the management and organizational design employed by the UK NISP. The Chapter focuses on the six key aspects which emerged from the analysis. These include: the research participants' views regarding the background of the UK NISP and its activities; their reflections on funding and the support received from the government bodies and their influence ; the research participants' opinions on strategy, coordination and management systems of the UK NISP; the research participants' reflection on the approach to delivery in the individual regions/devolved administrations within the UK; the reflection on regional teams' experiences of delivery and the overall assessment of the UK NISP with regard to its coordination and delivery including recommendations for the UK NISP. The details of the research participant codes are available in Chapter Four Table 4.3.

### **6.1 Background of the UK NISP and its objectives**

#### 6.1.1 Understanding of the UK NISP and its objectives

This section explores how the UK NISP was perceived by its co-ordinators and practitioners and presents what they considered to be the UK NISP objectives. Research participants had varying views with regard to the UK NISP objectives. Table 6.1 includes the whole range of research participants' views resulting from analysis of interview data.

**Table 6.1.: Objectives of the UK NISP**

<b>Research participants</b>	<b>the UK NISP Objectives</b>	<b>Example quotations</b>
P2R01	Development of synergy - waste exchange type or one leading to new business or new process	“Synergies go on from everything from what is quite a simple waste exchange type synergy all the way up to something that could be new business or a new process.”(P2R01)
P2R01, P2R06	Generating revenue/saving money for businesses	“The pitch I am going to do tomorrow, isn’t I am going to save the planet, I am going to save you money.” (P2R06)
P2R01, P2R08	Facilitate improvement in resource efficiency and help businesses to be more sustainable in the long term	“... improve their resource efficiency, so help the businesses to be more sustainable in the long term really.” (P2R01) “To be the key facilitator of resource efficiency.”(P2R08)
P2R02	Achieving ISL outputs	“to deliver the outputs that ISL has charged us with delivering.”(P2R02)
P2R03, P2R04, P2R05, P2R06, P2R07, P2R10, P2R11, P2R12	Hit the targets/Tonnage	“ISL make it completely 100% output driven. Outputs whatever else is happening, whatever the cost, whatever the situation, they want the outputs and that’s, you know, is the tonnage. We are tonnage hunters as a result. It has a danger of making it quite superficial in terms of our engagement process because we don’t want to spend lot of time dealing with projects which may take a long time to deliver the outputs or they would be very big outputs when we could be spending an amount of time engaging with business which has much obvious and quicker outputs. I think that danger is that we have a superficial attitude to industrial symbiosis.” (P2R03)
P2R03, P2R04, P2R05	Raising the profile of the UK NISP and promoting awareness/principles of industrial symbiosis	“I think we also have a like I said before significant responsibility in terms of both raising the profile of NISP and industrial symbiosis on a national, political and media level.” (P2R03)
P2R04	Look for quick wins and the lower hanging fruits	“... we would may be look for the quick wins or the lower hanging fruits”(P2R04)
P2R04, P1R06	Building and maintaining relationships; continuing to interact with businesses	“the key of NISP is that you maintain the relationship with the companies that you have worked with. Keep going back as someone may have new waste, new problems which we may be able to help with”(P2R04)
P2R09	Genuine reuse other than recycling	“What we are trying to do is not just sort of divert waste into recycling, we are trying to actually find uses where we can take waste materials and put it into a process and not just into recyclers because there is a danger that if you generate a lot more recyclers there is not going to be an uses for these materials anyway.”(P2R09)
P2R12	Find waste/by-products	“it is find the million tons for the regions to be able to use in synergies ... It could be anywhere of anything.”(P2R12)

Source: Author generated



There was a wide spectrum of perception and understanding regarding the research participants' views on the UK NISP's objectives. Very few responses illustrated an understanding of the concept of IS as a whole, as defined in the literature so far. As elicited in the above Table 6.1, most research participants considered the UK NISP objective to be simply achieving the (tonnage) targets. However, there was a concern raised by one research participant (P2R03) with regard to the tonnage objective. The research participant felt that this objective resulted in a superficial attitude to IS by focusing on short term outputs. Most of the research participants appeared to have focused on the quick wins for achieving their tonnage targets rather than the need to take a long term sustainable view.

One research participant (P2R09) stressed the importance of finding genuine uses for the waste rather than just facilitating the recycling of materials where the recycled materials may not have practical use, in any case. However, it was apparent that delivery co-ordinators and practitioners have had limited freedom in terms of choosing projects with a long term sustainable view and that they went forward with any projects that enabled them to achieve their tonnage target. Promoting the UK NISP and IS principles were the other important objectives as stressed by many research participants. Interestingly most of them, although carrying out the same activity, had different perception about the UK NISP and its objectives as illustrated in Table 6.1. Notwithstanding this, it is also interesting to note the differences and a number of similarities, in how the UK NISP is perceived among the policy makers (see Chapter 5) and managers of the UK NISP.

### 6.1.2 History and maturity of the UK NISP

In order to explore the origins of the UK NISP and how it gradually developed into a national programme, research participants were asked when they became involved with the UK NISP. Table 6.2 shows that most regional programmes were launched gradually over a number of years:

**Table 6.2: Age of regional programmes**

<b>Research participants</b>	<b>Quotations</b>
P2R02	“we have been up and running now from nearly over 12 months.”
P2R03	“It kicked off about 1 ½ years ago.”
P2R04	“The Tees Valley Industrial Symbiosis Programme prior to the NISP covered the Tees Valley because of the chemical clusters and that’s worked that why there are these three core regions, not necessarily that ISL started out as a result of chemicals, but certainly chemicals in the north-west are on Humberside and in Teesside as a result regain its link.”
P2R05	“Started in Early 2005.”
P2R06	“Scotland was one of the first regions to kick off. I believe that Scotland and West Midlands were in there at the start; possibly Yorkshire and Humber. Now it was back in 2002 or 2003 as I recall ...”
P2R07	“the programme has been going for at least 18 months”
P2R08	“It was started with the launch of The EDEN project. This is before my time because I only started last September. I understand that they pulled together a database of predominant Southwest businesses”
P2R09	“ARENA formed 13 years ago. It was a project that was fallen from the business in the community.”
P2R10	“Initially the programme was funded by the RDA in 2003 ... Based on the success of the West Midlands programme, we were able to launch a national programme. It was launched in April 2005 in the House of Commons”
P2R11	“The programme was initiated by catching the eye of the Yorkshire Forward ... So it was with in Yorkshire Forward who understands the potential of NISP. This is before it had any credit before it lived anything ...”
P2R12	“I mean it’s developing as we go along, as I said we’re only six months old.”

Source: Author generated

The UK NISP was initially launched in the West Midlands, then Yorkshire and Humber and lastly Scotland in 2003. Then, the programme gradually developed in other regions of England, supported by the regional development agencies and eventually received funding from DEFRA in 2005 for its launch as an England wide programme. Finally, the programme was implemented in Wales and Northern Ireland and, by 2007, covered the whole UK territory.

From Table 6.2, it is also apparent that some of the regional initiatives already existed and the UK NISP revived and nurtured them further.

### 6.1.3 Support/funding from government bodies

Funding for the UK NISP has come from many different sources and there were differences between all regions and devolved administrations in the way their funding was approached.

#### 6.1.3.1 The UK NISP funding in all regions of England

The majority of the UK NISP regions in England are funded by DEFRA, although some of these were initially backed by their respective EDAs and some are still being partially funded by EDAs. The quotes in Table 6.3 illustrate the funding arrangement in England:

**Table 6.3: Funding arrangement in England**

Research participants	Quotations
P2R01	“Funding we will get some money from EMDA but our core funding is from NISP.”
P2R02	“The regional programme is funded..., we just get our share of the national funding so basically from DEFRA ... we want to foster closer links with the RDA, be as a funder or just as a stakeholder partner”
P2R03	“we are about 70% by BREW and about 30% by the LDA which is the London Development Agency.”
P2R04	“First year it was funded by BREW with funding from One North East and New Tees Valley. Now in the second year, it is 100% funded by ISL through the BREW fund, through the landfill tax.”
P2R05	“Mainly through core team “BREW” allocation. But we have a small amount of NWDA (North West Development Agency) funding.”
P2R07	“Regional programme is funded by the client essentially it is funded by ISL so that’s you know International Synergies and that’s funded from DEFRA of course ... I think SEDA has given us some funding in the past. I think initially regional development agency provided some funding in the first financial year (the year 1). But I don’t think that they have given anything in the year 2.”
P2R08	“[funded by] ISL”
P2R10	“Initially the programme was funded by the RDA in 2003 ... we now have a national programme covering all of the UK operations.”
P2R11	“The regional programme is currently funded by the Yorkshire Forward money which is a combination of single pot money from EU. Since 2005, Yorkshire Forward funded the full regional programme on that basis. The future of this funding is going forward we will pick up the BREW funding as the rest of the regions from April 2007 onwards really.”

Source: Author generated

Prior to the national launch of the UK NISP in 2005, the IS networks operational in some regions were funded by their respective RDAs. There was also an element of European funding, for example, the Yorkshire and Humber IS initiative. Since the national launch of the UK NISP and the associated funding from DEFRA, some RDAs have pulled out, whilst others have continued to fund the UK NISP. However, the main proportion of funding came from DEFRA. In some regions, such as the East of England, there have been continued efforts to persuade RDAs to partially fund the UK NISP programme in their respective regions.

#### *6.1.3.2 The UK NISP funding in Scotland*

There was a very different approach to the funding of the UK NISP in Scotland compared with other devolved administrations and English regions, as one research participant commented:

“Up here we are funded by three funders. Scottish Executive, which is the main funder. Scottish Enterprise, which is the second main funder. SEPA is the third and the smallest one.”

P2R06

The UK NISP has been funded by three different sources in Scotland, i.e. the Scottish government, Scottish Enterprise (the Southern part of the EDA in Scotland) and the Scottish Environmental Protection Agency. It is also worthy to note that the decision in Scotland, regarding the provision and level of funding, is made between these three funders with no or limited external stakeholder involvement. The complexities arising from these funding arrangements have been explored in further sections.

#### *6.1.3.3 The UK NISP funding in Wales*

Given the limited devolved power in Wales, landfill tax is managed by DEFRA which then allocates the funds. The Waste Strategy unit in Wales distributes the money to the delivery programmes. The UK NISP is delivered by ARENA, which is responsible for delivering the UK NISP in Wales and is part of a group of Welsh projects called the Materials Action Programme (MAP). One research participant describes the process:

“Money ultimately comes from landfill tax. Landfill tax first goes in to DEFRA and then gets a portion roughly in line with the Barnett Formula. So the Waste

Strategy unit in Wales in effect distributes the MAP money Materials Action Programme money and they give us an amount of money which pays for our services. They give Welsh Environment Trust an amount. It is an equal amount between them. They give us some additional money to buy services from NISP centrally so that we can integrate our programme with the national programme.”

P2R09

#### *6.1.3.4 The UK NISP funding in Northern Ireland*

The UK NISP was launched in Northern Ireland in 2007 after having been launched in all other parts of the UK. One research participant expressed his frustration with the lack of funding for the support programmes:

“we don’t have a BREW fund or anything like that, I have been bidding for the past three years to get landfill tax revenues, ring fence in Northern Ireland and that hasn’t happened”

P1R07

Eventually the UK NISP was funded in Northern Ireland by Invest NI:

“it is left to Invest NI to find the money to fund those; so, I’m able to fund ... NISP activities in Northern Ireland. But all of them are at a lower level of funding than the rest of the UK.”

P1R07

#### *6.1.3.5 Strengths of the funding arrangements*

##### (a) Focus on synergies bringing both environmental and economic benefits

Part funding from the economic development agencies ensured that the UK NISP would be addressing their concerns. As such, this assisted the economic development aspect of IS. Similarly the targets set by DEFRA and devolved administration governments ensured that environmental outputs from IS projects were not ignored. For example, an research participant commented about the positive effect the involvement of economic development agencies has on the funding of the UK NISP:

“LDA definitely makes us focus on the jobs saved and created out of the programme. 30% isn’t anything significant sum. It definitely makes us think about LDA objectives which are more the economic development aspects of industrial

symbiosis. It makes us ask more searching questions of potential synergies when we are trying to retrieve data where we are enquiring that potential and job opportunities throughout the synergy. I think it probably makes us a bit thorough.”

P2R03

(b) Potential for inter-regional synergies as a result of national funding

Among the research participants, national funding was seen as being very positive as it enhanced the likelihood of inter-regional synergies, as one research participant commented:

“we now have a national programme covering all of the UK operations. That also identifies other opportunities which are good cross-regional synergies which the programme is now working on now. So the programme evolves and develops and expands, most synergies are identified. We are delivering on a national basis and we are also delivering on a regional basis.”

P2R10

The above quote also illustrates that knowledge transfer among regions and devolved administrations becomes easier and significantly important in identifying more synergies. This would have been difficult without the existence of a nationwide programme.

*6.1.3.6 Weaknesses of the funding arrangements*

(a) Businesses’ confusion due to various similar delivery bodies

Research participants were concerned about the large number of similar delivery bodies funded by BREW as well as by the economic development agencies. One research participant commented:

“As far as the businesses are concerned we are all pitching very much the same message ... in some respects we are very different from each other, in some respects the RDA has chosen to fund projects which are very similar to NISP, Envirowise, Carbon Trust and such like. I think that’s the complexity. It’s not only common for one organisation to being supported by 4 or 5 different BREW projects. None of those BREW projects will be aware of the fact that they all are all supporting the same organisation.”

P2R02

Another research participant felt that businesses are confused about which body to approach when they needed support, as they are unable to identify the responsibilities of each delivery programme:

“ ... I can see how lot of industry people get totally confused by the range of support organisations out there. Carbon trust, Envirowise, WRAP, Energy Savings Trust, ReMade Scotland, etc. and this confuses industry what each one do.”

P2R06

(b) Lack of co-operation among the various delivery bodies

Associated with the reported confusion in industry (described above), it is apparent from the quote below that the delivery bodies actually have a good understanding of where they belong in the overall picture of the governments' resource efficiency agenda. However, there is a limited desire among the delivery bodies to co-operate with each other, due to the competitive nature of the funding arrangements. For example, it was commented that:

“The programme seems to understand where they fit into the whole picture. I think Programmes need to be kicked hard as they do not cooperate with each other. What I mean by co-operation is, e.g. cross referrals where they can't cross people who aren't their remit to help. They know somebody else does that, but they just think, stuff it! I am not telling them about that. I don't think that it happens deliberately but there needs to a big step to say that we are part of a one big resource efficiency structure. And we need to make sure that we are signposting people to the other partners that are there to help.”

P2R06

Perhaps an indication that having conditions attached to funding may help resolve the situation is illustrated by one research participant, who stated:

“I am of the opinion that targets drive behaviour”

P2R06

On the other hand, another research participant felt that conditions attached to funding sometimes restricted the delivery approach, but also believed that this was a strength as it permitted the development of a more appropriate programme structure:

“I guess that complexities came around the funding and the restrictions that make us slightly out of line in terms of our approach to the delivery but I think ultimately it has added some strength in terms of how we structure the programme.”

P2R11

To sum up, most managers believed in the stringent conditions attached to funding in order to reduce the complexities that may arise during the delivery of the programme.

(c) Uncertainty and inconsistency of funding

In Scotland, funding has been made available on an annual basis, in contrast, to England and other devolved administrations where funding was guaranteed for longer periods. Uncertainty regarding the continuity of funding gave rise to high levels of staff turnover. This, in turn, resulted in difficulties in managing the ongoing relationships with businesses, which has been detrimental to the overall effectiveness of the programme, as one research participant stated:

“Funding has been made available year by year but it is always been at the start of the year people have to go back in and negotiate with all the funders say this is what we are trying to do and give us the money. There are always lengthy negotiations, promises of money eventually and delays in actually getting the money through. This actually underlines a lot of these staff turnover. That has actually put in a fair amount of uncertainty to the positions of the practitioners in the programme. You are working on the programme and then you are told we have got funding up to March and we don’t know after that. By that Jan Feb time you think end of march not far away I have got the bills to pay and I am going to go and find another job. This could be one of the reasons that there is high staff turnover. If you have high staff turnover then you do not have the opportunity building up the ongoing relationships and that I think impacts badly on the delivery of the programme.”

P2R06

A similar situation was experienced in England where managers have been unsure about the provision for future funding, particularly in regions where delivery of the UK NISP was contracted to consultancy organisations:

“NWDA funding may dry up next month. The BREW funding dries up next year. I am hoping that we take it forward. There is no guarantee that we will come up to



a satisfactory position on the contract negotiation for year 3 which means, all this could be completely in vain because in 4 weeks time we might not be here.”

P2R05

Complications with regard to future funding in regions such as the North West could be the result of the UK NISP funding originating from two different sources (i.e. the NWDA and DEFRA’s BREW programme). Furthermore, given the structure of the UK NISP, delivery in this region is contracted out by the UK NISP and the uncertainty that arose here includes the aspect of whether the UK NISP will continue to contract out the delivery to the same organisations.

The above quote from research participant P2R06 also indicates that as a result of many different funders involved with the programme and the individual targets that funders wish to achieve through the UK NISP, it may be complicated for the UK NISP to make a case for funding by promising to satisfy the individual targets of each funder.

Another highlighted issue was the inconsistency in UK NISP funding in different parts of the country, perhaps making it difficult to balance the delivery of the programme in all parts of the country:

“Other thing I have to say is within Scotland there is a missing link; the Scottish Enterprise covers south parts of the Scotland; there is a separate enterprise organisation called Highlands and Islands Enterprise that covers the north. And as such we do not get any funding from Highland and Islands.”

P2R06

However, the inconsistency in funding was particularly noticeable in Scotland, besides the overall lack of funding in Northern Ireland for BESPs.

## **6.2 Leadership and management of the UK NISP**

Section 6.2 covers all aspects of the UK NISP strategy including leadership, support and tools offered to regional and devolved administration teams. It also takes account of how the UK NISP central team’s contribution impacts on the delivery of the programme.

## 6.2.1 Leadership from the UK NISP central team

Research participants had different views in terms of the leadership skills among the UK NISP central team. In some areas they were assessed extremely positively, in others research participants disagreed with the central team's approach.

### 6.2.1.1 *Very inspiring*

Research participants believed that members of the UK NISP central team were very inspiring. For example, one research participant commented:

“They are also very good at inspiring people so there is lot of high level integration about what we are trying to do and how we trying to do it ... ”

P2R01

### 6.2.1.2 *Very accessible*

Some research participants felt that members of the UK NISP central team are very accessible when any regional team member approaches them to discuss any strategic issues, as well as to seek operational support. The following quotes illustrate this point:

“I had fantastic support from the core team ... At the regular regional co-ordinators meeting, they are very accessible. I would say I am probably on phone to Birmingham 5-10 times a week, taking to people, telling them what I am doing and making sure that I have got the latest ...”

P2R06

“I found it very comfortable to pick the phone up to speak to XYZ or XYZ or to discuss things through or to bounce emails round about what we are thinking in terms of the strategy and they give very good feedback on that ... It is very comfortable to actually put something up about what we are thinking and get some response.”

P2R11

The research participants provided positive comments with regard to the accessibility to the UK NISP central team. However, it was noteworthy that those regions, that were positive about this aspect, were the ones which had been active since the conception of the UK NISP. There were no such views in regions that became involved during the

later stages and/or the regions in which the UK NISP delivery was contracted out to consultancy organisations.

#### *6.2.1.3 Improved, more helpful, less demanding or less mean*

The quote below reflects the views of the delivery partners (i.e. consultancy organisations) about how they feel they were treated by the UK NISP central team:

“Core team since the Drum Beat event have got better, more helpful, less demanding, or less mean ... Getting better but room for improvement, could do better.”

P2R04

It is apparent from this quote that there was disappointment among research participants with regard to the help received from the UK NISP central team in the past. A networking event “Drum Beat” organised by the UK NISP central team, in order to bring together all regional teams was seen as a crucial element of the UK NISP central team’s leadership. The above quote demonstrates that the event was seen by research participants as highly effective. It allowed better access to all involved and encouraged networking and co-operation amongst all of the UK NISP regional teams. However, it also indicated that there was scope for further improvement in how the UK NISP central team supports regional teams.

#### *6.2.1.4 From complete freedom to a corporate feel/sales environment*

The way in which things have changed from what they were initially at the UK NISP was a concern raised by many research participants. Most research participants welcomed the UK NISP’s initial approach, where every regional team had some freedom in terms of their individual method of structuring their teams and making their own decisions on how to deliver their targets, whilst adhering to the principles of IS. For example, one research participant’s positive view, regarding the UK NISP central team’s initial approach is reflected in the following quote:

“we started with nothing. We had a clean sheet of paper with the famous line from XYZ “Go away and make something happen”. It is a great sort of thing, we as a team enjoyed that ... there has been a lot of freedom on how we structure the team and how we grow ... that has been fine.”

P2R11

However, this positivity did not continue for long, as many of the research participants felt that a sales/corporate environment developed in the UK NISP and the freedom to make decisions in individual regions no longer existed.

“when it started with a blank sheet of paper you had almost got complete freedom. And clearly we now fit into what is called more of a corporate feel about it and there are awkward reasons for that. I think if anything it does, there is more and more in terms of the data capture and some elements of that through running the programme through CRISP I guess is the setup of a strong element of the management now.”

P2R11

The key changes identified by the above research participant include a more corporate feel about the UK NISP, its focus on data capture and a strong management element. Similar changes were experienced by many research participants. One research participant described how, in contrast to the initial freedom of devising their own approach to deliver the programme, the UK NISP central team now provides presentation material to the regional teams to use:

“they have given these talks to use. In the past or to start with they left it with the region to devise their approach to deliver the programme.”

P2R01

Whilst some research participants (particularly in the regions managed by consultancy organisations) were sceptical about this approach, others (particularly in the regions directly managed by ISL) felt that they were better supported.

The criticism from research participants was mainly related to the changing focus of the UK NISP from being an organisation based on IS principles, to a corporation keen on achieving landfill reduction targets by any means.

“I think that’s the way that it has changed really. It has become much more of a sales environment.”

P2R04

The above quote indicates that achieving and reporting targets took priority over identifying genuine synergies based on IS principles. One of the concerns identified by the research participants was the amount of time needed to input data into a centralised system.

“ISL has decided then to tighten up and much more focused targets reporting which just take up a lot of the time at the end of the day.”

P2R04

Some frustration was felt among the research participants as the increasingly time-consuming and focused target reporting left the regional teams with limited time to identify and realise more synergies. However, further concerns arose from the pressure central team was under to achieve monthly performance targets. This mounting pressure led the regional teams to become involved in very obvious recycling activities, which achieved performance targets rather than focusing on synergies related to by-products that would actually go to landfill without the involvement of the UK NISP.

“Targets rightly, we have got targets to meet and it is really to keep performance up but I think it is becoming more and more of a large heavy tonnage grabbing exercise.”

P2R04

“we are now being pushed into more target driven so we are always being chased up at the end of the month and rightly or wrongly whether we took form again ‘rap over the knuckles’.”

P2R06

The above quotes indicate examples where projects were undertaken by regional teams, where a by-product would have been reused or recycled without the involvement of the UK NISP. This illustrates the possibility that the UK NISP undertook less worthy projects which could have been realised without their involvement.

#### 6.2.2. National coordination, support and migration of learning

Despite concerns about the lack of freedom among regional teams to make decisions and the increasing control the UK NISP central team has on how the programme is delivered across the country, many research participants are positive about the need of a national coordinating body to oversee regional operations, to bring consistency to the way the regions work and to facilitate the migration of learning across regions:

“there is always a need to have a central coordinating body like NISP Core in Birmingham to oversee what’s happening in all the regions and facilitate migration of learning and provide an element of coordination in certain cases where we need to sort of take migration of resources across regional boundaries and things.”

P2R07

“It can’t be an easy job dealing with all these different people doing completely different things, run in different ways, and manage in different ways regionally. I think the core team is trying to make every region work quite similarly.”

P2R04

There was some consensus among the research participants about the need for a coordinating body, as illustrated through the above quotes. Additionally, one research participant was very complimentary about the benefits of the UK NISP central team’s experience brings to the regions. Moreover, he believed that the central team’s involvement impacted positively on the regions’ capability to deliver:

“We can certainly learn from the experiences that ISL can bring to the table from the other regions. Yeah, that definitely does impact on our capability to deliver it and I think this can only improve it.”

P2R02

In addition to acting as a central coordinating body and facilitating the migration of knowledge across regions, the UK NISP also provided an infrastructure to enable the regional teams to deliver the programme effectively:

“Also there is an element there for support from NISP central team, i.e. ISL in terms of providing the infrastructure to make the programme, to be able to manage the programme effectively.”

P2R01

“all the tools and the infrastructure have been put in place to maximise the ability of each individual to do their job.”

P2R02

CRISP, an expert management system, became one of the key components of the tools and infrastructure offered to the regional teams (see Section 6.2.3 for more details). National programme team/managers were identified as the key members of the UK NISP central team to provide assistance to the regional teams. In addition to the support areas outlined above, the development of delivery strategy and support related to innovation and legislation, were also offered by the National Programme team in association with the UK NISP’s external partners. Most research participants approved of the level of support offered. Satisfaction amongst research participants, with regard to legislative and innovation support, is illustrated through the following quotes:

“... also support through either legislative to the environment agency queries ...”

P2R08

“So at the moment, you’ve got the innovation managers, you’ve one per region”

Since the UK NISP has been working in partnership with environmental regulators and RE-KTN, it was able to offer legislative and innovation support to the regional teams.

### 6.2.3 Opinion on ICT expert management system – CRISP

As explored in the previous section, regional teams had freedom in terms of structuring the regional programme. However, an expert management system called CRISP was introduced by the UK NISP central team to better manage the expanding programme better. CRISP is an internet based tool, liked by some regional teams, but not by others. The research participants' views are captured below with regard to the positive and negative points of CRISP.

Some of the research participants commended CRISP's ability to manage information, resources and events, as one research participant commented:

“what we actually now have is an internet based tool which is CRISP which allows all the practitioners and the regional co-ordinators to manage events, to manage resource, understand our members, exchange information, manage meetings, exchange information, ask questions.”

P2R10

There was evidence that the UK NISP central team had an effective arrangement in place to provide technical help to the regional teams, as and when, needed:

“Their main involvement is just getting help with CRISP system. They have some quite good people there who you can always phone them or email them and they are quite quick in helping out with small problems with the system.”

P2R04

Some research participants thought that CRISP was a powerful system, but it was difficult to learn and to obtain training, as a result, it was hard to convince staff to use it. Criticism from another research participant echoed the earlier concerns about the UK NISP being target driven and its superficial attitude to IS. This is illustrated through the comments made by several research participants:

“I think it is a fantastic system. I would put my hand up and say that I can't use more than 1/10<sup>th</sup> of the functionality. I need to do more. I need to sit down and learn it more.”

P2R06

“I think the tools that they have provided are excellent. CRISP is a very powerful tool. It has taken a while to get everyone to believe that. I think probably we have a slightly more difficult task because of the nature of the people we have brought in. They are very sales orientated so people tend to be little less process driven. I have to trick them into coming into the office and put things on occasionally.”

P2R05

“I think that they are trying to make sure that more data is captured in the CRISP system so we do a lot more inputting on the computer rather than going out and actually doing job.”

P2R04

Practitioners were more sales oriented and less process driven in some regions and therefore they were finding it hard to integrate CRISP into their work. The difficulty in becoming acquainted with the tool and the amount of time required to input data, also put off some regional co-ordinators and practitioners.

“Complexity is the introduction of the CRISP system. It has caused a bit of problem. Teams are getting integrated into the system, getting integrated in the way that it will work. It can take quite a bit of time to input data. It is quite awkward as such but I believe hopefully it will get better and become part of the team but it has been a bit of a problem integrating it into our work.”

P2R04

One research participant, who was involved in the programme from the UK NISP's very early stages, was a strong believer in the freedom the central team offered the regional teams to structure the programme. It is perhaps inevitable that he saw CRISP as a strong management element:

“I suspect it has more influence with time because when it started with a blank sheet of paper you had almost got complete freedom. And clearly we now fit into what is called more of a corporate feel about it ... there is more and more in terms of the data capture and some elements of that through running the programme through CRISP I guess is the setup of a strong element of the management now.”

P2R11

Notwithstanding this, it was believed by many that a significant amount of knowledge and information was recorded in the system which was advantageous if staff left the UK NISP, as it minimised the knowledge loss from staff turnover.

“A lot of the knowledge is starting to be captured within the CRISP so one or two people leaving the programme. Their knowledge is being properly captured and



recorded within the system. Again I don't know how effective we are in capturing that knowledge and capturing that information. If it is done properly then that system can overcome some of the issues of staff turnover.”

P2R06

The fact that CRISP was an internet tool was identified as a particular weakness by one research participant who commented:

“I would say if the internet goes down, we are stuffed. If we lose connectivity to database, a lot of work we do doesn't quite ground to the total whole. We do not have anything on the system if the internet is disconnected. If the internet is down, we can only do a small fraction of what we would do normally.”

P2R06

Although some research participants regarded CRISP positively, most were unhappy using it. It is interesting to note that support for CRISP was particularly evident from research participants who were part of the UK NISP central team or the ISL. In contrast, other delivery partners were not particularly positive about its use. This observation indicates that the use of CRISP was particularly beneficial in capturing data and enabling the UK NISP central team to keep track of the projects (particularly when staff left the regional team or where the delivery contract with the regional team was terminated). Additionally, capturing data for monitoring and reporting purposes and ensuring consistency among regional reporting have been identified as important reasons for the UK NISP central team to motivate regional teams to focus on CRISP. The ease of knowledge transfer, from one region to another when using CRISP, has also been emphasized by some research participants. The main points of criticism of the regional teams were the time and resource constraints and the resulting distraction from the identification of real synergies, based on IS principles, to achieve and report landfill reduction, by any means possible.

#### 6.2.4 Strategic support in leading discussion with funding bodies

Leading funding proposals and discussions was seen as a vital role of the UK NISP central team, as one research participant commented:

“There is support there if needed, e.g. the discussion with the funders; he is taking a lead role on that. He is great and I am there if they need something to go in on local level, he will then say that he is our regional co-ordinator. But the difficult

discussions about how much money and what they should expect that is being taken by XYZ.”

P2R06

“I think the key thing is funding basically so the contracts for the delivery; Yorkshire Forward contracts are arranged by XYZ. So the funding streams fundamentally come through them and in some cases we work jointly to make contributions to the work that XYZ has done to secure those contracts.”

P2R11

The above quotes are extracted from the interviews of research participants who had been part of the UK NISP since its conception. No other research participants from consultancy organisations (that were contracted to the UK NISP delivery) or otherwise, saw the UK NISP as being a support provider in securing funding, as most of them regarded the UK NISP as their client:

“In terms of the ISL ..., from Scott Wilson’s perspective they are the clients.”

P2R02

There was a clear indication that discussions to secure funding were led mainly by the UK NISP central team across the UK. This involvement is also addressed in Chapter Five and again, the evidence available to this study suggests that the UK NISP central team played a key role in leading the funding discussions.

### **6.3 Reflection on the UK NISP delivery strategy – geographical context**

The UK NISP began operating in a very unique way, led by businesses and supported by the regional EDAs, which subsequently give rise to a regional level of coordination and delivery. The programme’s growth then resulted in the development of a strategy that facilitated the delivery of the programme’s objectives across the UK. The geographical context of the coordination and delivery strategy is the focus of this section.

Geographical context was significant to the successful delivery of the programme’s objectives and has significant importance in the realm of IS. The UK NISP’s strategy to coordinate nationally and deliver regionally, is unique when compared with the approaches used previously. Although, regional delivery dominated the delivery mechanism it actually developed further to include delivering its objectives nationally, engaging nationally with organisations operating in more than one region, developing

inter-regional synergies, delivering on sub-regional or local levels and engaging at industrial park / estate levels, where appropriate and, or feasible. The UK NISP has, therefore, grown to include additional delivery mechanisms which have made the organisation more effective and efficient. This section explores the views of the regional co-ordinators / practitioners to evaluate whether they find the UK NISP delivery mechanism to be effective and investigates their opinions concerning the best way to deliver the UK NISP.

### 6.3.1 Regional delivery

Regional delivery of the UK NISP's objective was implemented at the programme's conception stage. Interestingly, all research participants considered the adopted regional delivery to be one of the key strengths of the UK NISP delivery mechanism which was considered to be overall, a better and unique approach. In contrast, most other national delivery organisations (similar to the UK NISP) were perceived to be less effective.

There were a number of reasons why research participants felt that focusing on individual regions was the best approach for the UK NISP delivery. These included: funding arrangements; particular industry sector within regions; the need for closer geographical ties to businesses; learning and adapting from other regions; better ties with the regional development agencies and their agenda; the possibility to align the UK NISP objectives with the regional strategy, and as such, a greater possibility of receiving support from regional bodies; less chances of the EDAs trying to provide similar services; and, the need for regional knowledge to understand what businesses expected from the delivery bodies. Some of these areas are explored further in the Sections below.

#### *6.3.1.1 Better ties with (regional) economic development agencies*

Prior to its national funding, the UK NISP initially relied on EDAs. Although this situation has recently begun to change, there are still regions where the UK NISP is able to secure additional funding from the EDAs and/or there is potential for the UK NISP to secure additional funding from the EDAs. The EDAs became interested in the UK NISP because they have their own economic development targets to meet within the region and the UK NISP activities have the ability to help them achieve some of these. In order

to convince the EDAs to fund the UK NISP, or to continue the existing funding for longer term and thereby receive support (including referrals) within the EDA network, it is crucial for the UK NISP to have a regional presence in order to form better ties with EDAs.

“I think NISP regional structure is a real strength. It gives regional presence. Better tie with Regional Development Agencies which has got significant networks and also funding and resource.”

P2R07

There is also a need for the UK NISP to fit within the realms of the regions’ EDA strategy so that it can demonstrate its ability and commitment in achieving regional economic development targets.

“I think that the regional basis is fundamentally because you need to be because ... then you are linking with regional developmental agency at that level and their agenda. So if you are looking at strategy and we have got some discussions going on, e.g. bio-fuels and that is a regional strategy thing. So the shape of the programme needs to fit to the shape of that key delivery mechanism.”

P2R11

Another point made by one of the research participants was that the regional presence of the UK NISP resulted in fewer opportunities for EDAs to launch a similar service, as well as the rather positive position of the UK NISP leading on IS initiatives.

“The other good thing about having a regional structure ... Having lived in RDA they are hungry empire building organisations. If they see a gap in the market which has not been provided, they will fill it. And the fact that NISP has regional teams, regional structure, means they are less willing to provide a similar resource. Now one or two regions they have done that already like East of England. But another which are a bit behind the game. As long as we keep close to RDAs and show them how we are regionally focused that will prevent them exactly what we are doing.”

XYZ

The above quote illustrates an important point regarding the need for the UK NISP’s existence alongside EDAs which have the ability to deliver IS services to businesses. This point is closely linked to scepticism felt about the existence of the UK NISP in Chapter Five.

### *6.3.1.2 Understanding of a region, its industry and businesses needs*

In order to pitch to regional businesses and to deliver the programme according to their specific needs, research participants believed that having an understanding of the regional context and the industry sectors that dominate the region were absolutely necessary for the successful delivery of the UK NISP programme by its co-ordinators and practitioners. Regionally focused delivery would therefore provide adequate opportunities for the UK NISP co-ordinators and practitioners to learn about the region, industry sectors and gain an understanding of the industry's specific needs. Research participants advocate that:

“You do need to have the regional knowledge to understand what the businesses want from you. By putting a regional team in place you can actually deliver what the business wants.”

P2R10

Furthermore, one research participant asserted that local knowledge could not be substituted:

“Sometimes it is a case of driving past a big factory that you didn't know was there. You will never find it just by looking on Google and then it would be too desk based and research based. You can't rely on internet for everything. You have to exactly know what is in your patch. A local knowledge does not have a substitute really.”

P2R03

There were research participants who also believed that putting regional teams in place (who have a better understanding of how things work in a particular regional setting) would be beneficial in developing relationships with regional organisations and working effectively with people in that region.

It was also considered important that closer geographical proximity to regional businesses would provide the opportunity for improving relationships, as is illustrated in the quote below:

“So going in the level that is significant within the industry that is important within the region. I am not saying that it will not happen if we have headquarters in the middle of England but it is going to be more difficult to get that connection. ... this programme is outward facing programme. It is not about what we do within the programme that matters, it is about what we do talking to the industry. To that

extent we have to be out there close to the people that matter and these are the people who have waste and who have other issues. We need to talk to them, we need to visit them and we need to keep in contact. Again if you are centrally based organisation you can do that to some extent but I don't believe that you can do to the same extent as you can if you are close to them geographically.”

P2R06

In summary, in the research participants' opinion, some of the elements that supported regional delivery were good local knowledge of the region and its dominant industrial sectors, understanding the needs of the businesses in the region and the need to be geographically close to them in order to promote relationships.

### *6.3.1.3 Opportunity to learn and adapt good practice from other regions*

Another important element which supported regional delivery was the possibility for inter-regional learning and the sharing of best practices. In addition, national coordination of the programme provided the necessary infrastructure and support to aid the learning process. The importance of regional delivery in creating a culture of co-operation, learning and adopting best practices is illustrated through the quote below:

“... NISP is being UK-wide programme. It allows you to interface with the other regions. Pick up from what other regions are doing, take ideas; take best practice those working elsewhere; take templates for meetings; take all sorts of stuff. And rather than having to think it for yourself from scratch, you just have to pinch ideas that work and you use them. It is very blatant. If it works somewhere else then why it shouldn't work here.”

P2R06

Additionally, most research participants were positive about the potential opportunities for inter-regional synergies:

“It is the strength and of course there is always a need to have a central coordinating body like NISP Core in Birmingham to oversee what's happening in all the regions and facilitate migration of learning and provide an element of coordination in certain cases where we need to sort of take migration of resources across regional boundaries and things.”

P2R07

The regions appear to be clearly reliant on having a nationally managed programme to facilitate the inter-regional efforts. Another research participant also asserted that it is

crucial to have a national programme covering all UK operations, including realising inter-sectoral synergies:

“we now have a national programme covering all of the UK operations. That also identifies other opportunities which are good cross-regional synergies ...”

P2R10

In this section, the importance of national coordination has been highlighted. However, this topic was explored in more detail in Section 6.2, where the usefulness of national coordination and delivery is evaluated.

#### *6.3.1.4 Resource limitations*

One of the other reasons for supporting regional delivery relates to the resource limitations associated with the UK NISP programme. Many research participants believed that having a regional delivery mechanism was beneficial. However, the occasional need to understand the sub-regional level was also considered important. The use of part-time business associates in sub-regions was proposed by a number of research participants in addition to the team of co-ordinators and practitioners in the region (similar to the hub and spoke model) however majority of them raised concerns about the level of available resources. This is illustrated through the assertion made by a research participant:

“we will have core team in Edinburgh but we will identify practitioners not necessarily full time may be half time practitioners in the west of Scotland, North East of Scotland and possibly the North West. ... It will be more effective because if I have everybody based here in Edinburgh we will still be concentrating on the central belt. If I will have somebody in Aberdeen, the Highlands and the Islands, West Coast of Scotland, they will find it much easier to visit companies, spending less time travelling around and more time talking to people. They will probably have their feet on the ground in terms of knowing what is going on locally. Yes, I think that will probably work well but to do that all we need a team bigger than what we have at the moment. With just 3-4 people I think spreading them around the country would not be sensible. 3 or 4 people in the central team and 2-3 people on part time basis; yep, I think that will work.”

P2R06

According to some of the research participants', a sub-regional delivery mechanism (if integrated well with regional delivery) could also have been effective, although

limitations related to funding and the availability of resources restricted this possibility. Although, an important aspect of the sub-regional delivery mechanism has been highlighted in this section, it will be explored in more detail below (Section 6.3.3).

### 6.3.2 National coordination and delivery

National coordination and delivery involves a number of the activities undertaken by the UK NISP central team. These include strategy development, involvement in discussions and negotiations to secure funding, mentoring and advising regional teams through national programme managers, delivering at the national level or organising delivery for businesses which operate in more than one region through NPT, coordinating inter-regional synergies, and facilitating knowledge transfer among regions. It is inevitable that most of these UK NISP central team activities were explored earlier in Section 6.2 to demonstrate the support and resources that were made available from the UK NISP central team. However, the aim of this Section is to present an understanding of the importance of having a national coordination and delivery mechanism and how it integrates with the overall strategy.

#### 6.3.2.1 *National Practitioners' team*

Following the launch of the UK NISP at the national level, it became more widely recognised by businesses. Interest from businesses which had operations in more than one region was inevitable, given the excellent publicity efforts of the UK NISP. On the one hand, it was a matter of pride and success for the UK NISP to be able to deliver their services to such large organisations. However, there was also reluctance by these organisations to deal with the UK NISP in every region, because of the centralised nature of decision-making and the limited authority among the regional managers to make any strategic decisions relating to the overall business strategy. This difficulty was first noticed by the researcher himself during the PhD fieldwork and a solution was proposed in the International Society for Industrial Ecology (ISIE) conference in 2007 during a presentation focused on the delivery strategy of the UK NISP.

The UK NISP central team devised an NPT, which was aimed to complement the regional teams in their engagement of multi-regional organisations (at senior management level). One member of the NPT commented on its role:



“we are a resource that could be called upon, anywhere in the country, because basically the people that we are looking to deal with are big, either big, multi-regional companies, or people that have operations in more than one region”

P2R12

Another research participant from a regional team also believed that it was an appropriate approach to deal with large corporations at national level:

“There might be a large number of companies like large corporate like Tesco and people like that who would be better having a hold at a national level but a small number may be top 20 blue-chip companies for example, it will be more appropriate to handle them nationally rather than at a regional level. I think the way NISP goes about that works tremendous. ”

P2R07

Moreover, another important reason for having a NPT was considered to be the possibility of better opportunities and larger projects when engaging at Head Office level, whereas the managers at regional level have to receive the decision from the top:

“if it would have been a regional guy, you would have just had your regional way, which is good, but if you can get the head of recycling involved, you talk about bigger projects and bigger things. This [regional] guy will still have a problem, until he gets the decision for the top, cannot move forward. So we just go straight to the top, as much as we possibly can, so people who we tend to deal with, you know are the national directors, the managing directors and will have you.”

P2R12

Research participants believed that multi-regional businesses may find it hard to deal with people in different regions. Moreover, the skill-set within regional teams would only have a limited capability to assist such organisations.

“the advantage to the big companies that are dealing with National Team [is that] ... we'll coordinate that work so they don't have to deal with twelve different people and get twelve different reactions and twelve different, you know, skill-set and everything else, you know because at the moment we're dealing with sort of keeping within our own areas of expertise so when they come and talk to us then they're talking to somebody who knows what they're talking about rather than perhaps going into a region and they might go to ... a region who doesn't have anybody with AD [anaerobic digestion] experience, for instance and they might not get a very rosy glow”

P2R12

Although, the NPT was viewed positively by most research participants, and regional co-ordinators were supportive of the national team's involvement, there were certain issues highlighted by research participants, which they considered were making the process difficult. One of the key issues that emerged in the early stages of introducing the national team as the 13th region, was the regional teams' concern that the outputs arising from the participation of multi-regional businesses would be claimed by the NPT, regardless of the fact that regional teams may have been working with these businesses prior to the NPT involvement. One research participant highlighted this difficulty:

“I mean we started off... we were going to be in the 13<sup>th</sup> region, I mean we were going to operate in that way. ... I think because we didn't want this competition for resources. The National Team is only going to work if we work with the regions and not take resources from them ... Because they're charged with delivering tonnage ... so if we were to come in and then take resources out and the National Team claimed the resources, claimed all the outputs, we're not going to get the back-up from [regional teams].”

P2R12

Given the difficulty associated with creating the 13th region to deal with multi-regional businesses, the NPT's function was changed to one of coordinating the projects and identifying resources among multi-regional businesses. Its role also included passing resources to the respective regional team(s) to better utilise the resources within their regional network and claim the outputs based on the proportion of resources used in synergy.

“So to make that relationship work yeah, all right, we'll pass it over to the region to say look we've got 200 tons of this stuff here and we've got 300 tons of that stuff, there's anything you could do with it? So give them a couple of months to have a look at it, if they can't do anything with it then as a National Team, we'll start to look further ... and saying is there anybody else out there who can do something with it?”

P2R12

After these alternative arrangements were introduced, there were still some disagreements between the regional teams and the NPT with regard to the output claims, unclear arrangements as to who should lead a project and the extent to which regional teams were expected to be involved in these projects. Overall, the NPT was not a huge success. However, research participants were generally positive about the

presence of a central coordinating body which provided oversight of operations across the country, including the provision of support and acted as a ‘virtual’ pool of resources and skills that could be used during a particular project. The role of the central coordinating body in assisting with inter-regional synergies was also seen as crucial to the success of the overall programme. Despite these views, research participants believed that these arrangements were only possible where regional teams were not overpowered, as was experienced in the case of NPT.

### 6.3.3 Opinion on sub-regional (micro-managed) level delivery

Although regional level delivery was considered to be the research participants’ preferred method, it is apparent that sub-regional delivery was not being completely discarded. The UK NISP central team did not state whether or not to approach delivery on a micro managed level. Some research participants supported the micro managed delivery approach, whereas others did not believe it to be effective. Factors that appeared to influence their opinion on the use of micro managed delivery included the existing infrastructure, regional logistics and resources available to each regional team. The positive opinions expressed by research participants concerning the micro managed delivery approach included the division of practitioners’ area of work into sub-regions, focusing on the micro level to find solutions within a closer proximity, better connections with geographically close businesses, and the use of micro levels in order to satisfy specific sub-regional agenda.

#### *6.3.3.1 Focus on sub-regional delivery Vs lack of resources and funding*

There were many regions where delivery was approached sub-regionally, or where there was a desire to approach it sub-regionally under regional coordination. Practitioners were given responsibility for particular sub-regions to ensure that most of the region was served, as explained by one research participant:

“You can may be possibly even go certainly smaller because and as our region is split into three: ... So you could may be have 3 separate networks there with one may be with one member of staff to look at. ... we each had our own sub-region in our region and then we could bring it together in one. I am also looking at smaller scales looking at industrial estates. ”

The evidence available to this study suggests that delivery within the regional delivery model was approached sub-regionally as well as on an estate level, within some of the regions. Others adopted this approach slightly. One of the research participants was particularly enthusiastic about having a regional team and business associates that covered sub-regional areas. The concept of using associates was to involve experienced individuals with local knowledge, perhaps on a part-time basis. The following quote illustrates the vision of one research participant:

“It will be more effective because if I have everybody based here in Edinburgh we will still be concentrating on the central belt. If I will have somebody in Aberdeen, the Highlands and the Islands, West Coast of Scotland, they will find it much easier to visit companies, spending less time travelling around and more time talking to people. They will probably have their feet on the ground in terms of knowing what is going on locally. Yes, I think that will probably work well but to do that all we need a team bigger than what we have at the moment.”

P2R06

However, issues regarding adequate levels of resources and funding appear to be a key difficulty in the adoption of this type of delivery model. The quote below clearly asserts this point:

“I think there are pros and cons in taking IS into a more micro managed level so as an example may be going in and having sort of sub-regions within our own regions as an example but that comes back to how do you resource that and the funding that would be required to do that. So I personally think based on the funding that we have and the other mechanisms in place that we have the most appropriate delivery mechanism.”

P2R02

However the idea from the above quote (by the research participant P2R06), of an extended ‘hub and spoke’ model appears to have been an effective form of delivery for organisations such as the UK NISP, from national to regional level, right through to sub-regional level. This would perhaps allow a better understanding of how the UK NISP and similar organisations might approach the effective delivery strategy of a nation-wide programme. Given the importance of the delivery strategy for the UK NISP type of organisations, this topic is thoroughly discussed in Chapter Seven.

### *6.3.3.2 Finding local solutions Vs difficulties with knowledge transfer*

A number of research participants were also positive about the sub-regional approach as it was considered necessary to find available solutions that were located in geographical proximity. However, rather than replacing the regional delivery, it was seen as a way to complement the regional delivery. Research participants stated that they:

“try to look for solutions as close to the business as possible. So the regional level project, some of the work we do is split down to sub-regions anyway so you always look within closest proximity for the solution. But if you broke it down further you probably would not have scope of solutions to be able to deliver because you need to know wide about what’s going on really.”

P2R01

It is interesting to note that sub-regional delivery is believed to be very useful in order to satisfy some IS principles. However, it is also apparent that any further micro arrangements may be detrimental to successful delivery, as it may result in eyes being taken off the bigger picture. Additionally, some research participants also believed that sub-regional delivery might restrict knowledge transfer within the region:

“We did have a sub-regional breakdown. We found that did not work as well because once one individual worked with a certain company in a certain industry he gained skill and knowledge which he could apply to a similar company in a similar industry. By being regional we were building on that accumulating knowledge. So really the right person needs to go to the right business wherever they are in the region. It is partly regional and partly sector.”

P2R03

It is also interesting to note that having a sector focus approach to delivery was also mentioned by the research participant (in addition to the geographical context of delivery). This view is in line with other arguments on the impact of the delivery contracted out to consultancy organisations in certain sectors. This topic is explored further in Section 6.4.

### 6.3.3.3 *Better ties with businesses Vs unequal business spread*

Another important reason to support sub-regional delivery of the UK NISP was the need to be closer to the people that matter (i.e. business people who either have a by-product from their processes or who need a by-product for their processes). One research participant had very strong views on creating stronger ties with local businesses:

“we have to be out there close to the people that matter and these are other people who have waste and who have other issues. We need to talk to them, we need to visit them and we need to keep in contact. Again if you are centrally based organisation you can do that to some extent but I don’t believe that you can do to the same extent as you can if you are close to them geographically. ”

P2R02

In a preceding Section, the idea of having an improved relationship with local business people links well with the earlier proposal to use associates with unique local knowledge. However, one issue highlighted, related to the example where a region has an enormous geographical area, or the businesses were spread unequally with regard to their size, sectors and volume. In which case, sub-regional delivery would be extremely difficult to achieve:

“I think for the Southwest what the current system is – is the best system because under the methodology of delivery it is difficult to justify changing that management structure because if you divide the southwest for example, let’s just say divide the SW for better management; suddenly there are 98% SME businesses that employ less than 10 people. Now one of the outputs is over 100000 tons of waste to divert from landfill. Very very difficult to subdivide the SW to achieve those outputs from very small businesses. So as a programme in the SW we deliberately focus on the big industrial areas.”

P2R08

The key barrier that has emerged regarding the sub-regional operation of the UK NISP, appears to be their requirement to achieve significant landfill diversion targets which would be impossible if focus was placed on all sub-regions, due to the unequal spread of industry, or large geographical area. This also illustrates the inequity in the amount of support offered to small businesses, although this is a policy issue.

#### *6.3.3.4 Satisfying the needs of a specific regional agenda*

A number of sub-regions were identified having specific agendas due to the different nature of their funding arrangements. For example, South Yorkshire is an ‘Objective One’ area due to its lower GDP (75% below the EU average) and therefore it receives EU structural funds support to restructure the declining industrial areas and agriculture. As a result, areas like South Yorkshire have a specific need to be managed at micro level, so that it fits within the overall strategy for the sub-region. One research participant proposed the need of a sub-regional delivery for such areas:

“There are specific things linked, e.g. South Yorkshire, objective one area, it has got its own uniqueness so unique that you need to manage that on a sub-regional basis. And some of our targets are based on that. I think that the regional basis is fundamentally because you need to be because ... then you are linking with regional developmental agency at that level and their agenda.”

P2R11

The need for sub-regional delivery was justified by the research participant in these specific cases. However, delivery on a regional basis is still considered fundamental in order to maintain the link with the EDAs and their overall strategy for the region.

#### **6.4 The UK NISP delivery strategy – direct delivery Vs contracted delivery**

The UK NISP commenced delivery of the programme in three different regions, with the three following approaches: (1) delivering directly (i.e. delivery managed by the UK NISP central team or ISL directly); (2) delivering through a consultancy organisation; and, (3) delivering via an academic/research institution. Since the UK NISP was launched nationally, delivery was contracted out to consultancy organisations in most new regions. All the approaches to delivery continued, although changes were made according to the availability of funding and performance of individual regions. The advantages and disadvantages of each of these approaches have been covered in this section to explore why the UK NISP employ different programme delivery strategies.

#### 6.4.1 Consultancy organisations and the UK NISP

The UK NISP was delivered predominantly through consultancy organisations, including Scott Wilson, WSP, Link2Energy, ThirdWave, etc. as one research participant commented:

“a vast majority of the other programmes although not necessarily a multinational engineering and consultancy, a lot of them are consultants within that or in smaller group.”

P2R04

Some of these consultancy organisations were also contracted out to deliver the programme in more than one region. Most research participants, from the contracted-out delivery regions, believed that there were mutual benefits involved in these partnerships. A number of the key advantages, for both the UK NISP and consultancy organisations, have been pointed out by research participants.

##### *6.4.1.1 Raising profile, opportunities and sector focus*

Being involved with the UK NISP (and the ability to raise their company profile) was seen to be a mutually beneficial element of the partnership between consultancy organisations and the UK NISP. Consultancy organisations were able to demonstrate their commitment towards the environment and/or sustainability by working together with the UK NISP and thus raising their profile. Additionally, there were further opportunities for the consultancy organisations working with the UK NISP, in addition to generating revenue for the organisation, as some of the quotes below illustrate:

“I suspect Scott Wilson’s reasons for getting involved were not just because it just an another piece of contracted work, there is a huge opportunity here for Scott Wilson to position itself as a leading support organisation to delivering some of these business benefits outside NISP and within the framework of the programme.”

P2R02

“as an environmental consultancy it is good for the profile of WSP to be involved in this kind of project. They are also getting growth as a company in terms of the personnel and they are able to bring people in to do NISP which then go on to become consultants in WSP. So they are getting to grow their business as a result and it is good for any consultancy to have that kind of recurring revenue.”



P2R03

“It benefits Scott Wilson because clearly when you are bidding for work it is helpful to suggest that we are associated with NISP programme and we have started to input NISP criteria should we say in our bidding process”

P2R07

Similarly, delivering through consultancy organisations also helped the UK NISP to tap into the consultancy organisation’s network base and raise its profile, as illustrated through the assertions made by several research participants;

“WSP also does quite a lot of promotion for NISP programme to get them the publicity.”

P2R05

“I mean it’s beneficial for NISP because we are more likely get linkages for large tonnages for projects in construction industry with which Scott Wilson is involved with.”

P2R07

It is very obvious from the research participants’ views, that consultancy organisations benefitting by working with the UK NISP, as it raised their own profile, generated revenue, and the potential for more opportunities and business growth. Whether the UK NISP benefited equally from this relationship is an important question that ought to be addressed. As research participants commented, as well as gaining publicity through the consultancy organisations’ networks, the UK NISP was able to benefit by claiming outputs for the waste diverted from landfills by the consultancy organisations’ networks. However, most of these consultancy organisations focused on the sectors that they themselves were active in, rather than attempting to identify synergies in other sectors. For example, one research participant commented:

“WSP in turn can offer NISP programme through their construction work and so forth, a lot of industrial symbiosis activity.”

P2R08

Furthermore, one research participant from another consultancy organisation working in partnership with the UK NISP also believed that the focus of the consultancy organisations, when working on the UK NISP project, would be on the specific sectors they are linked to or have a relationship with:

“I am sure that the links that we have, the information that we get, the relationship that we build with regional stakeholders and obviously feeds into some of the

decisions that we make in terms of who we engage with, how we take the programme forward, which particular sectors we are looking to engage with.”

P2R07

The above quotes indicate that one key reason why the UK NISP used consultancy organisations to deliver the programme was to be able to tap into and claim large tonnages through the projects that these organisations were involved with (e.g. construction and demolition waste). Whether the tonnages claimed were genuine (i.e. whether or not the by-products would have been landfilled) in the event of no involvement of the UK NISP is a crucial question? This important aspect of the UK NISP’s strategy will be discussed further in Chapter Seven.

#### 6.4.1.2 *‘Virtual’ pool of resources*

In addition to raising the profile and generating opportunities for both the UK NISP and consultancy organisations, having a ‘virtual’ pool of resources was advantageous to the UK NISP and its practitioners. Given their size, consultancy organisations had ample resources (in terms of skills and human resource) in most of the required areas in order to handle any UK NISP projects. Although, there were limited resources employed by the consultancy organisations to undertake the UK NISP projects, there was always additional support available in the form of the ‘virtual’ pool within the consultancy organisations. Individuals with a particular skill-set could be invited from within the organisation if there was a need for a particular skill-set to handle a specific UK NISP project; thus reducing the effort and expenses on part of the UK NISP to bring in such resources. Most research participants belonging to consultancy organisations contended that it would not be strategic for the UK NISP to deliver the programme directly throughout the country. For example, one research participant commented:

“For NISP, it enables NISP to deliver the national programme. Without partners and I think it won’t be very strategic in terms of resourcing and that is the main reason for going to support partners in the first place really. It is probably less risk for them. They are not bringing in their own staff to work on a single project only.”

P2R01

It was further asserted by another research participant that there are significant resource benefits attached to the UK NISP contracting out delivery to large consultancy organisations:

“It obviously has the expensive resources to call upon not just within the individuals charged with delivering the programme but as I spoke to you earlier about this concept of a ‘virtual’ pool. Scott Wilson has about 3000 employees in the UK that we can call upon.”

P2R02

#### *6.4.1.3 Facilitation and consultancy*

One issue that came to light during this study related to the differences between facilitation and consultancy. Most people employed on the UK NISP projects at consultancy organisations were consultants. These consultants found it difficult to understand the actual differences between consultancy and facilitation. It was contended by one research participant that practitioners were not aware of what facilitation involves and what they should, or should not do, during the facilitation process.

“there is a bit of a blur as to what constitutes facilitation and what constitutes a consultancy.”

P2R07

In addition criticism came from research participants regarding the approach the UK NISP suggested they take when undertaking the UK NISP projects:

“Yet in order to close out synergies, it is evident that you can’t just bring two people together in a workshop, respect them to go away and make something happen all on their own. That’s the kind of feeling that NISP had.”

P2R07

In regions where consultancy organisations were delivering the programme, there was evidence of a lack of suitable training being offered to practitioners. This indicates that the UK NISP central team was relying too heavily on the consultancy organisations used to deliver the programme, without providing basic training on how it should be delivered. One research participant raised the concern that they required a better understanding of the facilitation process and that practitioners should be trained before they embark on UK NISP projects.

“I think we do need to have a fuller understanding of what facilitation involves so we can explore that to our co-ordinators. And certain practitioners do not know what they are supposed to do and what they are not before their fingers get burnt.”

P2R07

Despite the many benefits as considered above, there were issues in the partnership with consultancy organisations. These issues included having a specific focus on sectors in which consultancy organisations were active, an over reliance on consultants from consultancy organisations to deliver the UK NISP projects without offering adequate training and consultants' limited knowledge of IS concept. Furthermore, issues were identified, particularly in the delivery contracted out to consultancy organisations, as consultancy organisations had their own working manner, whereas the UK NISP had been pushing its own system, which included requests for random data reporting, resulting in significant confusion for consultancy organisations:

“It negatively impacts, ... , we are requested by so many different people from ISL for many different reports and different pieces of information and you get it from that person, that person, that person and it gets confusing. Are we asked to do all these things at once by all those different people, why is this?”

P2R08

There was a feeling among the co-ordinators and practitioners in the consultancy organisations that the UK NISP is a client and that the consultancies are just delivering a service on their behalf, in return for a payment. This perception appears to have resulted in reduced commitment from the consultancy organisations when compared with the direct delivery by the ISL in some regions. There was also concern regarding the compulsory systems that the UK NISP central team expected all UK regions to use. These points have been illustrated through the assertions made by several research participants:

“In terms of the ISL, ..., from Scott Wilson's perspective they are the clients. Then obviously yes, that's the biggest external influence how we deliver the programme because essentially they are the clients to which we are answering and to which we are delivering a service on their behalf. They obviously have some clearly defined ideas on how the programme should be delivered.”

P2R02

“The core team influences our way of managing the programme because they introduced compulsory systems as they want to see them used as a pilot to their contractual agreement. It does influence our performance.”

P2R08

“Probably the only complexity is that we are trying to use the system that is being developed elsewhere, and it is not as easy to use as our systems ourselves.”

P2R09

#### 6.4.2 Direct delivery (by ISL)

Another important delivery mechanism identified in some regions included the UK NISP central team managing the delivery of the programme itself. Overall coordination in these regions was undertaken by members of the UK NISP central team involved with the UK NISP from the conception stages. At this level, there were signs of strong relationships between the co-ordinators and senior members of the UK NISP, due to their early involvement in the programme. One of the research participants stated that:

“It is a mutually beneficial relationship. Myself and XYZ being here since June 2003. So we had a long standing relationship with all the people who were there from the very beginning. I found it very comfortable to pick the phone up to speak to XYZ or XYZ or to discuss things through or to bounce emails round about what we are thinking in terms of the strategy and they give very good feedback on that.”

P2R11

In contrast to the contracting out delivery method, by delivering directly regional teams have to rely on their own resources and skill-set in the region and within the UK NISP central team in order to raise their profile and develop their membership base. In this approach, focus on particular sectors has been very much reliant on the skill-set of the practitioners and co-ordinators within the regional team. However, they appear to receive full support from the UK NISP central team to enable them to deliver the programme, which was not the case where delivery was contracted out to consultancy organisations, as one research participant commented:

“I had fantastic support from the core team. People like ... has been up. At the regular regional co-ordinators meeting, they are very accessible. I would say I am probably on phone to Birmingham 5-10 times a week, taking to people, telling them what I am doing and making sure that I have got the latest, e.g. the presentation that I am doing tomorrow ...”

P2R06

No particular issues were identified in the direct delivery method as most decisions were taken and systems were gradually developed after consultation with most ISL staff. Furthermore, they were fully aware of the IS concept and the facilitation skills that were required to deliver the programme. However, the staff at the consultancy organisations working for the UK NISP did not feel the same way as they were either:

(1) treated differently by the UK NISP central team; or, (2) they did not consider themselves to be part of the UK NISP, as the quotes in the previous section illustrate.

#### 6.4.3 Partnership with universities and other public funded bodies

In addition to delivering directly and through consultancy organisations, there were some regions where delivery was contracted out to research institutions and to public sector bodies already delivering a similar service. The UK NISP's relationship with both these types of organisations was seen as mutually beneficial. Most research participants agreed that it was beneficial for them to be linked to a national programme and to raise their profile. Furthermore, involvement with the UK NISP generated good revenue, enough to enable them to sustain more than half of their staff, as well as allowing diversity in their portfolio of services. For example, one research participant commented:

“Money is to start off with. CLEMANCE gets a lot of cash from NISP. Clemance get the benefit by getting in the forefront of the programme and get the funding to pay for nearly half the staff requirement. So it gives us some good options with the diversity.”

P2R04

Furthermore, there was consensus among research participants that these relationships were mutually beneficial. Both the University setting and the public sector bodies - already delivering similar services - were considered to be more effective compared with the consultancy organisations delivering the UK NISP services. Research participants believed that these types of organisations either had prior experience of delivering similar services (in the case of public sector bodies) or had better knowledge of what the concept was about (in the case of research institutions) and how the facilitation process could be approached. This view contrasted with that of the views regarding consultancy organisations which struggled to deliver the UK NISP services effectively. In response to the question why a research institution was chosen to deliver the UK NISP services, one research participant said:

“Because it was beacon of ISL. It was the only currently active ISL region. It was the shining light. There was no one else who could have come close to the knowledge of what the concept was about.”

P2R04

A greater understanding of the IS concept was the key advantage in these relationships. Furthermore, since these organisations were not serving a particular sector, they appeared to be open to all sectors for the development of genuine synergies. On the other hand, consultancy organisations' focus was predominantly on generating synergies within their own business domain. However, the possibility for a 'virtual' pool of resources and skill-set was very similar in all the delivery organisations, as most of them had a larger workforce than the one actually employed for the UK NISP project. Moreover, skill-set from various different sectors could be utilised, as and when required.

The only issue raised by these organisations included changes experienced during the growth of the UK NISP when much more focused target reporting was introduced and absorbed a large proportion of the practitioners working day, thereby restricting their time to actually perform the work.

“You go and here is the money, these are your targets, here is your contract and now we don't mind how you do it using the general principles of IS but the targets, and obviously now saying that there are some underperforming regions. ISL has decided then to tighten up and much more focused targets reporting which just take up a lot of the time at the end of the day. I think that's the way that it has changed really. It has become much more of a sales environment.”

P2R04

## **6.5 Regional teams and their experiences of delivery**

This section comprehensively explores the skill-set and roles of regional co-ordinators and practitioners and their experiences of delivering the UK NISP services to business. The experiences explored include approaches used to make businesses aware of the UK NISP services and to motivate them to participate in the UK NISP projects. It also focuses on the type of projects undertaken by regional teams and the barriers faced during synergy projects and how these barriers were overcome.

### **6.5.1 Management and leadership in regional programmes**

The role of the regional co-ordinators is explored in this section, and includes interaction with the UK NISP central team, strategic development of the regional

programme, managing and leading the team (training, delegating, etc.), financial management, set-up and running of events, public relations and marketing, setting priorities and achievement of targets, working as a practitioner, managing and reporting data and facilitating knowledge transfer across regions.

#### *6.5.1.1 Interacting on contractual issues with the UK NISP*

There are differences in the way each of the regional programmes were managed, with a distinct diversity in the regions managed by consultancy organisations. Although all regional teams were managed by the regional co-ordinators, UK NISP contractual issues were dealt with directly by central project managers within the consultancy organisations. However, in the case of delivery through other partners, e.g. University/similar delivery bodies, or in the case of direct delivery by the UK NISP central team, of the majority of these issues were dealt with by regional co-ordinators. One research participant who works for a consultancy organisation commented:

“...some of the interaction on contractual issues is done through our central project manager within Scott Wilson.”

P2R01

Regional co-ordinators are also seen by some research participants as a channel for information to pass between the UK NISP central team and the practitioners:

“The regional co-ordinator is a line manager for the team but also is a channel for information from NISP core team.”

P2R04

#### *6.5.1.2 Strategic development of the regional programme*

Strategic development of the programme was contended to be one of the key roles of the regional co-ordinators. The research participants identified the roles of regional co-ordinators in the strategic development of the programme to be: engaging with regional groups including membership organisations and other delivery bodies; developing and maintaining relationship with EDAs, regional government, environment agency and other regional/local bodies; and, coordinating the Programme Advisory Group (PAG). These roles have been illustrated through the quotes below:



“I am responsible for the kind of strategic development of the programme in the region so engaging the likes of the development agency, the regional assembly, fostering the links with the environment agency and local authorities.”

P2R02

“In effect use expertise to help with various networking in RDAs for example ...”

P2R07

“... ensuring ... programme delivers what our PAG has asked us to do within the region, what the RDA has asked us to do within the region.”

P2R10

Although most research participants were positive about the strategic development role of the regional co-ordinators, engagement with high level bodies in the region, creating relationships with the PAG and meeting their expectations were mentioned by only one research participant. This research participant comes from the region at the root of the UK NISP and works extremely closely with the UK NISP central team. No other regional co-ordinators considered it their role to coordinate the PAG in their region. The UK NISP central team always considered PAG to be a crucial part of the regional delivery, as they believed that the UK NISP was a business led programme. However, there was limited evidence of interest in the PAG among regional co-ordinators.

### *6.5.1.3 Management of the team*

Management of the team was identified by all research participants as key role of the regional co-ordinators. However, some of the research participants were very sceptical about the phrase “managing the team” and appeared to have believed in leading, instead of managing the team. For example, one research participant commented:

“I do intensely dislike the term manager. It kind of implies somebody sitting in the office ticking boxes, checking to see if people are in on time, doing something what they should be doing. ... To that end, I would much rather see people in the regions who are leaders rather than managers. It is leadership thing, not the managerial thing, certainly at this stage. I am saying that because programme is really about change management. It is about change management within industry. Change management is about influencing behaviours. And influencing behaviours is not about ticking boxes, it is more about explaining, it is more about leading, guiding, influencing.”

P2R06

Another research participant presented a similar view:

“As a regional co-ordinator – be proactive in your communication, need to be a leader, need to be organised, and you need to respond to the needs of your team.”

P2R08

Some of the elements related to team management that were particularly highlighted, included keeping the team motivated, taking people out of their comfort zone, etc.:

“You just have to keep them motivated but also have to make sure that they managing their work load in order to take people out of their comfort zone without making them feel lost.”

P2R05

Whereas others believed in setting out priorities with regard to focusing on specific sectors or focusing on selected limited number of synergies

“the regional co-ordinator obviously manages his team and sets priorities for which sectors they are working in, which workshops they hold and how they go about their daily business.”

P2R07

One of the research participants was quite keen on using the balanced scorecard:

“one of the things we have put in place is the individual Balance Scorecard that includes a prediction; probability of things coming up; and how much time they are going to be spending on it.”

P2R05

Specifically in case of consultancy organisations, regional co-ordinators are also responsible for reporting to the project leader in their own organisation:

“he is responsible for the results in that particular region to the Scott Wilson project leader.”

P2R07

Some of the research participants also believed training practitioners was an important aspect of the role to ensure practitioners have a good understanding of the UK NISP, as well as the capability to deliver targets.

“I am responsible for the delivery of the contractual targets ... and responsible for ensuring that the team members have the capability to deliver that.”

P2R08

It was interesting to note that most managers' focus had been on managing the team and each of them had his/her own tactics on how this should be achieved and most of them appeared to approach it quite differently.

#### 6.5.1.4 *Financial Management*

Financial budgeting, managing resources including people resources and distributing resources also fall under the responsibilities of the regional co-ordinator. This is illustrated through the following quotes:

“The way that we distribute the resources, people resources and the financial budget to deliver the outputs is also mainly my responsibility.”

P2R02

“... manager has to then consider what you have got in your web of resources”

P2R06

#### 6.5.1.5 *PR/marketing and running workshops*

Another important aspect of the regional co-ordinators' role included supporting PR and marketing strategies devised by the UK NISP central team, as one research participant commented:

“supporting the PR and marketing to help the programme as we go through.”

P2R07

There were very few research participants who highlighted this particular role of the co-ordinators. Presumably, PR and marketing were seen as activities undertaken by the UK NISP central team. However setting up, marketing and running the workshops for businesses were, a few research participants pointed out, their key responsibilities:

“I help ... to set up events, then marketing the events and running the events.”

P2R02

#### 6.5.1.6 *Working as practitioner and providing support to regional teams*

Some of the research participants also believed that the need to work as a practitioner, as well as providing support to the team in developing synergies was an important aspect of a regional co-ordinator's job:

“I work with members on going to visit them to talk about their resources and help them to develop the synergies that we are working on with them and also support the team in doing that role as well.”

P2R01

“The manager has to actually do the practitioner type work themselves. Has to talk to the companies and find out what the issues are.”

P2R06

However, this point was only highlighted by a few research participants.

#### *6.5.1.7 Knowledge transfer across regions and inter-regional synergies*

Facilitating knowledge transfer among regions was also an activity uniquely undertaken by the central project managers of consultancy organisations, as one research participant commented:

“And my role is to assist the transfer learning across all three regions”

P2R07

However, this particular activity was not mentioned by research participants as being a role for regional co-ordinators elsewhere, illustrating the limited interest of regional co-ordinators in cooperating with other regions and sharing best practice.

Furthermore, there was no evidence that regional co-ordinators were making any effort in looking for solutions in other regions, indicating no particular interest among regional co-ordinators in developing inter-regional synergies.

#### *6.5.1.8 Achieving targets and managing/reporting data*

In addition to the predominant focus of regional co-ordinators in managing the teams, managing finances and other resources and strategic development of the programmes, some research participants considered achieving targets and reporting to the UK NISP central team as an important responsibility for regional co-ordinators. This point was highlighted by some research participants:

“I am responsible for the delivery of the contractual targets that the region needs to achieve and responsible ... for reporting...”

P2R08

In summary, the key areas of regional co-ordinators’ responsibilities include managing and leading the team, strategic development of the regional programme, financial and resource management, achieving and reporting data. On the other hand, there were other areas of responsibilities which were not common among all regions, including training practitioners, working as a practitioner, PR and marketing support, etc. In addition there

are certain areas which were not considered or considered to a very limited extent as being part of the regional co-ordinators' responsibility, including knowledge transfer among regions, facilitating inter-regional synergies and coordinating the PAG.

### 6.5.2 Regional practitioners

Since the responsibilities of regional co-ordinators have been discussed in Section 6.5.1, this section focuses on the skills and roles of regional practitioners and other support staff

#### 6.5.2.1 *Skill-set of regional practitioners*

Key skills that are considered necessary for the practitioners' role and are available among regional practitioners have been identified by the research participants as follows:

##### (a) Knowledge base of specific sectors

In response to the skill-set crucial for the role of practitioners, most research participants believed knowledge base of specific/priority sectors to be of utmost importance. Research participants commented that they would be keen to recruit someone with an expertise in a particular sector to complement any other sectors expertise that is already available within the team. The quotes below illustrate the sector related knowledge and skills that are considered to be the most important aspects of the UK NISP practitioner's role:

“So between us, we've got you know a mix of skills and sectors and everything else but I'm looking for... we've been given the permission to go out and recruit somebody else, so we're looking at another sector. I've also got working for a part-time guy which is right in this area”

P2R12

“XYZ has fantastic knowledge base in the construction sector.”

P2R10

“XYZ is the practitioner with extensive background in built environment and architecture and XYZ who has a background in design but also recycling of electrical equipment and that was the main reason that she was taken on.”

It is clear from the quotes above, that most practitioners are recruited based on their skills in a particular priority sector identified by the regional co-ordinators.

(b) Having own network/industrial experience

The majority of practitioners recruited had significant experience of working in the industry, with knowledge of industrial production.

“All of our people working on this programme have significant industrial experience and I think it is very important.”

P2R09

In addition to good industrial experience, these people are expected to have their own network:

“he’s got lots of experience, lots of very good contacts which is what we need”

P2R12

It is a very similar case for business associates (part-time business practitioners). Business associates generally work on an hourly basis whilst running their own business. Their experience (in the recycling sector in most cases) as well as their client base, is most important when contracting out practitioner type work. For example, one research participant commented:

“one they are street wise because that’s how they earned a living anyway, by being good in the market and it also means that they have their own client base too, which they can bring. ”

P2R11

(c) Good in managing relationships and engagement

Skills in managing relationships and engaging effectively with businesses were also seen as being useful for the position of practitioners as the research participants commented:

“ ... the business managers I have employed are for their skills, with managing relationship ... I believe that the team has got the ability to identify opportunities to manage the relationship with businesses.”

P2R11

“But he’s also very good in engagement”

## (d) Sales and marketing skills

Sales and marketing skills were considered relatively important and consultancy organisations focused on these in particular, as one research participant commented:

“Originally the consultants that were here were very research/academic based. They liked comfort zone quite a lot. We have moved that away to a very much outward facing, sales focused. Most of the people employed are quite extrovert and quite loud as well but can also go out and open doors and also finish them.”

P2R05

### 6.5.2.2 *Roles of regional practitioners*

The roles of regional co-ordinators are outlined in this section as experienced and expected by the regional co-ordinators. The key areas of their responsibility include:

- (a) organising events and improving awareness of the programme;
- (b) selling the idea of IS, explaining the concept of the UK NISP to businesses and engaging companies with the UK NISP;
- (c) conducting site visits, identifying resources have and wants, and establishing opportunities for individual businesses;
- (d) supporting businesses from the start of the synergy process through to synergy fruition; and
- (e) maintaining relationships with businesses and capturing data.

Table 6.4 elicits some of the responses highlighting the practitioners' roles:

**Table 6.4: Practitioners’ roles**

<b>Research participants</b>	<b>Quotations</b>
P2R02	“Their responsibility is to engage companies, sell the idea of industrial symbiosis, get companies to engage with NISP programme, conduct the site visits, establish what the opportunities may be for individual companies, actually support them and others within the network to bring a synergy to fruition”
P2R04	“Main role is to engage with companies in the region to find out waste and then look for solutions for waste problems towards our targets. Also involved in organising events, doing presentations and trying to improve awareness of the programme ... a facilitator between companies, engage companies in the idea of NISP, inform them about NISP, get information from them, we can then use to help them improve their resource use efficiency.”
P2R01	“Practitioners have to work with members; help identify new members; bring them into the programme; explain what NISP is; try to identify what resources use they have where we might be able to help and then bring synergies together and working with them. There is also an element of... in terms of managing events and workshops and facilitating these as well.”

Source: Author generated

The majority of research participants had similar views with regard to the responsibilities of practitioners. However, one research participant was very keen for the practitioners’ role to maintain a healthy relationship with businesses, for the purpose of capturing output data and to ensure a continuous dialogue:

“business managers have got the companies and their responsibility is to maintain this relationship. And they do that by calling them up, by listening to them and not by ignoring them. Their role is to maintain those business relationships. They will do that as a matter of course to generate some outputs but we almost force the issue of maintaining that relationship by having interim status. We call back every six months and catch up with what has happened in that time period. Even If the business manager did not have occasion to visit them for any other reason, then it should be that after six months they need to be having to go back and having a discussion. Although interim status is used to capture some outputs, it is also a great excuse to make sure that a dialogue continues. So I think that the system we have got actually channel the healthy relationship with companies that I see as very important.”

P2R11

These aspects of the practitioner role were not particularly emphasized by other research participants.



### 6.5.2.3 *Recruitment and staff turnover*

Two main human resource issues pointed out by research participants, included the difficulty in finding the right people for the practitioner role and the high turnover of practitioners.

#### (a) Difficulty in finding right people

Since the practitioner's role is considered a specialist position, as explored in Section 6.5.2.2 (where necessary skill-set for the job and the roles to be undertaken by a practitioner are outlined), regional co-ordinators have found it extremely difficult to fill these positions. One research participant commented that there is shortage of such a skill-set in the market place:

“Finding suitable people can also be difficult. It is quite a specialist practitioner role. Quite specialist skills required and there is shortage of those in the market place.”

P2R01

#### (b) High staff turnover

Another issue identified was the high turnover of staff in many UK NISP regions. There is a high turnover of the regional co-ordinator's role, as noted by one research participant:

“Obviously there has been turnover of the regional co-ordinator role and I am the third in the region. So that has its complications.”

P2R01

Another research participant analysed the reasons for this high staff turnover and came to the conclusion that uncertainty about the continuation of funding and consequently the uncertainty about the future existence of the programme has been a key reason:

“As I said before it is an outward facing programme. It is about relationships. It is about building relationships with people in industry ... One of the biggest issues that the programme in Scotland has had, has been because of the lack of continuity of funding. .... There are always lengthy negotiations, promises of money eventually and delays in actually getting the money through. This actually

underlines a lot of these staff turnover. That has actually put in a fair amount of uncertainty to the positions of the practitioners in the programme. You are working on the programme and then you are told we have got funding up to March and we don't know after that. By that Jan Feb time you think end of march not far away I have got the bills to pay and I am going to go and find another job. This could be one of the reasons that there is high staff turnover. If you have high staff turnover then you do not have the opportunity building up the ongoing relationships and that I think impacts badly on the delivery of the programme.”

P2R06

Continuation and certainty of funding appears to be one of the main reasons for high staff turnover. High staff turnover, in turn, has consequences in terms of maintaining a healthy relationship with businesses, which in earlier sections was considered an important part of the delivery process.

## **6.6 Concluding summary and recommendations**

Understanding of the IS concept as well as the objectives of the UK NISP, by the coordinators and practitioners varied to a large extent. The most common objective of the UK NISP, as highlighted by the research participants, was to achieve the tonnage, i.e. achieving tonnage targets in terms of landfill diversion. However, this demanding objective was seen as coming from the UK NISP central team and some of the research participants believed it was a very superficial attitude to IS. Some clarification with regard to the actual objectives of the UK NISP, whilst adhering to the IS principles was suggested.

The UK NISP as well as the UK industry faced difficulties arising from the funding arrangements that were put in place across the UK. The drawbacks of the funding arrangements included: inconsistency in the level of funding across the UK; uncertainty about the future funding and associated staff turnover in programmes such as the UK NISP; funding too many similar delivery bodies and creating confusion for businesses about who to approach; and, competition instead of co-operation among the delivery bodies. However, research participants' were satisfied with the funding offered by the EDAs, as it helped the UK NISP to focus on economic development aspects of IS, as well as meeting environmental objectives. Furthermore, the national funding

arrangement was commended by research participants as it acted as a catalyst in promoting inter-regional synergies through the UK NISP.

Contradictory views were expressed regarding the leadership by the UK NISP central team. The UK NISP central team was seen as very inspiring and accessible by some research participants. On the other hand, others believed that there is scope for the UK NISP central team to become more helpful and less demanding. Moreover, it was felt that initially complete freedom was offered to regional co-ordinators to structure their teams and manage the regional programme in their own way, as long as they adhered to IS principles. However, frustration was experienced amongst regional co-ordinators after the UK NISP central team tightened their control, by insisting compulsory systems were used in each of the regions and after introducing more rigid targets. Changes were not welcomed by most regions as most regional co-ordinators and practitioners believed that the UK NISP environment was moving from having complete freedom in the way regions operated, towards becoming a sales/corporate environment. Consequently, this left the co-ordinators and practitioners with limited time to identify and realise synergies, compared to the amount of time and effort spent on data management and reporting. As research participants suggested, this extreme pressure to achieve targets and a limited time scale to execute the actual work, resulted in the UK NISP becoming involved in projects that may have been realised without the involvement of the UK NISP and which were possibly in opposition to the principles of IS.

Notwithstanding the above criticism, it is apparent from the research participants' views that they were positive about having a national coordinating body to oversee operations across all UK regions and devolved administrations. There was support for the coordinating body's role to bring consistency in the way regions work, to facilitate migration of learning among regions, to provide infrastructure and support to regions, and leading funding discussions. However, there were contradictory views expressed about having an ICT expert management system such as CRISP. In most cases, CRISP itself was not criticised, but the way in which it was implemented was ineffective in majority of regions. There appeared to be a need for better training, including an explanation of the importance of its use and some effort was also expected from the UK NISP central team assessing the amount of time and resources required in order to manage the changes introduced. These proposed actions would have prevented the

actual work from being hindered, i.e. the development of synergies based on IS principles.

An important part of the UK NISP organisational design was the nationally managed and regionally delivered programme. Regional delivery of the UK NISP was seen by research participants as one of the key strengths of the UK NISP, because of the benefits derived from: linking up the strategies of the respective EDAs and other regional bodies; opportunity to learn about businesses' needs in particular regions; the prospect of being connected geographically; and, the possibilities of learning from other regions through the national coordinating body. However, national and sub-regional deliveries were not completely contested by the research participants and both delivery modes were seen as complementing the regional delivery.

National delivery was approached in the UK NISP through the NPT. Initially, there were setbacks initially and dissatisfaction among regional teams about the way it was introduced. However, the NPT was regarded positively by research participants as an appropriate mechanism by which to manage multiregional companies. Nevertheless, regions were concerned that the NPT would overpower them and that there was a good chance outputs, which should be claimed by the regions, would be stolen by the NPT. Overall, the NPT was not seen as a successful mechanism and there was scope for improvement. Sub-regional delivery on the other hand, was welcomed in some regions but not in others due to the specific context of the regions and availability of resources in each region. However, it was seen to be beneficial in finding local solutions and enabling people to be closer, ensuring a greater connection. An unequal spread of businesses with regard to their size, sectors and volume in some regions would make it difficult to deliver sub-regionally. Additionally, any further micro managed delivery may result in eyes taken off the big picture, which would perhaps also lead to a restriction of knowledge transfer within the region.

The advantages and disadvantages of delivering the UK NISP through different regional partners revealed some interesting insights from the research participants. With regard to the direct delivery of the programme, the biggest advantage was considered to be the resulting total control of the operations. However, the issue arising from this was that it was reliant on the resources and skill-set available in the region or in the UK NISP central team. Delivery contracted out, on the other hand, was seen to present many more

advantages, including better publicity, large tonnages coming from the consultancy organisation's projects and the availability of a 'virtual' pool of resources from within the consultancy organisation. However, there were concerns raised by research participants with regard to delivery contracted out to consultancy organisations. Consultancy organisations are already active in certain sectors, which would limit them to those sectors when developing new synergies. Moreover, some of the outputs claimed may not be genuine, as any by-products which could have been reused without the involvement of the UK NISP could be attributed to the UK NISP. Furthermore, the research participants believed that there are significant differences between consultancy and facilitation, and that practitioners from consultancy organisations do not have a clear understanding of what they should or should not do when facilitating synergy development.

## CHAPTER SEVEN: DISCUSSION

This Chapter aims to discuss the findings of the research study in relation to the research questions set out in Chapter One. In doing so, it establishes the UK NISP's place in the UK government's 'green' market strategy, whilst also attempting to understand the organisational design employed by the UK NISP as well as its implications.

### 7.1 The UK NISP, environmental policy and devolution in the UK

Analysis conducted in Chapter Five on the policy context of the UK NISP suggests that devolution had a significant role to play in how the UK NISP is linked to the government's 'green' market strategy and how devolution and the resulting individual policies/strategies in each of the UK countries, impacted upon the effectiveness of the UK NISP.

Predominantly studies conducted in the UK on the UK government's 'green' market strategy concentrate on England. Such studies are focused on the belief that the policies in the devolved administrations are transposed from those of England and are slightly modified to reflect the local industrial, political and cultural context of each devolved administration. However, the findings from this study suggest that although broadly similar, policies can be very differently formulated and implemented in each of the countries in the UK and this may be the reason for the varying levels of effectiveness of a policy instrument across the UK.

Analysis presented in Chapter Five suggests that the policies and strategies that relate to, or promote the UK NISP, are both economic and environmental. One of the key findings relates to the significant variation in the way in which the various policies and/or departments are integrated (or even attempt to integrate in some cases) in each of the countries in the UK to support a policy instrument such as the UK NISP. It is evident from the findings of this study that the UK NISP cuts across both economic and environmental policies and government departments (see Chapter Five). However, the way in which it was treated in each country by the government varied with regard to support and funding.

In England, the approach was well integrated with the development of BREW, an overarching programme that was created in consultation with the Treasury and the Department of BERR. However, in Northern Ireland, Scotland and Wales there was no overarching programme to manage programmes that cut across different departments. In Scotland, in particular, effort was evident as economic and environmental departments came together to support the programme. However, this was approached with no formal mechanism (such as BREW) in place, resulting in different targets being imposed on the UK NISP by different funding bodies. In Wales, decisions were taken by the Welsh Assembly government in consultation with the steering group of the MAP. Decisions were based on whether the activities and outcomes of the UK NISP were aligned with strategy/policies in Wales, but it was also approached on an ad-hoc annual basis. The Welsh government focused on issuing tenders for services the government required, with no guarantee of funding any specific programme. Northern Ireland was the last country in the UK to make the UK NISP services available. The UK NISP was supported/funded by *Invest NI* in Northern Ireland with no, or limited involvement of other government departments.

It can be suggested from the findings that the differences identified in each of the UK countries, with regard to the effectiveness of a policy instrument, relates to the decision-making mechanism employed in that country. This is in addition to the different strategies and policies being adopted by each of the UK countries based on their specific needs (DEFRA 2010).

Responsibility for environmental taxes in the UK, which includes landfill tax lies with the UK government. The UK NISP was adopted as one of the measures by the UK government to allow them to meet their landfill diversion requirements (set out by the EU Landfill Directive), fulfil their share of the Kyoto target and to reach their domestic goals to reduce CO<sub>2</sub>. In the political context of the UK, a very high proportion of environmental responsibilities have been passed from the nation-state to the EU (Gibbs and Jonas 2000). Within the context of the UK NISP, this has been done by the nation-state mainly through adopting the Landfill Directive and the Waste Framework Directive issued by the EU. Despite this, it was the UK government that took the initiative to introduce landfill tax in 1996, The Landfill Directive that came into force in 1999 had strong implications for waste handling and waste disposal, with the overall

aim to reduce the impact on the environment from the landfilling of waste. Moreover, the UK needed to abide by the legally binding targets set by the Landfill Directive.

In response to the Landfill Directive, an annual escalation in the level of landfill tax was introduced throughout the UK. The same landfill tax escalator was applied all across the UK, since tax matters are dealt with at a central level in the UK, with a particular view to encourage the industry and the local authorities to find alternatives to landfill and to recycle the landfill tax, in order to fund BESPs such as the UK NISP. Given the varying powers of the devolved administrations in the UK, policy formulation and implementation is a complex issue. However, formulation and implementation of environmental/waste policy and strategies are dealt with at devolved level. Although the landfill tax escalator was introduced UK-wide and promises were made by the UK Treasury to recycle the landfill tax to businesses (as the powers to do so lie with the central government), the decision about how landfill tax revenue would be used remained with the governments of the individual countries. Therefore, decisions taken to recycle landfill tax through the UK NISP and/or other BESP's were taken by the various governments of the individual countries. This increasing empowerment of the devolved administrations is interpreted as decentralisation within the theory of Ecological Modernisation and it has been referred to by Gibbs and Jonas (2000) as the "downwards" hollowing out process within the rescaling of environmental policy. The findings suggest that pressure is mounting to find devolved solutions for devolved issues. Also, increasing importance is being given to the decentralisation of environmental policy in the discourse of ecological modernisation. However, it is accepted that formulating and implementing policy, on a downward scale, is a complex issue (Gibbs 2000) and the effectiveness of it would depend on "who is in control, who sets agendas, who allocates resources, who mediates disputes, who sets the rule of the game" (Wilbanks 1994, in Gibbs 2000: 18) This brings us to the question whether the "downwards" hollowing out process has been effective in the implementation of the UK NISP as a policy instrument in the UK devolved administrations.

Frijns et al. (2000) believe that environmental policy could operate more effectively at a decentralised level. However, migration of learning and innovation from one devolved administration to another would become significantly difficult. Frijns et al. (2000) argued that decentralisation would provide more opportunities for financing the environmental policy. This has been absolutely true in most UK NISP cases throughout



the UK. In particular, research participants commended the involvement of both economic and environmental government department in funding the UK NISP, as this would harmonise the economic growth and environmental protection. However, there have been complexities that have no common sense of direction for the UK NISP, due to the different targets set by each of the funding bodies. For example, in Scotland the UK NISP was funded by three government bodies, including the Scottish government, Scottish Enterprise and SEPA.

Difficulties experienced by the UK NISP in managing the three funders included the need to satisfy the individual targets of each of the funding bodies and the uncertainty of the UK NISP's existence, given the different time scales during which the UK NISP was being funded by various funding bodies. Thus, it agrees with the claim made by Frijns et al. (2000) that decentralisation does offer more opportunities for financing/funding policy instruments. However, it is detrimental, in terms of the effectiveness of the policy instrument, if it is required to achieve the different targets set by each of the funding bodies, as well as maintaining the continuity and stability of the policy instruments influenced by the short term commitment of funders and the changing policy focus of each of the funders in the long term.

Frijns et al. (2000) also suggest that extended powers to devolved administrations in order to enforce regulation and the liberty to use revenues from pollution fee/tax in the area of environmental policy are likely to achieve more than central government. Regardless of the promises made by the UK Treasury to recycle the landfill tax to businesses by funding various BESPs, devolved administrations decided to make use of most of the revenues in areas (non-environmental policy) which were considered to be a priority for the then governments in the devolved administrations. This resulted in an uneven focus on resource efficiency and waste management policies throughout the UK, which was to the detriment of the UK-wide businesses as they had to deal with a different policy focus in each of the UK countries, different BESPs and a different level of environmental support throughout the UK and in some cases, even a different interpretation of EU and central government legislation. Most of the powers, with regard to choosing and funding BESPs, rested in the hands of the devolved governments. There was no formal decision-making mechanism (such as BREW in England) and very limited involvement of relevant stakeholders, including the NGOs and business representatives, in the decision-making process. The lack of relevant

stakeholder involvement and a formal mechanism is related to the limited resources made available for harmonising the economy and the environment in areas that the devolved governments considered to be a priority.

The key issues emerging, due to the devolved nature of the UK government and their individual powers in formulating and implementing policy, include the different (formal or informal) mechanisms used in the decision-making process, e.g. unequal involvement of stakeholders, lack of policy framework, such as BREW in England, different interpretations of legislation coming from the EU and the central government, different priority areas for spending money, varied level of resources to employ on decision-making exercise, and uneven development across the UK. These issues may relate to the lack of skills and knowledge in environmental matters among the decision-making bodies in the devolved administrations. This may, therefore, result in a lack of harmony between economic growth and environmental protection and a lack of innovation and knowledge transfer between the devolved countries. Decentralisation or the downwards hollowing out process, particularly in the case of the UK NISP in devolved administrations, does not appear to have been effective in UK environmental policy-making. However, this should not be interpreted as the ineffectiveness of the decentralisation aspect within the theory of EM, but as an example of an asymmetric system of devolved government and the varying powers vested in the government, that decentralisation did not come across as an effective approach to environmental policy making, particularly when analysing the case of the UK NISP. A lack of strategic capability among devolved authorities to enable the harmonisation of environmental protection and economic growth may have been one of the reasons for this ineffectiveness (Frijns et al. 2000, Gibbs 2000, Gibbs and Jonas 2000).

There was enough evidence to suggest that the upwards hollowing out process (Gibbs and Jonas 2000) has been useful in environmental policy making, through the adoption of EU environmental directives and targets imposed on the UK. Decentralisation is seen in EM theory as a prerequisite of the state's role to decouple environmental impacts from economic development. Although in this particular study, it is the rescaling of policy formulation and implementation that is given importance rather than just decentralisation. Rescaling upwards, through the adoption of certain EU directives, has been of particular advantage and most legislation in the UK is based on these EU directives. In addition to contributing towards the legislation, the Landfill Directive and

the Waste Framework, along with other related directives, have played a significant role in the formation of waste policy and other policy instruments across the UK. This helped in changing the focus of the UK government from just municipal waste in the past, to a holistic approach towards managing industrial and commercial waste alongside municipal waste. This provided the impetus for the government and businesses to climb up the waste hierarchy, improving the relationship between environmental impacts and economic development. The credit for this change goes to a large extent to the adoption of the EU directives. It suggests that upwards rescaling has a role to play in the ecological modernisation agenda, in addition to the downwards rescaling or decentralisation of policy formulation and implementation. However, when looking at the policy context of the UK NISP, rescaling downwards, with regard to the recent policy formulation and implementation powers of the devolved administration, does not seem to positively impact on the ecological modernisation agenda. As the research participants believed, support and funding for a policy instrument like the UK NISP, if received at central level, would have been more effective than the downwards rescaling from central government to devolved administrations. One research participant commented:

“I think it would be more effective if it was a completely national programme ... that relies on having very good links with the devolved authorities and I think that’s still a bit of an issue.”

P1R02

Different environmental standards and the level of environmental support in devolved administrations may be detrimental to the efficiency of businesses that operate across the UK, moreover, it may affect the competition, thus limiting the harmonisation of economic growth and environmental protection. Additionally, the fragmentation of power makes communication difficult among the decision-making bodies (Alvarez 2002). This study therefore supports more centralisation of the environmental policy-making to ensure that the same standards are applied across the UK boundaries. However, there is potential for effective downward rescaling in environmental policy-making if the efforts are made towards the capacity building of the decision-making bodies in environmental matters, in the devolved administrations, with an increased devolution of responsibility and if the relationship between the central government and the devolved administrations is better managed.

Whilst the failure of decentralisation is somewhat evident in the case of the UK NISP and the policy framework around the UK NISP and other BESPs, efforts to pursue sustainable development are visible. However these efforts in devolved administrations come across in the form of weak policy formulation and implementation when compared to England. “ ... the constrained capacities of subnational government will continue to inhibit the development of meaningful policies for sustainable development in Britain” (Batchelor and Patterson 2007: 210). Extended and consistent empowerment of devolved administrations and their capacity building, with regard to skills and knowledge of the decision-making bodies in the environmental policy area, as well as the availability of adequate resources to at least the same level as in England, may only be a long term solution in diverting from the weak formulation and implementation of the sustainable development policies.

## **7.2 Non-state stakeholder participation in decision-making**

Although the UK NISP was initially introduced and led by businesses, the government had an important role to play in adopting the UK NISP as a policy instrument within their mix of the ‘green’ market strategy. Decisions made by the governments in the UK to adopt certain environmental policy instruments also relate to the decision-making process and the extent of non-state stakeholders involvement. Additionally, within the EM perspective, a trend towards larger involvement of non-state stakeholders in environmental decision-making (Mol and Spaargaren 2009) is evident. Therefore, the discussion in this section focuses around the decision-making mechanism and participation of non-state stakeholders in environmental decision-making, within the UK NISP policy context. The participation of non-state stakeholders is discussed in relation to the extent of their involvement, relevance and competency of the stakeholders and the influence of the non-state stakeholders’ views on the policy outcome.

Apart from the government’s initial support of the UK NISP when it was recognised as a potential policy instrument, capable of reducing the environmental impact of UK businesses and at the same time, utilising resources efficiently, the UK NISP was adopted as one of the key instruments within the BREW programme that focused on resource efficiency and waste management. In later years, the UK NISP was also adopted by the devolved administrations as part of their economic and/or environmental

policies. However, the decision-making mechanism varied across the UK and the findings from this study suggest that the effectiveness of a policy instrument could, to some extent, be dependent on the decision-making mechanism and on the extent of non-state stakeholder involvement in the decision-making process. The decision-making mechanism within the BREW programme demonstrated a trend towards the larger involvement of stakeholders. In contrast, the decision-making in devolved administrations did not follow the same trend, as would have been expected in an industrialised economy (Frijns et al. 2000, Mol and Spaargaren 2009).

**Table 7.1: Level of participation**

	<b>Government's role</b>	
6	Ask participants to make key decisions	↑
5	Delegates part of its authority	
4	Plans jointly	
3	Asks and takes advice	
2	Consults	
1	Gives information	

Source: Adapted and modified from Coenen (2009)

The government's role (as illustrated in Table 7.1) relates to the level of participation it allows non-state stakeholders. The findings suggest that the level of participation of non-state-stakeholders in the environmental decision-making process, as approached by the government, does not go beyond level 3 (see Table 7.1). In some devolved administrations it may not even reach level 1 and 2 (see Table 7.1). For example, there was no formal mechanism for consulting any non-state stakeholders in Scotland and the decisions were made by government officials on the basis of the short term performance of BESPs. The reasons and impacts of this shortfall in involving non-state stakeholders, as Batchelor and Patterson (2007) believe, depends upon the power, competency and resources of the decision-making bodies and this, to some extent, is evident in the case of Scotland.

Another aspect of non-state stakeholder involvement relates to the relevance of these stakeholders. Participants in the environmental decision-making process in England included a wide variety of environmental NGOs as well as trade organisations. Furthermore, the range of non-state stakeholder involvement satisfied the research

participants. Based on, (1) claims made by the UK NISP that it was led by businesses, the landfill tax revenue that was collected from businesses was used to fund the UK NISP and (2) that businesses are considered to have a good understanding of their processes and how best to deal with their environmental impacts, the involvement of individual businesses and/or trading organisations in the environmental decision-making process was instrumental in formulating an effective environmental policy. Gouldson and Murphy (1998: 11) suggest that “the capacity for action of a particular coalition depends ... on the strength, competence and constellation of the actors that seek to influence policy”. From these findings, it is evident that in devolved administrations in particular, the attributes as outlined by Gouldson and Murphy (1998) were not present amongst the actors that were involved in the decision-making process. In particular, this relates to the lack of involvement by trade organisations or individual businesses as well as representatives of any environmental groups.

The influence of the non-state stakeholders’ involvement on the policy outcome is another key aspect when discussing the involvement of non-state stakeholders. This aspect was particularly relevant to England as it was the only country where the research participants were satisfied with the involvement of relevant stakeholders which would be a prerequisite for a discussion about the level of influence that non-state stakeholders had on policy outcomes. Gouldson and Murphy (1998) believed that the influence from the non-state stakeholders’ views had on the policy outcome depended upon the structural framework within which they had to operate. An example of this was the dissatisfaction felt among the non-state stakeholders, regarding the funding of a policy instrument which, although not discussed during the consultation process, was funded without the prior knowledge of the non-state stakeholders involved (see Chapter Five, Sections 5.5 and 5.7). These findings confirm the views of Gouldson and Murphy (1998) concerning the relevance and strength of the individual actors which, as discussed earlier, would be of no advantage in the absence of a favourable structural framework.

In addition, there was no provision for any non-state stakeholder consultation during the first year of the BREW programmes when most of the active BESP were government funded. Even after the formation of a non-state stakeholder steering group, none of the new BESP were allowed to bid for money in later years and only those that were funded in the first year were considered for further financial support. As a result, the

role played by non-state stakeholders has been restricted with very limited, or no heed given to their recommendations. The random selection of funded BESPs made it extremely confusing for businesses to fully understand the roles of each BESP and which specific BESP businesses should approach for advice. Involving and considering the views of non-state stakeholders from the onset would have prevented this confusion. Although the government promised to reduce the number of government funded BESPs from about 3000 to 100 or less through their BSSP, there is no evidence that it actually happened. The only development, with regard to BSSP, included making Business Link the first point of contact for identifying expert BESPs suitable to deal with specific business issues. Additionally, it is noteworthy that most of the Transition Management Board Members who were responsible for driving forward BSSP solutions came from the public sector.

In summary, the involvement, relevance and influence of non-state stakeholders was of tremendous importance in the policy formulation and implementation process and there was limited evidence of an effective government approach. It could be argued that the development of the non-state stakeholder related capacities in the decision-making process will have had a profound impact, not only in choosing the right mix of policy instruments, but also on better integration of environmental concerns in non-environmental policies at the macro economic level and this would “secure the macroeconomic structural change that is a key component of ecological modernisation” (Gouldson and Murphy 1998: 12).

### **7.3 The UK NISP, environmental policy and innovation**

Whilst the findings of this study suggest that innovation has a role to play in the effective application of the IS concept to industrial problems, “innovations [as well] depend upon a system or network of relations without which their adoption would be impossible” (Gouldson and Murphy 1998: 27). This statement suggests that IS networks flourish when they have innovation capability; IS networks also have the ability to foster innovation, whereas innovation is unlikely to be adopted in the absence of such, or similar networks. The most successful IS projects are expected to provide some sort of innovation that is technological and/or related to knowledge and information transfer. Multidirectional linkages (as in IS networks) result in innovation through their ability to transfer knowledge and information (Gouldson and Murphy 1998). However, access to

funds, in order to support R&D and long term policy focus, can enhance the innovation capability of such linkages. Access to funds relates to not only the institutional capacity and skills to undertake R&D, but also to the availability of disposable funds to carry out R&D required for potential IS projects. Private investors can be encouraged to invest in R&D/innovation related to IS projects, provided they are convinced of the certainty of the related policy direction in the long term. Therefore, the integration of innovation capability to an IS programme comes across as being of importance for the successful application of the IS concept, as well as for fostering the adoption of innovation. Whether this integration was approached by the UK government effectively - whilst formulating and implementing the environmental policy in relation to the UK NISP and impact of any government action - is the key focus of this Section. In addition, this Section discusses the innovation capability - and its influence on the performance - of the UK NISP.

In addition to introducing regulations and taxes, government intervention to promote innovation could have been possible in four key ways including: (1) creating knowledge networks that can assist in the adoption of innovation; (2) introducing R&D funds to support the innovation required to realise specific projects inspired by BESPs (e.g. IS projects motivated by the UK NISP); (3) fostering co-operation among the BESPs funded by the UK government; and, (4) introducing policies with a medium to long term focus to encourage private investors to invest in innovation projects.

Without doubt the landfill tax escalation and certain bans on landfilling promoted the adoption of innovation to a certain extent. However, UK businesses are still unsure whether to modify their waste management practices, as most believe that waste management is a very small proportion of their overall turnover and the current landfill tax is still not high enough to significantly impact on their business. The UK NISP, a voluntary instrument which claimed to be a business opportunity programme, did manage to persuade many businesses to engage in enhancing their environmental and economic performance through IS projects. The evidence available suggests that many of these projects have been successful, but there have been projects that required some form of innovation in order to make an organisation's by-product usable by another organisation. One of the ways in which the government contributed to this need was through the development of the Technology Strategy Board (TSB) and funding of the Knowledge Transfer Networks (KTNs). A drive for innovation was evident at central



level and it was significant compared to the efforts made in devolved administrations. Notwithstanding, there were no government attempts to link these KTNs to specific BESPs. The KTN (Knowledge Transfer Network), which was relevant to the UK NISP was RE-KTN. There was evidence of a partnership between the UK NISP and RE-KTN based on a mutual arrangement between the two organisations. In essence, the RE-KTN managers were contracted out to the UK NISP in each of the regions in England and in the devolved administrations. The UK NISP claims to have been innovative in a large proportion of IS projects with which they were involved. However, most regional coordinators believed that there was little contribution by technology managers with regard to innovation in the UK NISP inspired projects. The main role of the technology managers was very much in line with the UK NISP practitioner's role. Having said that, some technology managers were able to tap into their research networks to discuss R&D possibilities. However, very little was achieved because neither the UK NISP nor the RE-KTNs had any disposable income to invest in R&D for any IS projects that may require innovation. Limited innovation capability would run the risk of the UK NISP becoming involved in a large number of projects that could have been realised, even without the involvement of the UK NISP. This may have also resulted in the UK NISP becoming involved in, or taking credit for projects, e.g. the one-off recycling of construction waste or for introducing member businesses to waste management companies. These activities may not be considered as an application of the IS concept if it was examined through Chertow's (2007: 12) '3-2 heuristics' for IS projects, where "at least three different entities must be involved in exchanging at least two different resources". Additionally, these examples contradict one aspect of Chertow's (2000: 314) definition of IS, that "industrial symbiosis engages traditionally separate industries ...". Limited innovation capability in IS networks may, therefore, encourage the UK NISP or other similar IS network coordinating bodies to divert from the principles of the IS concept.

Based on the findings, the lack of disposable funds available to permit the adoption of innovation has been detrimental to the overall agenda of the UK government to promote innovation. Linking available funds for innovation to individual BESP projects would have created a win-win scenario for both the genuine outputs of BESPs, as well as the higher output in terms of innovation. Competition between the BESPs instead of co-operation was another aspect that has been detrimental to the greater adoption of innovation and consequently to the 'green' market strategy of the UK government.

Kirschten (2005) argues that co-operation is a key element in promoting innovation in networks. As all the BESPs were funded based on their individual performances, it gave rise to significant competition. The most common phrase used by research participants to describe this behaviour of the BESPs towards each other was “treading on each other’s toes” to achieve their individual targets. Given this level of competition, although there were some BESP’s that had disposable funds for R&D projects, there was limited co-operation between them, thus, jeopardising their ability to foster innovation.

Innovation can also be boosted through private investment. However, the lack of economic incentives and the uncertainty of policy direction in the long term, presented the biggest barriers to private investment. A further disadvantage of private investment relates to the fact that the intellectual property arising from an innovation project would remain the property of a private investor and could not be disseminated to the wider business community, creating further obstacles to knowledge transfer. This would not be the case if the innovation projects were funded by the government.

With regard to the UK NISP and its innovation capabilities, there was limited evidence that the UK NISP projects are predominantly based on innovation. However, the events organised as part of the UK NISP strategy did encourage knowledge transfer and the sharing of information. Randles and Berkhout (2006) refer to this as adaptive and continuous learning which may result in innovation. Notwithstanding this, the UK NISP’s partnership with the RE-KTN, through their technology managers, did not reap any significant benefits. This relationship virtually came to an end, with a number of technology managers continuing to work at the UK NISP as practitioners. This is in contrast to the findings of Domenech (2010: 262) who suggested that “recent cuts in the funding given by DEFRA to NISP has affected the partnership between KTN and NISP in many regions”. Her statement does not hold any weight, based on the findings of this study, as the relationship between the RE-KTN and the UK NISP had been affected by the ineffectiveness of this partnership long before any decisions about funding cuts were made. Domenech (2010) also suggests that 70% of completed synergies, which were UK NISP inspired, required some sort of technological innovation. This statement is also invalid as there is no evidence base to suggest this. Furthermore, one research participant (P1R08), who is a representative of the RE-KTN, stated that “we deliver some way round about 10-15% of the innovation fixes ... We claim that ten percent of

the UK NISP's outputs are directly related to our team's effort". In addition, during his interview the same RE-KTN representative clearly indicated that the benefits of technological innovation are generally experienced in the medium to long term, whereas most the UK NISP projects were focused on achieving their short term targets. The ineffectiveness, with regard to the adoption of technological innovation in the UK NISP inspired projects, mainly relates to the way in which the partnership between the RE-KTN and the UK NISP was formed and to the lack of disposable funds to conduct R&D for any potential IS projects that required technological innovation.

Despite this, UK NISP's focus on the development of an information and communication tool "CRISP" played a positive role in its ability to create a network that enabled the UK NISP to identify and match producers and recipients of by-products. This tool was based on a similar idea to "Facility Synergy Tool" (Mangan and Olivetti 2010), developed by the US EPA in the mid 1990s, but with a greater possibility of capturing knowledge and information from current projects that could be shared with other UK NISP practitioners within and across regions. "Such information and communication platforms would make it easier to find suitable potential network partners with specific expertise for concrete sustainable innovation projects" (Kirschten 2005: 142). This indicates that although the IS concept itself acts as a catalyst to promote innovation and the UK NISP also demonstrates its ability to promote innovation to some extent through their events and 'CRISP', albeit with a failed partnership with the RE-KTN, there is a clear role for the government to support the adoption of innovation in projects inspired by BESPs that require some sort of innovation. This would ensure that the government receives value for their money invested in BESPs and that innovation is focused on projects that are inspired by BESPs and have the capability to integrate environmental protection and economic growth.

In order for the government and the UK NISP to integrate environmental protection and economic growth, it is necessary that the (technological) innovation is focused on embedding the industrial metabolism into nature's metabolism, which would enable structural changes in industrial operations rather than merely focusing on reducing the quantity of turnover, e.g. nanotechnology which has less environmental impact compared to larger conventional machines (Huber 2008). However, no such arrangements were identified in the policy, or at the RE-KTN or the UK NISP that may help to identify the focus of a potential innovation project, as suggested by Huber

(2008). A very fragmented approach by the government to fund technological innovation was evident, with no specific effort made to structurally change the industrial operations to make them more environmentally friendly. A key reason for this, is the government's tick box approach where they wish to be seen doing things and focusing on short term results, instead of promoting structural change in industrial operations that may be beneficial economically as well as environmentally, in the long term. Therefore, the UK NISP and other BESP's are focused on short term wins and no particular effort is being made to promote technological and environmental innovation.

In summary, the evidence available to this study suggests that the government has made continued efforts to boost innovation. However, some of the factors that resulted in limited innovation and restricted long term environmental benefits associated with innovation include the following: (1) the lack of disposable R&D funds to allow innovation to be adopted; (2) the lack of innovation-related funds assigned to individual BESP's; (3) the fragmented approach towards the 'green' market strategy, e.g. competition, instead of co-operation among BESP's; (4) the lack of economic incentives and certainty of the policy direction in the long term; and, (5) the tick-box approach of the government to fund projects that reap benefits in the short term.

Within the IS concept and the UK NISP domain, mainly social/technical innovation is experienced and this is particularly reliant on knowledge and information transfer. By contrast Ecological Modernisation theory supports the notion of technological (as well as environmental) innovation, which has been difficult to achieve in the case of the UK NISP given all the reasons outlined above. Social/technical innovation is triggered by the application of the IS concept and IS projects are fostered through more innovation. However, government support for technological (as well as environmental) innovation, which is focused on structurally changing industrial operations, is crucial in order to tap into the more significant benefits of IS and to ensure an integrated 'green' market strategy to satisfy the UK government's ecological modernisation agenda.

#### **7.4 Effectiveness of the UK NISP as a self-regulation instrument**

Under the Waste Strategy framework, the UK government focused on introducing a mix of regulatory, economic and voluntary instruments that are complementary to each other. Although the findings suggest that regulatory instruments are necessary and

should be incorporated into the mix for a resource efficient future, economic and voluntary instruments are deemed important in offering flexibility to the industry. Whilst discussing whether the UK NISP is a self-regulation instrument within the government's 'green' market strategy, it is important to understand the motivation behind the industry joining the UK NISP, in order to see the broader picture of the government's agenda. Although currently funded by the UK government, it is undeniable that the UK NISP came into existence through the efforts of industry. However, the UK NISP was subsequently noticed by the government and it was invited to bid for BREW funds. Industry's motivation to join the UK NISP relates to the mounting pressure felt with regard to certain regulations and taxes, including landfill bans of certain material and escalating landfill taxes. Most research participants were of the view that the policy mix was just right, instead of focusing on command and control approaches such as landfill tax escalation and a landfill ban of certain materials.

The UK NISP provided support to businesses by helping them to become more resource efficient, whilst at the same time diverting waste from landfills. The money used to fund the UK NISP came from revenue collected from the landfill tax paid by the industry. Research participants were positive about the link the government established between 'the carrot and the stick', meaning that businesses were less likely to send their waste to landfill because of the increasing taxes and the ban on landfilling certain materials and, at the same time, businesses were able to secure support and help from the UK NISP in finding alternative ways to deal with their waste, thus, becoming more resource efficient.

An overall mix of these instruments appears to offer a win-win scenario for both command and control and voluntary approaches. However, the effectiveness of the UK NISP as a self-regulation instrument in the UK government's 'green' market strategy is still to be confirmed. Research participants believed that the UK NISP may focus on short term wins to achieve their targets in order to satisfy government requirements for funding instead of taking a long term view. For example, the UK NISP's focus has been on diverting waste from landfill, rather than looking at how to reduce the generation of waste by structurally changing the way industries operate.

There is the possibility of industry taking a more sustainable long term view when responding to the regulatory and tax instruments in the absence of the UK NISP. The

UK industry may slow down in the way they would otherwise react as a result of the changing regulatory regimes. For example, legislation on the pre-treatment of waste has made a difference as well as the escalating landfill tax and landfill bans. Pre-treatment of waste legislation suggests that all waste sent to landfill should be treated prior to sending to landfill sites. Legislation on the pre-treatment of waste results in not only less waste being sent to landfill sites, with more being recycled, but also in the effort being made by businesses to reduce waste at source, in order to reduce the cost of pre-treatment and the costs of landfilling. However, engagement with the UK NISP allows industry to find a quick fix to their waste management problems and enables the government to tick the boxes. As von Malmborg and Strachan (2005) suggest with regard to the UK ETS, it may be a very similar case with the UK NISP where the industry, in many cases, may lose out in the long term by adopting the UK NISP inspired solutions.

It cannot be denied that the UK NISP is the first national IS initiative that was initiated and led by industry in the desire for flexibility and self-regulation, but adopting the UK NISP inspired solutions and not looking at the long term sustainable solutions may be to the detriment of the UK industry itself. The EU Waste Framework Directive introduced a waste hierarchy that is aimed to extract maximum possible benefit from natural resources before being discarded. The waste hierarchy refers to five key steps, including reduce, reuse, recycle, recovery and disposal. The focus of NISP remains on reuse, recycle and recovery, whilst ignoring the key step which is fundamental in developing a resource efficient business culture. Other European countries have approached the issue by developing innovative technologies which would reduce generation of waste at the first place. Conversely, the approach adopted by the UK government through the UK NISP activities is a short term fix rather than looking at long term sustainability of the UK industry. UK industry risks losing their competitive advantage over similar industries in the EU, as the industries in other European countries would have engaged in more technological innovation and long term sustainable solutions to reduce generation of waste, compared to the reuse, recycle and recovery solutions inspired by the UK NISP. The UK NISP, as a self-regulation instrument, may be considered to be a weak 'green' market strategy of the UK government and not the best approach through which to achieve a low carbon economy and the ecological modernisation agenda. Research participants recommend devising appropriate public policies, including the appropriate fiscal frameworks, economic instruments, environmental taxes and

regulations to let the market deliver itself, and even be capable of deterring any need for the UK NISP by engaging in technological innovation aimed towards reducing or even eliminating the production of waste from their business processes.

### **7.5 The UK NISP and the sustainable regional development**

The application of the IS concept has the potential to contribute to regional development, although Welford (2004) argues that greater benefits of such an approach will have to be demonstrated. The regional context of delivery adopted by the UK NISP could be a good example of how the region may benefit from the existence of a programme such as the UK NISP.

In case of the UK NISP, most Regional Development Agencies realised the potential of the IS concept and the notion that the UK NISP would be able to help them achieve their economic targets. The UK NISP marketed the programme as a business opportunity and demonstrated the economic benefits of the UK NISP inspired projects to the regional bodies. At the same time, the UK NISP funding from central government was based on achieving the environmental targets of the UK government. Although environmental protection was a peripheral issue for RDAs in practice, contributing to sustainable development was one of the key focus areas of their strategy (Gibbs 1998, Mirata 2004). Becoming involved with the UK NISP was an optimal solution for the RDAs as they were able to demonstrate their desire to incorporate environmental consideration into their overall strategy for the regional development. However, the main aim of the RDAs was to ensure that the UK NISP assists them in achieving their economic targets for which they were responsible to the central government. This was an opportunity for the UK NISP to obtain additional funding and support from the RDAs and a way forward for the UK NISP to flourish with their regional model of delivery. The UK NISP engaged the EDA representatives in their decision-making process to ensure that the UK NISP regional strategy was well aligned with the regional development strategy set out by the respective EDA. The UK NISP was able to secure part-funding in regions where the UK NISP was able to demonstrate a clear alignment of their strategy on region's strategy and its key sectoral focus, as well as agreed to help the RDAs to achieve part of their economic targets.

Most RDAs took a different approach dealing with the UK NISP. Some, in particular those that had a very strong and diverse industrial base, saw much potential in the UK NISP type approach, given the possible benefits of implementing the IS approach. The RDAs that fell in this category were predominantly those which were involved in assisting the UK NISP in the early stages of its conception. These RDAs continued to support and even partly fund them in a number of cases. Some were disappointed with the first year's results and decided not to support the UK NISP any further. Other RDAs included those that did not believe that the UK NISP had added any value from the beginning and also those that believed the UK NISP's job was finished after a couple of years and by additionally funding the UK NISP on the regional level it would not add any further value to the regional development.

It is apparent from the findings of this study that the UK NISP type activities have some potential to support regional development, but this may be limited to economic development. The presence of a regional body, such as the RDA, is necessary to ensure that any potential regional initiatives are evaluated for their ability to influence the sustainable regional development before they are offered funding and support. The decision by the RDAs whether or not to fund the UK NISP in their regions, relate to whether the UK NISP is able to add any value to the work the RDAs are already doing, in terms of economic development of the region. Research participants believed that the involvement of RDAs provided assurance to businesses that the UK NISP is not entirely focused on environmental targets. Thus, the RDAs provided the UK NISP with a platform to enable them to demonstrate to businesses that the economic dimension of IS is not being ignored, whilst satisfying the environmental targets of the central government.

Initially the efforts of the BESP's were not coordinated and much confusion was experienced by industry with regard to their dilemma of who to approach when they needed help with environmental issues. RDAs had a role to play in coordinating the efforts of all BESP's delivering in their respective region. The key role of the Business Link, an existing body of the RDAs, was to control the overlap of similar services and ensure that the BESP's were not treading on each other's toes to achieve their targets. This opened the door for the UK NISP and other BESP's to become directly linked to companies that require the help of a BESP with specific expertise. The coordination of efforts at regional level is of significant importance for the development of IS networks.



The presence of a regional body, along with full powers to fund and support regional initiatives, would have a significant impact on regional development, albeit in an economic sense only. Delivering the IS programme on a regional level catalyses the development of inter-regional IS projects, and also provides a platform for knowledge, innovation and information transfer across regions, albeit in the presence of a national coordinating body, which has been the case with the UK NISP. In certain circumstances the RDAs do not have the power to decide whether a BESP's presence is necessary in their region. However, funding by central government enabled the UK NISP to operate in all regions of the country without prior assessment on whether this was welcomed by the RDAs, or if there was a need of the UK NISP in that region, or even if the UK NISP strategies align with the regional strategy. Notwithstanding the role of central government, the UK NISP's relationship with some of the RDAs acted as a catalyst for businesses to engage in UK NISP activities, thereby helping the development of IS in those regions. Extended decentralisation of powers to the RDAs to enable them to decide (based on their regional strategies) whether a BESP should be funded or not and to what extent in specific regions would have been significantly more effective promoting sustainable regional development. However, this would require central government to scrutinize whether the environmental objectives are well integrated into other areas of the regional policy, prior to handling more powers. Environmental improvements were not even a part of the regional policy at the earlier stages of the RDA establishment (Gibbs 1998). This disapproves Mirata's (2004: 973) statement that "RDAs ... see IS programmes as a means to help address the sustainability challenges they face in their respective regions ...". If the environmental objectives were integrated well with the other key objectives of the regional policy, there was a possibility that Mirata's statement would carry some weight. These circumstances would have enabled the RDAs to effectively assess the social, environmental and economic benefits of involving the UK NISP as an instrument of sustainable regional development. However, the decision made by most RDAs, with regard to part-funding the UK NISP, was related to the achievement of their economic targets through the outputs arising from the activities of the UK NISP.

Most of the UK NISP outputs data submitted to DEFRA relates to three regions (which are mainly diversified industrial regions and constitute approximately 85% of the total outputs claimed by the UK NISP). Data presented to DEFRA also predominantly relates to regions which are directly managed by International Synergies and not to the regions

that are managed by consultancy organisations (contracted to deliver the UK NISP on behalf of ISL). This aspect is explored in detail in Section 7.9 to explain the UK NISP strategy of delivering the programme. There is therefore, a possibility that although the UK NISP may have assisted with the economic development in some regions, it may have also occurred due to the nature of the industry in those particular regions. Regions with a diversified industrial portfolio would have more inter-organisational and innovation opportunities due to their easier access to resources and expert knowledge (Desrochers and Sautet 2008). As one research participant suggests, there is no evidence that the developments which took place during the time when the UK NISP was active, would not have happened in the UK NISP's absence. There is clear evidence that a range of legislations and policies (e.g. pre-treatment of wastes prior to landfilling, ongoing work on definition of waste, escalating landfill taxes, Waste Protocols Project) have been introduced during this period. These policies and perhaps, new ones may have encouraged the industry to change their behaviour without the need for UK NISP involvement. There was also no evidence of any monitoring undertaken by the RDAs, neither on the quality nor on the progress of the UK NISP project implementation, which is argued by Varga and Kuehr (2006) to be an important part of the success criteria for sustainable regional development. The research findings suggest that there is no strong evidence to support the UK NISP as an effective instrument for sustainable regional development. This does not necessarily mean that the ecological modernisation theory as well as the IS concept, cannot offer solutions for sustainable regional development. Both these fields of study deliver environmental benefits alongside economic growth if implemented appropriately on the regional level, as suggested by many studies (Burstrom and Korhonen 2001, Deutz and Lyons 2008, Welford 2004) and there is still further scope for research in this area (Gibbs 2008).

It is noteworthy that the new coalition government elected in the UK decided to abolish RDAs and instead create Local Enterprise Partnerships (LEPs) with contributions from industry as well as local government. The role and responsibilities of LEPs are not yet clear, but the formation of LEP's will result in some of the RDAs' responsibilities being taken over by central government, whilst others would remain with the LEPs, with the possibility of additional responsibilities. The impact of this change on the regional development and the regional delivery of the UK NISP and its influence on regional development will not become clear until later in 2011.

## 7.6 The dynamic nature of the UK NISP

The two key means of pursuing IS have been either through the planned development of IS networks, e.g. EIPs, or as Chertow (2007) suggests, through identifying and nurturing existing IS networks. Chertow (2007: 11) claims "... that 'uncovering' existing symbiosis has led to more sustainable industrial development than attempts to design and build eco-industrial parks incorporating physical exchanges". For the sake of this discussion, these are categorised as planned IS development or emergent IS development. However, it is likely that IS is pursued in ways which may not fall into any of the above two categories. Chertow (2007) classified the IS development as lying between planned and emergent. She mainly referred to EIPs when discussing planned approaches, but ignored the planning perspective of developing virtual/regional IS networks from scratch. The IS network in question, the UK National Industrial Symbiosis Network, appears to be one such initiative that may not be categorised as planned or emergent. However, the UK NISP is described by Chertow (2007) as a model that would be suitable for fostering existing IS network, giving an indication that it is an emergent IS development. In contrast, Domenech (2010) considers the UK NISP as a planned and policy driven initiative, rather than seeing it as an emergent development.

Development of the UK NISP was based on a vision by the Director of International Synergies Ltd. to create a nation-wide IS network. Although, in some regions the UK NISP was able to identify the pre-existing industrial networks they had built upon, in others they had to start planning from scratch. Although the regional operations of the UK NISP were overseen by a national team, each of the regional networks was operated individually by various organisations contracted by ISL to deliver.

The BCSD-UK organisation supported the development of the UK NISP, which was initiated in key industrial regions in the UK. By using help and experiences of the US-BCSD representatives and their ongoing by-product exchange project in the Tampico Bay in Mexico, BCSD-UK identified ConocoPhillips as an anchor tenant and started to communicate individually and in a workshop format with local businesses to identify potential IS projects in the Humberside Region. Although, the approach was based on the earlier experience of an initiative in Mexico, there was nothing emergent.

One of the critiques of the Chertow's (2007) paper could relate to the fact that she labelled EIPs as planned and the other IS networks as self-organised. This may not be true in cases such as the UK NISP, as many of the UK NISP regional initiatives were completely planned efforts, initially taken forward by government involvement at regional level, and there was no sign of self-organisation from the beginning. However, once the UK NISP was able to secure a few projects, it was possible to foster the existing network to a larger level, due to the existing relationships the UK NISP held with participating businesses. The UK NISP network developed further to the national level, through the support it received from central government in later stages.

Having discussed the planned and emergent nature of the IS networks, I now move on to discuss the top-down Vs bottom-up approaches employed in the development of IS networks. Some of the IE academics indicate that the top-down approaches, e.g. policy driven EIPs, have less chance of success (Gibbs and Deutz 2007) compared to the bottom up approaches, e.g. Kalundborg IS network. Costa and Ferrao (2010) suggest that the effective collaboration and continuous interaction among various actors can serve as an adequate context for IS development and suggest that a middle-out approach may be able to provide such a context. Costa and Ferrao (2010: 985) has described the middle-out process as follows:

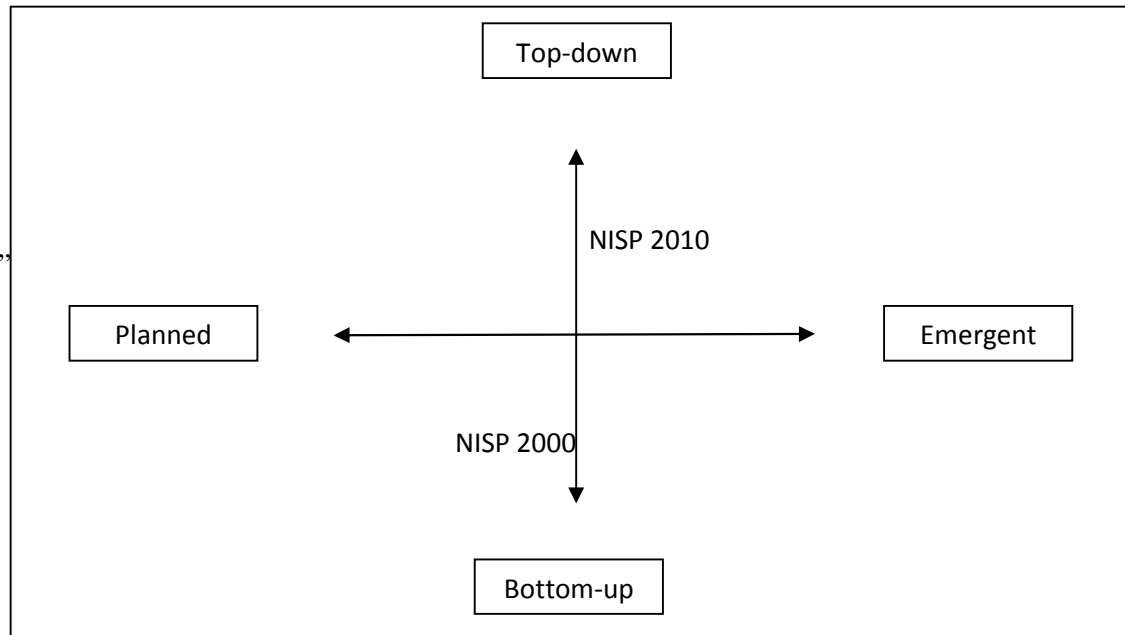
“The middle-out process requires the monitoring of all agents actions and their impact of the context. This information is fed back to the agents in order for them to develop tailored interventions or make adjustments that can eventually support IS development more effectively. With successive interventions the process acquires a dynamic, evolving nature. The monitoring process includes the consideration of variables such as: resource oriented policies, economic, regulators and voluntary instruments in resource management; mass flows of waste/by-products generated at regional level; evolution of material flows consumed by companies in a given region; number and characterization of synergies established; potential of IS in a given region; and funding mechanisms to support business collaboration in resource management.”

Some of the features of the middle-out process, as described above by Costa and Ferrao (2010), exist in the UK NISP model in the UK. However, not all features of the middle-out approach prevail in the UK NISP model nor would all the above features provide favourable conditions for the development of IS in all contexts, given the different governance structures. Another important aspect of the middle-out approach that has

been ignored by Costa and Ferrao (2010) is that it does not take into consideration the financial implications for all the stakeholders involved in carrying out the whole middle-out process. In a nutshell, the proposed model is very complicated and not one that can be easily introduced into the system, although the system can be nurtured if certain elements of the model are already present. However, a key lesson appears to be the availability of up-to-date information regarding resource flows and effective communication among all the key stakeholders involved in promoting and developing IS networks. Based on the findings from the fieldwork, a very superficial approach has been used to monitor IS projects inspired by the UK NISP and this involves a range of projects that may not be categorised as IS projects, according to Chertow's (2000) definition.

Another framework presented by Verguts et al. (2010) at the IS Session in the International Sustainable Development Research Conference in Hong Kong, suggested that distinguishing between planned and emergent development of IS is not the way forward in the development of IS, as it may have become a reason for the failure of certain planned projects in the US, as Gibbs and Deutz (2007) claimed. The framework contends combining the planned and emergent change and managing the IS development as a process of continuous change. Both the frameworks by Costa and Ferrao (2010) and by Verguts et al. (2010) seem to give importance to the dynamic nature of IS development, with particular reference given to monitoring and reporting and effective communication amongst the actors involved. The enthusiasm among the researchers to attempt theory building in this area is evident and commendable. However, generalising favourable conditions for different governance structures may not be the best way forward. Instead, learning from existing models and adopting and modifying these to suit the political, economic and cultural contexts of individual countries would be the best way forward. It may, therefore, be useful to demonstrate where the IS projects in different countries/regions fit within the planned Vs emergent and top-down Vs bottom-up framework, as illustrated below using the example of the UK NISP:

**Figure 7.1: The UK NISP: planned Vs emergent and top-down Vs bottom-up**



Source: Author generated

Figure 7.1 illustrates how the IS development context in the UK NISP has shaped over the years. In 2000, the UK NISP, despite being recognised by regional names, was launched through a joint effort between the BCSD-UK and their industry members. This approach can be considered to be planned rather than emergent, as potential IS projects were identified from scratch. Projects were mainly led by businesses, with some support from the regional development agencies and thus a predominant bottom-up approach was evident during this period. During the period 2000 to 2007, the UK NISP went through dramatic changes, including the successful effort to become a national programme, the provision of national funding and the associated monitoring and reporting of the IS projects and their outputs. However, given that programme was supported by regional and national governments, achieving government targets became the main agenda for UK NISP executives. The UK NISP even became involved in various projects that fell outside the domain of IS and thus, it was highlighted by some, that the UK NISP regional co-ordinators/practitioners had a very superficial attitude to IS. During this period, the UK NISP was funded by national and regional governments and supported by the EA and the RE-KTN. According to the middle-out model proposed by Costa and Ferrao (2010), this would have been close to an ideal context for the development of IS network as there was adequate communication between the actors and monitoring and reporting of the projects were also evident. However, a number of difficulties were experienced with the model and various changes were

undertaken, most of which were related to financial limitations. One such change made was to the UK NISP's relationship with the RE-KTN and a change of contractors to deliver the programme in some regions. Having said that, during this period, the IS projects were a mix of both planned and emergent efforts, as well as being quite consistent to the middle-out process suggested by Costa and Ferrao (2010). In 2007, the UK NISP managed to roll-out the programme in Northern Ireland and declared the programme UK-wide. However, during the period 2007 to 2010, they gradually lost funding from the regional governments and had to fully rely on funding from central government, thus giving the impression that there was full government control over the existence of the programme. Funding cuts at central level also influenced the scale and strategy of the UK NISP, given that they were fully reliant on central government funding. Although, central government did not exert any pressure on businesses through the UK NISP, the UK NISP is controlled by the UK government as it relies on central government funding for its survival. Moreover, it needs to follow the strategic direction and targets set by central government, thus suggesting that a top-down approach is becoming prevalent. Notwithstanding this, the IS projects inspired by the UK NISP have become more emergent due to the ongoing communication among the UK NISP membership. So there has been a transition from planned, to emergent IS, in the development of the UK NISP and this validates the analytical framework presented by Verguts et al. (2010), which suggests that IS development is a change process, built up of both planned and emergent change and demands, taking continuous perspective into consideration. Noticeable movement, from the bottom-up approach to a top-down approach was also evident in the case of the UK NISP in an attempt to achieve the middle-out approach introduced by Costa and Ferrao (2010). Where does the UK NISP go from here is an intriguing question?

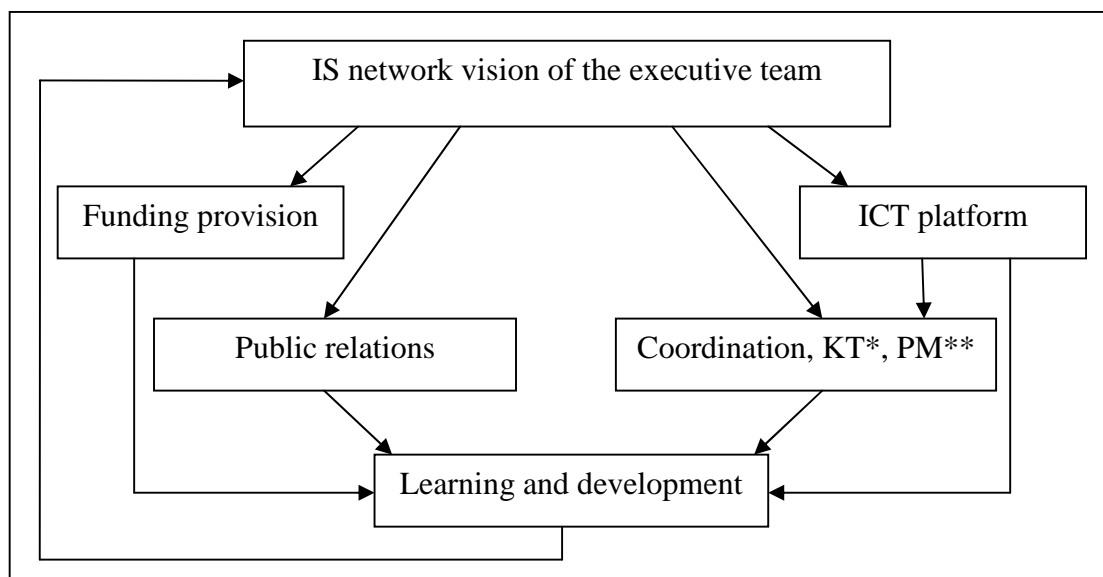
There is no concrete answer to the above question, as the survival of the UK NISP, or at least the possibility of the UK NISP operating nationally on a similar scale depends entirely on central government funding. Whether the outputs of the UK NISP inspired projects are able to feed into the government's agenda on resource efficiency and waste management defines the UK NISP's future status. However, research participants, which include UK NISP practitioners, have been sceptical about the future availability of similar volumes of IS projects as they believe that 'low hanging fruits have been picked'. There are more possibilities for emergent growth in IS Networks and there may not necessarily be a role for the UK NISP in this further emergent growth, as the

industry would have understood the benefits of IS projects by now and may be well placed to reap the benefits of such projects. On the other hand, government policies would have been framed effectively, based on the work the UK NISP has been doing over the last decade to make industry deliver itself.

## 7.7 The UK NISP leadership and management at national level

This is an important topic of discussion since the UK NISP is the first IS programme to have been launched and managed at national level. National coordination has been subdivided into further topics to ensure in-depth discussion. However a diagrammatic representation (Figure 7.2) demonstrates how each of these sub-topics integrates for the effective management of the UK NISP.

**Figure 7.2: The UK NISP leadership and management at national level**



Source: Author generated

KT\*- Knowledge Transfer; PM\*\*- Performance Management.

### 7.7.1. Vision for the UK NISP

Vision is a necessary element for the development of IS networks. Leadership assists in creating the vision and in inspiring all stakeholders to realise the vision. Leadership at the UK NISP is always centred among a few individuals, most of whom have been involved with the UK NISP programme since its conception. Co-ordinators/facilitators and, to a lesser extent brokers, are generally the terms used to describe people who are



involved in developing and nurturing an IS network. However, the model developed by the UK NISP involved an Executive Team that lead the vision of developing a free and open IS network, which would deliver economic and environmental benefits to UK businesses (NISP 2009). During the launch of the UK NISP, the Executive Team was made up of a Director, an Operations Director, a Performance Director and an International Director. Most of the decision-making was led by these four individuals. A very autonomous approach was used towards creating this vision and all stakeholders were given a sheet with the phrase ‘make something happen’, which was quoted in a number of UK NISP presentations in the UK and elsewhere. However, autonomy came with a commitment to IS principles. This autonomy and the proposed use of IS principles were welcomed by most stakeholders although they were still unsure what IS meant in practice. The Executive team handed over the responsibility to the regional teams to manage the regional programme as they saw fit, on the condition that they were able to deliver their regional targets. The Executive Team was seen by some research participants as being very inspiring and accessible in the early stages. It is noteworthy that most of these research participants belonged to a group that were part of ISL (an organisation that manages the UK NISP).

How the UK NISP is portrayed by its leadership and the way in which the UK NISP is perceived by various stakeholders are necessary elements in understanding the aims and objectives of the UK NISP. The way research participants chose to describe the UK NISP objectives indicated that most stakeholders of the UK NISP were unsure of its overall aims and objectives. Each of them have their own understanding, with regard to the aims and objectives of the programme, but the overall understanding of the IS networks, as defined by Chertow (2000), was missing from these descriptions. Additionally, it is worthy to note that the evidence from this study suggests that adopting the term ‘industrial symbiosis’ in the name ‘UK NISP’ may not have been effective because of the following: it restricts the organisation to operate in a certain way; representatives of businesses find it hard to understand what the programme has to offer; and, the term industrial symbiosis itself is broader than the type of activities NISP becomes involved with (as discussed in Chapter 5, Section 5.2.3).

Notwithstanding this, the key vision of delivering economic and environmental benefits to the UK businesses through a free and open industrial symbiosis network (NISP 2009) was successful to some extent, however this vision and the future of this vision is

dependent on funding from central government. However, given the UK NISP's involvement in various projects that may fall outside the domain of the IS concept, the name 'National Industrial Symbiosis Programme' is questionable. The term *waste* was not particularly liked by the UK NISP executive team and was eradicated from the UK NISP publications. Furthermore, the UK NISP did not become part of any UK waste management events to ensure that the UK NISP was only regarded as a business opportunity programme and not a part of waste management initiatives. However, in order to secure funding in some parts of the UK, the UK NISP had to change its strategy to incorporate the term *waste* in order to be able to feed into the government's strategy to bid for funding, e.g. the UK NISP became part of Scotland's Zero Waste Plan.

### 7.7.2 Provision for funding

Central government funding was a key factor in developing a nationwide IS network in the UK. This is in line with Gibbs (2003b) who considers central government to have a key role in a country's EID, mainly through advocacy and research funds. When referring to central government funding in this thesis, it predominantly relates to the UK NISP funding in England. Having said that, funding was available to the UK NISP in all countries of the UK, but it appeared inconsistent, uncertain and unstructured when compared to funding in England. The UK NISP Executive Team played a major role in securing funding from central government, as a result the launch and continuation of the UK NISP at national level has been possible. It is also important to mention that the UK NISP was the first IS initiative in the world to be funded and managed at national level.

The UK NISP Executive team was based in England and thus, they had a superior relationship, both at a government and business level. This relationship is the result of the BCSD UK working closely with the UK NISP in the early stages of the UK NISP conception. Provision for funding in England and the stronger development of IS networks in English regions, compared with other UK countries, have been evident due to the pre-existing linkages amongst various UK NISP stakeholders. A similar approach to securing funding in other UK countries was not particularly successful despite significant efforts being made by the UK NISP Executive Team. The key difficulties associated with securing funding included inconsistency in funding levels for each of the countries, uncertainty of funding in subsequent years, unstructured approach to funding and different expectations of each funding bodies involved, in terms of the UK NISP outputs. There were issues identified at policy level (see Chapter 5, Sections 5.4 and 5.5) with regard to a lack of a coherent policy and the unstructured approach to funding which gave rise to randomly funded BESPs, with limited consideration of how the activities of these BESPs fit together in the government's overall strategy. Notwithstanding the policy issues (which are discussed in Sections 7.1 – 7.5 in this Chapter), there are reasons why the funding arrangements appear inconsistent and uncertain in devolved administrations. Some of these key issues include: (1) less attention was paid to the UK NISP in devolved administrations as the UK NISP head office was based in England and the Executive team alone controlled the funding arrangements, with very limited powers given to the people leading the programme in

devolved administrations; (2) the UK NISP's key focus of securing DEFRA funding and thus the effort made to align most strategies to the DEFRA strategies, whilst limited effort was made to align its strategies to those of the devolved governments; and, (3) independent auditing only focused on the most successful regions in England when reporting to DEFRA, but devolved governments saw very limited evidence of its outputs. The only motivation for the UK NISP to become involved in devolved administrations was to ensure that the programme continued to be operational all over the UK, to be seen as a national programme. However, all the issues highlighted above indicate that their main focus was to secure funding in England and to continue developing intra-regional and inter-regional IS networks in England, whilst also catering for organisations that were operating on the UK level. The key factors that helped the executive team to secure funding included: relationship with government officials; back-up of the BCSD-UK; independent auditing; reporting of the outputs arising from the UK NISP activities; and, reporting of the significant outputs arising from the successfully performing UK NISP regions (e.g. West Midlands). The UK NISP Executive team's role of focusing on funding provision has been beneficial and one of the key reasons for the successful development of a UK-wide IS network.

### 7.7.3 Development and management of the ICT system

Authors (e.g. Mirata and Emtairah 2005, Kirschten 2005) believe that the information and communication platform is vital for the success of IS networks. Ausubel (1992), Gibbs (2003a) and Heeres et al. (2004) also believe that informational barriers can restrict the development of IS networks. One of the key reasons why these informational barriers exist in the market place is to preserve business secrets related to inputs, by-products and waste streams. However, the involvement of a coordinating body in collecting and centralising information may be perceived by businesses to be less risky, in terms of information leakage. Against this backdrop, the UK NISP's development of an information and communication platform "CRISP" has been of significant benefit in the development of a UK-wide IS network. CRISP is a software that enables the by-product 'wants' and 'haves' of businesses to be matched. Initially, the UK NISP's Executive team planned to provide restricted access to all its members to enable them to identify potential synergies. However, this was not considered the best option given the confidentiality issues around business information, the likelihood of unstructured data entry, as well as the UK NISP Executive Team's fear of not being

able to monitor the outputs arising from these efforts. Regional teams were made responsible for inputting data on CRISP, from the beginning of their membership throughout the lifecycle of a project. Given the limited resources of the regional teams, they were initially reluctant to input data, although the majority agreed that it was an important element.

There were significant advantages to using CRISP including: (1) reduction in transaction costs by identifying synergies that were geographically close; (2) easier tracking of ongoing IS projects; (3) effective monitoring and reporting of outputs arising from the UK NISP activities; (4) migration of knowledge and information among the UK NISP regions; (5) consistency in regional reporting; (6) performance monitoring of regional teams; and, (7) information and knowledge capture in 'CRISP' to overcome the issues arising from staff turnover and a change in sub-contractors. However, there were also some disadvantages identified during the research fieldwork. In one of the UK NISP regions 'North West', the regional team bought a database of approximately 2000 businesses in the North West and they were advised by the UK NISP Executive team to record these into 'CRISP' as UK NISP members. This was done with no prior permission from these businesses and these members were included the UK NISP membership total, which reached 10000+ in 2008 (NISP 2009). These membership numbers, which were not externally verified, were reported in most UK NISP publications, including reports for government bodies. Another drawback of 'CRISP' was that regional teams have autonomy over which IS projects they engage in or decide to ignore. The impact of this would have been particularly significant for the SMEs and/or businesses with only a small volume of by-products, as the regional coordinators would not be interested in these small volumes, given the pressure to achieve their tonnage targets in terms of diverting waste from landfills.

Regional teams were not particularly keen on using 'CRISP' due to the time and resource constraints. However, the UK NISP Executive Team put in place a mechanism to provide all the support and training necessary to manage CRISP successfully. Despite all the advantages of 'CRISP', it was seen as a strong element of management, giving the UK NISP a corporate feel, which was initially introduced to regional teams as an autonomous approach. Notwithstanding these drawbacks, 'CRISP' acted as a backbone for the UK NISP and has been an extremely useful tool in developing the IS network in the UK. The UK NISP Executive team receives full credit for developing the effective

information and communication platform ‘CRISP’, which has been considered a key factor in the development of an enabling context for IS networks (Kirschten 2005, Paquin 2008, Domenech 2010).

#### 7.7.4 Leading the regional teams

Even though the UK NISP was marketed as a business opportunity programme, it was focused on achieving the highest possible volumes of waste diverted from landfill. The reasons for this appear to be the rising pressure from the funding bodies (including both national and regional governments) with regard to the monitoring and reporting of the outputs, which entirely changed the way in which the UK NISP regional teams were led. The autonomy offered to regional teams in the early stages was removed and the regional teams started to receive strict directions from the Executive Team on how the programme ought to be managed. More frequent visits by the Performance Director to all the regional programmes and a significantly increased focus on target reporting was evident, which resulted in less time being spent in identifying potential synergies. Therefore, more time was spent in number crunching and ensuring that the UK NISP was able to feed its quarterly performance to the government. This short term approach to data management and reporting gave rise to the focus on short-term wins, ignoring sustainable long term projects. It also gave rise to the UK NISP’s involvement in projects that did not particularly adhere to the IS principles, e.g. the UK NISP’s involvement in introducing a company with a by-product to a waste management company and claiming the outputs for their involvement, without even knowing where that by-product will end up after being passed on to the waste management company. Diversion from landfill was the key agenda of the UK NISP, with no particular attention paid to what actually happens to the waste diverted from the landfill (at least in early stages of the programme). In many cases, waste was diverted from landfill to waste management and recycling companies, which was not consistent with the IS principles. I re-quote from an interview of a regional practitioner:

“ISL makes it completely 100% output driven. Outputs whatever else is happening, whatever the cost, whatever the situation, they want the outputs and that’s, you know, is the tonnage”

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So tonnage diverted from landfill became the key objective of the UK NISP and this was communicated to the regional teams by the UK NISP Executive team. The tonnage

objective of the UK NISP not only resulted in focus being placed on short-term and large volume projects, but also in the long-term sustainable projects being ignored. Additionally, limited efforts were made to assist small companies and those with a small amount of by-products, to achieve targets in order to secure funding for future years. IS networks (as discussed in Section 7.6) are more likely to be successful when they develop organically, are uncovered and nurtured (Chertow 2007). However, the pressure of securing government funding for the future leads the UK NISP to control the IS network development by focusing only on large volumes of by-products in the short term, and ignoring companies with small quantities of by-products as well as projects with long term prospects.

Some of the new roles added to the UK NISP Executive Team to oversee regional operations included a Business Systems Director, a Knowledge Development Director, a Finance Director and an Innovation and Technical Director and a few others. Most of these new positions were introduced to manage the emerging changes resulting from funding limitations and conditions associated with funding, the deteriorating relationship with the RE-KTN and to enable the more efficient management of the business processes. The regional directors' role was created to oversee regional delivery contracted out to other organisations. However, the main decisions were still made by the key Executive Team which appeared to be in full control of all aspects of the programme, regardless of new positions created in the various business areas. During the author's attendance at the UK NISP regional co-ordinators' meeting, which naturally involved the Executive Team, bureaucracy was excessive and no, or very limited heed was given to the views of the regional co-ordinators. Most messages were firmly set and there were few opportunities to raise issues and/or to discuss the implications of any decision. The way the programme was being led, created a competitive feeling amongst the various UK NISP regions. Regional co-ordinators and practitioners found themselves competing instead of co-operating with each other to encourage and facilitate inter-regional synergies and to enable knowledge transfer between the regions. One of the approaches employed to cater for inter-regional synergies and in particular, to offer a 'one stop shop' for businesses with a UK-wide presence, was the development of the NPT (discussed in detail in Section 7.8). In addition, 'Drum-beat', a networking event which was organised for its staff and contractors by the UK NISP brought a sense of togetherness to the UK NISP regional co-ordinators and practitioners from across the UK. After this event, the UK NISP

executive team appeared more approachable and helpful than before. The 'Drum-beat' event created a culture of change in the UK NISP as an organisation and the UK NISP Executive Team began to listen to the voice of all the co-ordinators and practitioners. However, cuts in central government funding and limited/no access to funding at regional level, meant that in 2008/2009, the UK NISP had to introduce new strategies and changes to its organisational structure to deal with the financial shortcomings. This included changing sub-contractors and making a large proportion of UK NISP staff redundant.

#### 7.7.5 Public relations

One significant feature of the UK NISP's public relations effort was their engagement with government bodies, research institutions and regulatory bodies. Good relationships with these organisations assisted the UK NISP to offer financial, technical and legal help in each of the regional programmes. This, in turn, helped the regional programmes tackle any innovation related and legal barriers to realise potential IS projects, as well as enabling the regional programme to be part-funded by the regional government.

Additionally, the programme was marketed to businesses as a 'Business Opportunity Programme' (BOP) and this was again led by the UK NISP Executive team. Marketing the UK NISP as a BOP was significantly useful in raising awareness of IS practices and their benefits to businesses, without having to take them to the actual area of environmental protection. This was meant to convey to businesses that the UK NISP does not just have an environmental focus, but also offers business opportunities. Marketing the UK NISP as a business opportunity programme aligned the IS concept with normal business practice. The UK NISP Executive team's ability to market the programme as being compatible with business activity (Tibbs 1993) and taking into account business specific features (van Leeuwen et al. 2003) positively influenced the development of the IS network in the UK. Thus, the UK NISP managed to increase the awareness of both the environmental and economic benefits of the IS concept, which provided an enabling context for the development of a UK-wide IS network.



### 7.7.6 Learning and development

CRISP was a crucial tool for the UK NISP, enabling it to capture knowledge and information which became the basis for all the learning and development at the UK NISP. Despite the initial reluctance of the regional teams to use CRISP to capture data, it was considered an important tool by most of the research participants. One key outcome of using CRISP was the possibility of knowledge transfer from one region to the other. It also opened doors for inter-regional synergies in cases where geographical distance was not the main barrier. The issue of a high UK NISP staff turnover was also dealt with, through the recording of data in CRISP during the developmental stages of the projects. For example, if a UK NISP staff member decided to leave, all their contacts and details of any ongoing projects were captured in CRISP, which made it easier for the incoming staff to continue working on the ongoing projects. Similarly, if a sub-contractor decided to leave, or the UK NISP decided to contract out delivery of the UK NISP to another sub-contractor, information and knowledge captured in CRISP would make the transition easy.

In addition, learning and development have also been possible by coordinating and performance managing regional teams and through the experiences gained by making provisions for funding and maintaining relationship with a range of stakeholders, e.g. regulatory bodies. Thus, learning and development provides a better understanding of all processes and feeds back into all the key elements of IS network leadership more effectively, enabling further and greater development of the IS programme as illustrated in Figure 7.2 .

In summary, the UK NISP leadership, although criticized to some extent, realised the vision for a open and free nation-wide IS network, as well as being successful to a certain degree in providing an enabling context for the development of an IS network.

## **7.8 Geographical delivery strategy of the UK NISP**

Following on from the discussion in Section 7.6, most planned and organic IS developments have been confined to small areas, i.e. at an industrial park level (Gibbs 2008, Chertow 2007), except for a few that have rolled out at regional levels. (Agarwal and Strachan 2007, Baas and Boons 2004, Costa et al. 2010). The UK NISP went a step

further to create the world's first nation-wide IS network, managed nationally and delivered regionally (Agarwal and Strachan 2008, NISP 2009). Unlike the national coordination that is about creating the vision, providing all necessary tools and resources as well as promoting learning and development across all regions (see Section 7.7); regional delivery is about coordinating the efforts of the regional team in order to realise the regional objectives, as well as UK NISP objectives as a whole, through the development of inter-organisational synergies. Harris (2004) builds on the work of Welford (2004) around the theory of regional environmental management systems and suggests that regional IE strategy is a driver for IS development. Sterr and Ott (2004) concluded that the absence of suitable regional bodies hinders the optimal exploitation of the existing regional IS potential. The UK NISP's delivery strategy, which is predominantly regional, appears to fill this gap. Therefore, this section discusses the geographical delivery strategies employed by the UK NISP and their implications for the optimal exploitation of existing IS opportunities. An attempt is also made to discuss the appropriate scale for implementing IS projects.

The findings suggest that regional delivery of the UK NISP is the most effective delivery model. Each region is different with regard to the dominating industrial sectors and sectoral diversity has been given much importance in IS literature (Korhonen 2004b). So, the knowledge of regional industry sectors and how things work in a particular regional setting are particularly important in understanding the needs of businesses in the region. Such regional knowledge can only be achieved by being geographically close to the businesses. This would also offer more opportunities to develop relationships with regional organisations, in both private and public sectors. Better engagement would then be possible with regional businesses leading to effective implementation of the IS concept. This resonates with the findings of Proctor (2005: 194) who claims effective engagement with firms is "... a critical and defining point in the implementation of EID". However, the question that arises now, is why do we not opt for sub-regional delivery over regional delivery, as this may provide better conditions for the effective engagement with local businesses?

In general, sub-regional delivery has been regarded positively by ensuring synergies are developed in close geographical proximity and regional teams have closer ties with local businesses. The closer geographical proximity of businesses would also promote inter-organisational communication. There are some examples in the UK NISP regions

where delivery of the UK NISP was contracted to local business associates. The business associates' local knowledge and their pre-existing business network assisted in developing closer ties with the local businesses. However, there are resource constraints that restrict the adoption of sub-regional delivery due to funding limitations in most regions. Sub-regional delivery may also result in focus being taken off the larger picture, which may, in turn, result in the reduced possibility to learn from existing synergies and replicate the same ideas in other areas in the region.

An alternative solution for better inter-organisational communication, besides sub-regional level delivery, was suggested by Sterr and Ott (2004) when delivery is approached at regional level. They believed that the development of a communication platform for businesses may counteract the lack of inter-organisation communication. Efforts in this direction were evident at the UK NISP when the executive team decided to roll out such a communication platform. However, due to NISP membership size, which has exceeded 10,000 in recent years, extreme difficulties were predicted in managing this platform and keeping track of the communication. The idea of launching a communication platform for business members was dropped and it was used internally for the UK NISP team to share knowledge and information. A key reason for this action may have been the UK NISP executives' fear about losing control of the UK NISP membership. Open and regular communication between the UK NISP members may result in the UK NISP teams losing the autonomy to decide whether to deal with a particular business or a potential synergy. Notwithstanding this, the UK NISP provided opportunities for face-to-face inter-organisational communication to aid the development of IS projects.

This communication platform was part of the UK NISP's wider information and communication system which also allowed the UK NISP to capture and share knowledge arising from various regional projects. This NISP system resonates the recommendation made by Sterr and Ott (2004; 957) to develop an instrument for "... regular provision of high quality data ..." for the business. However, business members had no access to this system and it was managed entirely by the regional teams to ensure consistency of data input. Another issue that emerged, which further restricted the use of the system by business members, relates directly to the confidentiality of individual business information that was recorded in the system. The system was capable of being more than just a data platform, as Sterr and Ott (2004) proposed. It

was capable of matching potential synergies, as well as having the potential to aid standardisation of synergy development, reporting and monitoring.

Another finding which corresponds to Sterr and Ott (2004) when delivering on a local/smaller level, relates to the possibility of unstable input-output connections. In the UK context, sub-regional delivery may mean dealing with a large number of SMEs (1-10 employees) in many areas. This may result in the instability of input-output connections, due to minor changes in the IS network composition. However, it is worthy to note that NISP regional co-ordinators admitted that they deliberately focused on large industrial estates, which allowed them to achieve their targets. Consequently, they tended to ignore SMEs due to the small volumes of their by-products, as SME projects are not helpful in achieving their targets. Nevertheless, delivery at sub-regional levels would not have had the same scope of solutions compared to delivery at regional levels. This finding is in agreement with the statement of Sterr and Ott (2004; 953) that “the regional potential to close material cycles is rather high and could provide ... greater stability for industrial ecosystems”. Regional delivery would also offer greater knowledge of what is happening in the area, which is necessary identifying effective IS solutions.

On the other hand, national delivery was never considered by the UK NISP in the early stages. One of the findings of this thesis, presented at the ISIE conference (see Chapter Six, Section 6.3.2), indicated that a different mechanism was required in order to engage with businesses that operate across the UK, as well as coordinating inter-regional synergies. As a result of these findings, a NPT was launched at the UK NISP to deal directly with the senior management of businesses operating across the UK, instead of engaging with their business units in individual regions. Although of much importance, national delivery conflicted with regional delivery, as regional teams felt that their outputs were being claimed by the NPT. One of the reasons for such a conflict relates to the type of regional delivery partners which is discussed in detail in Section 7.9. This again suggests that national delivery is not effective on its own, when compared to regional delivery or when in competition with regional delivery. However, the NPT may be more effective when assisting regional teams to develop synergies from businesses that operate across the UK without actually claiming the outputs themselves.

Another reason why regional delivery may be seen as the most effective approach is the possibility of aligning the objectives of the UK NISP to those of economic development agencies. This arrangement was mutually beneficial as the UK NISP was able to demonstrate its focus on some of the key priorities of the region and its commitment to assist in achieving regional economic development targets. The EDAs offered additional funding to the UK NISP as the UK NISP was able to help them achieve some of their economic development targets. A strong relationship with the EDAs also provided the opportunity for the UK NISP to engage with more regional businesses. It was also stated by research participants that if the EDAs notice a gap in the market, in terms of the services offered, they would attempt to bridge that deficit. The existence of the UK NISP with a regional structure and regional teams, deter EDAs from making provisions for such a service. This suggests another advantage of the UK NISP delivering regionally with a regional structure and regional teams. However, this raises the question whether having a programme like the UK NISP is really necessary when EDAs have the capability to deliver a similar service themselves in the region. This reinstates the point made by a number of research participants whether there was a need for the UK NISP, or would the market deliver itself if the right policies and incentives were put in place.

Regional delivery also offered the possibility of sharing best practices and inter-regional learning. Research evidence suggests that national coordination of the UK NISP was not effective in terms of developing a culture of co-operation in the early stages and the regions were competing with each other to achieve their targets. However, this changed to a certain extent, when national team started to encourage a co-operation culture rather than a competitive culture amongst the regional teams, through various networking events for their staff and contractors. The national team also provided an information and communication technology (ICT) platform and trained regional staff in its use, which also influenced the way regional teams communicated with each other. This resulted in sharing best practices, replicating ideas from one region to the other and developing opportunities for inter-regional synergies. Although the national team provides the necessary infrastructure and support to aid inter-regional learning, it was the regional teams that operationalised it.

For all the reasons discussed above and in agreement with Sterr and Ott (2004) who see regions as having the potential to solve a variety of waste issues, it can be argued that

regions do provide an effective boundary to host the development of IS networks. Therefore, regional (sub-national) delivery offers an effective way to implement large scale IS network, such as the UK NISP for the effective exploitation of existing IS opportunities. Table 7.2 summarises the benefits of regional delivery for a large scale IS. However, the success of regional delivery is, to a great extent, dependent on the effective national coordination including making provision for funding, infrastructure, tools, public relations as well as learning and development (see Section 7.7). The regional context of delivery has been considered effective by many IS researchers (e.g. Sterr and Ott 2004, Maltin 2004) and evidence from this study suggests that IS is being practiced effectively at regional level. Additionally, Sterr and Ott (2004: 963) argued about the need for "... adequate instruments for the exchange of data and experiences among industrial actors in combination of inter-organisational communication on the regional scale". However, the national coordination aspect which could make provision for instruments, as suggested by Sterr and Ott (2004), on which the regional delivery of the UK NISP relies, is missing from literature. As such, the UK NISP model with a nationally managed and regionally delivered IS programme is a novel approach and there is no evidence of such a model being implemented elsewhere. In addition to the effectiveness of the regional delivery, sub-regional delivery and national delivery may not be the best approaches as stand alone delivery strategies; but they would be effective in complementing the regional delivery strategy for a nation-wide IS network.

**Table 7.2: Benefits of delivering regionally**

1.	Better knowledge of region and industry sectors
2.	Better understanding of how things work in a region
3.	More opportunities to develop relationships by being geographically close
4.	Opportunity to share best practices with other regions
5.	Replicating synergy ideas in other regions
6.	Development of inter-regional synergies
7.	Regional structure/team support for the long term survival of the IS network
8.	More opportunities for funding and support from regional bodies

Source: Author generated

## **7.9 Regional partnership strategy of the UK NISP**

The use of regional partnerships to deliver IS services came across as crucial part of the UK NISP organisational design. Literature on IS places emphasis on the public – private sector partnership, leading to the development of the network broker or facilitator role for IS projects. (Korhonen et al. 2004, Gibbs 2008). This role focuses on

“initiating the actor networks and providing managerial and political support as well as information and educational services and infrastructure support for the other participants of the industrial ecosystem” (Korhonen et al. 2004: 299). The model employed by the UK NISP offered these services as part of ISL national leadership and management (see Section 7.7). Some studies claim that the role of the local authority as a network broker, or a facilitator is crucial in the development of IS networks (Deutz and Gibbs 2004; von Malmberg 2004). However, the NISP model did not include local authorities as a broker or facilitator of IS. In addition to the ISL coordination at national level to provide the services proposed by Korhonen et al. (2004), the UK NISP regional delivery was contracted out to various different partners, including consultancy organisations, research institutions, as well as being directly coordinated by ISL in some regions. Although a mixed sectoral approach to recruit regional partners has been prevalent at the UK NISP from the beginning, consultancy organisations dominated the UK NISP regional delivery. How do these delivery partners differ in their approach to delivering the UK NISP? The UK NISP’s regional delivery strategy is explored in this section along with the benefits and drawbacks of each type of delivery approach and its implications on IS practice.

Consultancy organisations dominated the delivery of the UK NISP throughout the UK. One research participant, who is a member of the UK NISP executive team, stated that rolling out the UK NISP on a national level would not have been possible without the involvement of the private sector. This suggests that the private sector played a significant role in the development of a nation-wide IS network. This would have been possible due to the mutual advantages this partnership had to offer both the UK NISP and the private sector.

The consultancy organisations’ motivation to partner with the UK NISP was related to enhancing their environmental image and thus raising their profile as well as generating revenue. This partnership also allowed them to engage with new businesses and position themselves among the UK NISP members as a ‘leading support organisation’ (P2R02) in delivering some of the business benefits outside the scope of the UK NISP activities. Another aspect of the partnership relates to the possibilities for consultancy organisations to employ new staff to deliver UK NISP services who would then continue to work for the consultancy organisations as consultants. The experience gained from working with the UK NISP would bring further benefits to the consultancy

organisations when bidding for government funding for any similar business support projects. At the same time they would be able to claim that they had delivered UK NISP services in their region and had the capability to deliver other similar projects. All the above advantages that this partnership has to offer resulted in the growth of consultancy organisations. However, consultancy organisations have to follow the strict process laid out by the UK NISP national team and are bound to achieve and report targets on a quarterly basis. In particular, staff working on the UK NISP project were reluctant to use the ICT platform developed by the UK NISP so the regional teams could record all the knowledge and information collected. However, consultancy organisations were prepared to deal with any difficult conditions experienced when in partnership with the UK NISP, as they treated the UK NISP as their client and were reaping significant benefits from this partnership. Having discussed the impact of this partnership on consultancy organisations, I now move to discuss the implications for the UK NISP as well as for the IS practice.

There have been clear advantages and disadvantages of using consultancy organisations to deliver the UK NISP regionally. Most consultancy organisations that were contracted out UK NISP delivery were well established international consultancies. A large 'virtual' pool of consultants, with varied skill-set, is available in such consultancy organisations. These consultants can be utilised, when needed, to deliver the regional IS programme and that is a key strength for the UK NISP when contracting out delivery to consultancy organisations. This reduces the need for the UK NISP to recruit new staff to deliver a project, as they can rely on the consultancy organisations' 'virtual' pool. Notwithstanding this, there has been concern among the research participants regarding the consultants' skills and knowledge to facilitate IS networks. It is believed that consultants may not understand the boundaries of facilitation. And although consultants may have experience of resource efficiency and waste management in specific sectors, they may not understand the differences between consultancy and facilitation approach. Limited training of the UK NISP practitioners, particularly those from consultancy organisations, impacts further on the practitioners' ability to facilitate IS projects. Consequently, practitioners from consultancy organisations treat the UK NISP as their client and do not feel they are a part of UK NISP vision, which could be very detrimental to IS practice. Inter-organisational trust is another element that needs to be developed when facilitating IS projects (Gibbs 2008; Sterr and Ott 2004). A consultancy organisation facilitating IS projects would not help in the development of inter-



organisational trust. Additionally, potential synergy partners may not feel comfortable in discussing and negotiating in front of a consultancy organisation. It may be difficult to establish trust amongst all the parties involved if an IS project is being facilitated by a consultancy organisation.

Notwithstanding this, the involvement of consultancy organisations helps to spread UK NISP awareness and enhances membership levels of the UK NISP in the consultancy organisations' network. It is also more likely that consultants have knowledge of the region, industry sectors and how things work in that particular region, which would be of significant advantage to the UK NISP.

The area of main concern when using consultancy organisations to deliver IS projects, is that these consultancies focus on a particular sector(s) and they are more likely to stick to the same sectors when developing new projects. This contradicts the general IS principle which is concerned with the diversity of industrial system rather than focusing on traditional ways of dealing with by-products (Chertow 2000). Any IS projects undertaken would be entirely under the control of consultancy organisations and would focus on maximising profit for themselves, instead of caring for the IS principles. As long as these consultancy organisations were able to meet their targets they would have no interest in undertaking projects in other sectors and with other organisations. Additionally, consultancy organisations may not engage with their competitors to promote and develop IS projects. The UK NISP may not have any issues with their approach as long the consultancy organisations are able to achieve the tonnage targets they are contracted to deliver. Another similar issue concerns the key sector focus of consultancy organisations, e.g. 'Scott Wilson', that was contracted to deliver the UK NISP services in various regions. One of the benefits that the UK NISP gains in using 'Scott Wilson' is the large tonnages from their construction and demolition projects that help the UK NISP make up their targets significantly. The question now arises is how effective is this approach with regard to IS practice and learning?

It is outside the scope of this study to discuss whether the construction and demolition waste from the linkages of the consultancy organisations could have ended up in landfill sites without the involvement of the UK NISP. It is, however important to note that these organisations have a global reputation as being a consultancy for resource efficiency and waste management; and this reputation existed before their involvement

with the UK NISP. It is, therefore, evident that these organisations would have found ways to reuse and recycle their waste, particularly now that UK landfill tax has accelerated to very high levels and continues to increase. Apart from the fact that consultancy organisations and the UK NISP enjoy mutual benefits of partnering, this partnership does not appear to significantly benefit the practice and learning of IS. The partnership with consultancy organisations demonstrates a superficial attitude to IS as commented upon by one of the research participants. There may be a proportion of the UK NISP projects undertaken by consultancy organisations that simply do not fall under the banner of IS. However, further research is required to make a clear case for the effectiveness of consultancy organisations in delivering IS projects.

In addition to contracting out delivery to consultancy organisations there were some regions in which ISL is delivered directly. Most of the regions in which ISL decided to deliver directly were coordinated by individuals who were involved with the UK NISP from its conception stages. The disadvantage for ISL in delivering directly is that they would need to rely on their existing resources and skill-set in the region. However, the full backing of the UK NISP national team made it possible to deliver in this manner with a limited number of staff recruited at regional level. Moreover, the staff at ISL had a much better understanding of the IS approach and facilitation skills. This type of support was not experienced by the consultancy organisations that were contracted out delivery of the UK NISP, as they were expected to manage within their own resources. When comparing with consultancy organisations, it was difficult for the ISL regional teams to develop IS projects in the sectors in which they had no experience. A strategy to focus on certain sectors was then implemented by the UK NISP. One of the reasons why ISL decided to focus on specific sectors may relate to the success the consultancy organisations had in their respective regions, because of their sectoral focus. Additionally, their decision was based on the sectors' potential for achieving tonnage targets, e.g. construction and demolition, as well as on the government sector priorities to aid the funding process. Therefore, staff, with a strong background in particular sectors, were recruited in ISL coordinated regions to maximise the tonnage targets and to satisfy the sectoral focus of the government.

Delivery of the UK NISP was also contracted out to research institutions and public sector bodies. These organisations had particular advantage over the consultancy organisations and the ISL team as they were not focused on any particular sector and

instead focused on the needs of industry in the respective region. Research participants agree that there are significant benefits for these organisations to be linked to a national programme, including generating revenue and raising their profile. The revenue raised by these organisations helps to recruit or sustain a significant proportion of their staff and adds to the diversity of their portfolio. The universities, research institutions and other public sector bodies chosen to deliver, are more likely to have an adequate knowledge of the concept to enable them to deliver the IS programme effectively. It is also probable that these organisations have experience in delivering a similar service.

Unlike universities and public bodies, consultancy organisations and the ISL focus on specific sectors. This does not infer that the focus is only on one sector, but it is likely that it would restrict the engagement of diverse industries in the development of IS projects. This does not conform to Chertow's (2000: 314) definition "... engage traditionally separate entities in a collective approach ..." as the delivery organisations would continue to focus on those specific sectors that assist them in achieving their tonnage target, rather than adopting an open approach to all sectors. The sectoral approach would be unavoidable as the UK NISP relies on government funding, which requires them to meet certain targets. There is also clear evidence of limited knowledge and understanding of the IS concept among regional co-ordinators and practitioners, particularly in the case of consultancy organisations and ISL. A vague understanding of the differences between consultancy and facilitation was also evident among practitioners of consultancy organisations. In the current state, with delivery partners from various sectors, the UK NISP is not following the principles of IS concept, but the provision for training to generate greater understanding of the IS concept and to enhance the facilitation skills of regional staff may improve the way in which the programme is being delivered. Notwithstanding, there are advantages and disadvantages of using delivery partners from different sectors, which are illustrated in the Table 7.3:

**Table 7.3: Implications of the UK NISP delivery partnerships**

	<b>Consultancy Organisations</b>	<b>Direct delivery</b>	<b>Universities and other public bodies</b>
<b>Advantages for delivery organisations</b>	<ul style="list-style-type: none"> <li>-Enhanced environmental image</li> <li>-Profile of leading support organisation</li> <li>-Generation of revenue</li> <li>-Increase in number of staff</li> </ul>	<ul style="list-style-type: none"> <li>-Earlier involvement</li> <li>-Full training by NISP central team</li> <li>-Full support from the NISP central team</li> <li>-NISP's own information System</li> </ul>	<ul style="list-style-type: none"> <li>-Enhanced environmental image</li> <li>-Raised profile</li> <li>-Generation of revenue</li> <li>-Increase in the number of staff</li> </ul>
<b>Disadvantages for delivery organisations</b>	<ul style="list-style-type: none"> <li>-Strict guidelines for delivery</li> <li>-Strict targets</li> <li>-Strict reporting mechanism</li> <li>-Use of information system developed elsewhere</li> <li>-Limited training by NISP central team</li> </ul>	<ul style="list-style-type: none"> <li>-Limited number of staff</li> <li>-Limited skill-set</li> <li>-High staff turnover due to uncertainty of funding</li> </ul>	<ul style="list-style-type: none"> <li>-Strict guidelines for delivery</li> <li>-Strict targets</li> <li>-Strict reporting mechanism</li> <li>-Use of information system developed elsewhere</li> <li>-Limited training by NISP central team</li> <li>-Difficulty in retaining staff</li> </ul>
<b>Advantages for the UK NISP</b>	<ul style="list-style-type: none"> <li>-Large 'virtual' pool of consultants</li> <li>-Reduced need to recruit new staff</li> <li>-Better NISP awareness and membership levels</li> <li>-Easy to meet tonnage targets</li> </ul>	<ul style="list-style-type: none"> <li>-Reduced costs</li> <li>-All knowledge and information captured in ICT platform</li> <li>-Easy to manage</li> </ul>	<ul style="list-style-type: none"> <li>-Considerably large virtual pool of practitioners</li> <li>-Reduced need to recruit new staff</li> <li>-Better NISP awareness and membership levels</li> <li>-Easy to meet targets</li> </ul>
<b>Disadvantages for the UK NIISP</b>	<ul style="list-style-type: none"> <li>-Difficult to manage</li> <li>-Increased costs</li> <li>-Reluctance in using ICT platform</li> <li>-Limited information and knowledge captured in ICT platform</li> </ul>	<ul style="list-style-type: none"> <li>-Limited staff</li> <li>-High staff turnover due to uncertainty of funding</li> <li>-Limited awareness of NISP</li> </ul>	<ul style="list-style-type: none"> <li>-Difficult to manage</li> <li>-Increased costs</li> <li>-Reluctance in using ICT platform</li> <li>-Limited information and knowledge captured in ICT platform</li> </ul>
<b>Advantages for IS practice</b>	<ul style="list-style-type: none"> <li>-Good knowledge of the region and industry sectors</li> <li>-Varied skill-set to aid any IS projects</li> </ul>	<ul style="list-style-type: none"> <li>-Excellent facilitation skills</li> <li>-Good understanding of IS concept</li> <li>-Feel part of NISP vision</li> <li>-Easy to establish trust</li> </ul>	<ul style="list-style-type: none"> <li>-Open to all sectors</li> <li>-Good knowledge of the region and industry sectors</li> <li>-Excellent knowledge of the IS concept</li> <li>-Likely experience of delivering similar services</li> <li>-Good facilitation skills</li> <li>-Easy to establish trust</li> </ul>
<b>Disadvantages for IS practice</b>	<ul style="list-style-type: none"> <li>-Weak facilitation skills</li> <li>-Limited understanding of IS concept</li> <li>-Do not feel part of the NISP vision</li> <li>-Lack of trust by potential synergy partners</li> <li>-Focus on particular sector</li> </ul>	<ul style="list-style-type: none"> <li>-Less likely to have knowledge of region and industry sectors</li> <li>-Limited sectoral experience</li> <li>-Focus on particular sectors</li> <li>-Limited skill-set</li> </ul>	<ul style="list-style-type: none"> <li>-Less likely to feel part of the NISP vision</li> </ul>

Source: Author generated

## 7.10 Concluding Summary

This Chapter provided a thorough discussion of the policy context and the key organisational design of the UK NISP in relation to the relevant literature, with a view to addressing the significant findings. With regard to the policy context of the UK NISP that has been analysed using the ecological modernisation theory key tenets, the findings suggest that there are signs that the ecological modernisation agenda is moving forward. However, there is still a long way to go for the UK government to be effectively implementing an integrated 'green' market strategy to stimulate the industrial reform.

According to the EM theory, the rescaling of environmental policy is predominantly focused downwards, i.e. decentralisation. However, evidence from this study suggests that upwards rescaling has been of particular advantage in the context of the UK NISP. Upwards scaling prompted the UK government to move away from focusing only on municipal waste to adopting a holistic approach towards managing industrial, commercial and municipal waste and it assisted the government's move to climb up the waste hierarchy, which resulted in an improvement in the relationship between environmental impacts and economic development. A degree of failure of decentralisation is evident from the findings, with regard to its influence on the EM agenda. This does not suggest the decentralisation aspect of EM Theory is ineffective, but suggests a lack of appropriate conditions, including the limited empowerment of devolved administrations, lack of skills and knowledge among the decision-making bodies, and lack of adequate resources, etc. On the other hand centralisation of the environmental policy was seen as being more effective in the UK NISP policy context, to ensure consistency of support available to businesses across the UK, effective communication between the decision-making bodies, and that the same standards were applied across the UK.

The discussion about the stakeholder participation aspect of the EM Theory particularly focuses on the participation of non-state stakeholders. The discussion areas relevant to non-state stakeholder participation include the extent of their involvement, their relevance and competency as well as their influence on the policy outcome. There is a large difference in the level and relevance of participation in England and in the other devolved administrations. Although participation levels were high in England, they did

not go beyond the 'asks and takes advice' element of Coenen's (2009) model (See Table 7.1). In devolved administrations, on the other hand, participation was at a very low level and decisions were taken almost entirely by government officials, with very limited involvement of non-state stakeholders. It is argued that the involvement of individual businesses and trade organisations is critical in formulating an effective environmental policy. However there was hardly any evidence of these stakeholders engaging in the decision-making process, particularly in the case of devolved administrations. Unlike devolved administrations, there was satisfaction among research participants in England with regard to the extent and relevance of non-state stakeholder involvement. Notwithstanding the extent and relevance of non-state stakeholders, it is argued by Gouldson and Murphy (1998: 12), whilst building on a Janicke's model (1997, in Gouldson and Murphy 1998) that there is the need for "a favourable structural framework within which to operate if they [stakeholders] are to influence the policy process". The lack of a structural framework was evident in almost all cases and there is adequate evidence of dissatisfaction among the stakeholders about some of the decisions taken. This could suggest that the non-state stakeholders' influence over policy formulation and implementation has been limited, regardless of the satisfactory involvement of relevant stakeholders in the case of England. Therefore, it can be argued that the ecological modernisation agenda, within the policy context of the UK NISP, has not reached an effective level to be able to influence industrial reform.

The findings suggest that the IS concept triggers the social/technical innovation which is particularly reliant on knowledge and information transfer, whereas ecological modernisation supports the notion of technological (as well as environmental) innovation. There is some evidence from the findings to suggest there is an increase in social/technical innovation, but technological innovation has been difficult to achieve in the case of the UK NISP. Although there is some evidence of technological innovation being funded by the UK government, the approach taken has been very fragmented. Funding for technological innovation is not focused on changing the industrial operations structurally, nor does it specifically link to the projects inspired by BESPs. This fragmented approach to funding technological innovation has not been particularly useful in influencing industrial reform. However, it is a much required element of the EM theory that allows the more significant benefits of the IS approach to be accessed and more broadly ensures an integrated 'green' market strategy to satisfy the ecological modernisation agenda of the UK government.

The UK NISP is a product of industry's desire for flexibility and self-regulation. However, the status of the UK NISP as a self-regulation instrument is particularly weak as the solutions it offers industry are predominantly a quick-fix to the waste management issues and are focused on short term wins. The UK industry runs the risk of losing their competitive advantage over other EU countries, as industry in the EU has focused on more technological innovation and long term sustainable solutions. Research evidence suggests that the industry would lose out in the long term by adopting the UK NISP inspired solutions, which resonates the findings of von Malmborg and Strachan (2005) in the case of the UK ETS. The UK NISP as a self-regulation instrument may be considered a weak 'green' market strategy of the UK government and may not be considered as the best approach to achieve the low carbon economy and the ecological modernisation agenda of the UK government.

The regional delivery of the UK NISP, as well as the provision for the part-funding of the UK NISP by the regional development agencies, raised thoughts whether the UK NISP is an effective instrument for sustainable regional development. Findings suggest that the UK NISP had some potential to support regional development but this may be limited to economic development. Most of RDAs' motivation to part-fund and support the UK NISP was related to achieving their economic targets, through the outputs arising from the NISP activities. However, there is a possibility that, although the UK NISP may have assisted in the economic development of the region, it may have happened anyway, due to the nature of industry in those particular regions and to the range of policies and legislation that were introduced during this period. So the potential for the UK NISP to be labelled an effective instrument for sustainable regional development is limited and it may require further research to establish the concrete impact the NISP had on individual regions.

Based on the findings, a critical discussion of the planned or emergent and top-down or bottom-up approaches, in relation to the development of the UK NISP, suggests that IS initiatives may not fall under any of these categories. In the case of the UK NISP, there has been a transition from planned to emergent IS, which resonates with the findings of Verguts et al. (2010), who contends that the IS is a change process and thus, takes into consideration the continuous perspective. The noticeable shift from the bottom-up to

top-down approach was also evident in the case of the UK NISP, in an attempt to achieve the middle-out approach introduced by Costa and Ferrao (2010).

Coordination of the UK NISP at national level was a significant part of the organisational design employed by the UK NISP. The key elements of the UK NISP leadership were the vision for a nation-wide IS network; provision for funding; developing and managing the information and communication system; coordinating and performance managing regional teams; developing and managing public relations; and, promoting learning and development. Despite experiencing some difficulties related to the provision for funding and managing regional teams, the findings suggest that through the above roles, the UK NISP was able to provide a fairly enabling context for the development and management of a nation-wide IS network.

With regard to the geographical delivery strategy of the UK NISP, findings suggest that regions provide an effective boundary to host the development of IS networks and offer significant benefits for the development of IS projects, as illustrated in Table 7.2. However, this strategy is effective only as part of the overall organisational design that includes coordination at national level. National and sub-regional deliveries are also seen to be effective, but only to complement the regional delivery strategy and not as standalone delivery strategies.

The creation of a partnership between the UK NISP and organisations from different sectors to enable regional delivery was another key part of the UK NISP's organisational design. A critical discussion based on the findings suggests that there are advantages and disadvantages of using organisations from different sectors and each one of them has different skills and knowledge. Amongst the range of partner organisations, the key areas of concern relate to the focus on specific sectors when developing IS projects, limited knowledge and understanding of IS concepts and vague understanding of the differences between consultancy and facilitation. Given the complexity in the development of a nation-wide IS network, the use of partner organisations from different sectors cannot be completely criticised. However, there is a clear case for these organisations to be trained effectively to gain a greater understanding of the IS concept and to enhance the facilitation skills of the regional teams, as well as making provision for a consistent and transparent strategy for employing an inter-sectoral approach to the IS projects.



## **CHAPTER EIGHT: CONCLUSIONS AND RECOMMENDATIONS**

The overall aim of this research project was to explore and understand the UK NISP's place in the UK government's 'green' market strategy and the management and organisational design employed by the UK NISP in establishing and managing a nation-wide IS network. The methodological approach adopted to realise the aim of the research project includes: (1) an extensive review of literature and other relevant information sources in the areas of EM, IE, EID and IS (Chapters Two and Three); and, (2) a case study of the UK NISP developed through the practical experiences of the UK NISP key stakeholders (Chapters Four, Five and Six). A critical discussion is offered in Chapter Seven to explore the findings in relation to the existing literature. Chapter 8 answers each of the research questions set out in Chapter One. This Chapter explains the contributions to knowledge, and provides recommendations for the UK NISP and policy makers. The thesis concludes with the theoretical implications of the study and recommendations for further research.

### **8.1 Addressing the research questions**

The study had the broad aim of exploring and understanding the policy context, as well the management and organisational design of the UK NISP. The study aims have been realised and a summary of the findings is presented below, addressing each of the research questions in turn. The three research questions were:

- (1) Why was the UK NISP adopted by the UK government as one of the key instruments of their 'green' market strategy?
- (2) What are the key barriers to the effective use of the UK NISP as a key instrument within the UK government's 'green' market strategy?
- (3) How crucial is the organizational design employed by the UK NISP in establishing and managing a large scale IS network?

A summary of the answers to each of the questions is outlined below:

### 8.1.1 Summary of the answer to Question One

There were a number of reasons why the UK NISP was considered a key component of the UK government's 'green' market strategy. These have been outlined in the Section below:

#### *8.1.1.1 The UK NISP's ability to decouple negative environmental impacts from economic growth*

The UK government and the administrations in Northern Ireland, Scotland and Wales agreed on a common strategy to achieve sustainable development (DEFRA 2005a). One of the four priority areas that emerged from this strategy was Sustainable Consumption and Production (SCP). The boundaries of the SCP are outlined in the strategy framework as follows:

“Sustainable Consumption and production is about achieving more with less. ... This includes reducing the inefficient use of resources, which is a drag on the economy, so helping boost business competitiveness and to break the link between economic growth and environmental degradation” (DEFRA 2005a: 9)

This demonstrates the UK government's focus on adopting features of ecological modernisation in order to manage a reduction in: waste production, resource use and greenhouse gas emissions; and thus achieve climate change targets. Gibbs (2000), and other commentators from the field of EM, indicated that the creation of a successful business climate can help deliver sustainable development and this was also observed by the UK government. Although the government's focus in the past had primarily been on increasing recycling, this appeared to change when the landfill tax reinvestment plan came into force through the BREW programme. The reinvestment of landfill tax into businesses, through BESPs, complemented the landfill tax and was, therefore, a possible approach to reduce the negative impacts on economic development arising from the landfill tax. In addition, BREW did not just fund the BESPs to achieve the environmental objectives, but also developed a context in which the involvement of the economic development agencies was unavoidable, to ensure that a real effort was underway to reconcile economic development and environmental protection. This initiative is an example of how the government has moved towards a better relationship

between environmental impact and economic development, rather than focusing on environmental impacts alone. BREW was simply a mechanism where landfill tax money was reinvested into businesses through a range of programmes, to promote innovative ways to be environmentally effective, and, in some cases, businesses were also able to benefit economically. The UK NISP, whilst coordinating the IS network in some of regions, proved itself to be a programme that has the capacity to decouple environmental degradation from economic growth by diverting waste from landfill, through the implementation of the IS concept. This led to the BREW Programme funding of the UK NISP in England and assisting the UK NISP to launch nationally.

#### *8.1.1.2 The UK NISP as a self-regulation instrument*

There is evidence that the UK government has made efforts and progress in terms of developing a mix of regulatory, economic and voluntary instruments in the hope that they may positively influence on both the economy and the environment (DEFRA 2003). A number of regulatory and economic instruments were put in place by the UK government, including the landfill ban of certain materials, escalating landfill tax, etc. The UK NISP came across as a self-regulation instrument offering flexibility to industry. Since the UK NISP was initiated by the efforts of industry and is supposedly led by industry, there was an element of self-regulation which motivated industry to become involved with the UK NISP. This did not go unnoticed by the government, as the introduction of voluntary policy instruments and programmes has been a key part of the UK government's strategy to integrate environmental and economic policies. Thus, the UK NISP was adopted by the government. As a result, the UK NISP was funded via BREW from the landfill tax revenues collected from UK-based businesses. Support and funding of programmes such as the UK NISP has encouraged the businesses to take responsibility for reducing their environmental impacts, albeit with a view to improving their competitive advantage. This was a balanced UK government strategy, where regulatory instruments discouraged businesses from sending their waste to landfill because of the increasing landfill taxes, as well as imposing a ban on the landfilling of certain materials. At the same time, the UK NISP, as a self-regulation instrument, had the potential to offer support and help to UK businesses in finding alternative ways to deal with their waste, thus promoting resource efficiency.

### *8.1.1.3 The UK NISP assisting in economizing the ecology*

The policies in the UK, particularly waste and resource efficiency policies, demonstrate to some extent, the government's effort to economise the ecology. Nevertheless, these policies and associated regulations are based on EU directives such as the EU Landfill Directive. The UK's landfill tax escalator was one of the environmental taxes that demonstrated the UK government's desire to place economic value on the land and its use for dumping industrial and commercial waste. Since the launch of landfill tax in 1996, there have been changes in the way industry thinks about waste management options, but these have not been significant. Nonetheless, the escalator element of the landfill tax in the UK has played a vital role. Industry players believe that, until recently, landfill tax had not reached the level necessary to motivate industry into thinking about alternative waste management options. Most business representatives believe that it may only change after the landfill tax reaches a level which impacts on the bottom line of industry. Recent government documents on waste and resource efficiency also encourage industry to use secondary material, rather than utilising primary material as raw materials. It was not easy to convince industry to implement such changes, since there was no economic incentive to use secondary material. The UK NISP had the potential to convince businesses to consider alternative waste management options, as well as the use of secondary material, albeit with a view to improving their competitive advantage; thus, helping the UK government to persuade UK businesses about the benefits of their agenda.

### *8.1.1.4 The UK NISP assisting the preventive and proactive features of the environmental policies*

Environmental policies are increasingly preventive and proactive. One example of this is the landfill tax which penalises the dumping of waste on landfill sites. The landfill tax escalator promotes the generation of less waste, reuse, recovery, recycling and incineration. Taxing waste sent to landfill and escalating taxes on a regular basis, was welcomed by most research participants. Nevertheless, they believed that the landfill tax level should be much higher. Notwithstanding this, the landfill tax escalator appears to be encouraging businesses to create less waste. Moreover, re-investment of tax revenues into businesses, through BREW partner programmes, such as NISP, provides them with support, which enables businesses to explore innovative ways of resolving resource and waste issues. BREW, and in particular the UK NISP, encouraged businesses to consider alternative waste management options and develop innovative ways of dealing with waste, thus assisting the preventative and proactive feature of the policies introduced by the UK government. There is always an element of risk associated with preventive

approaches, in particular stringent regulations and environmental taxes, which may put UK businesses at a competitive disadvantage, however, the UK NISP support for businesses may lessen that impact. In summary, there appears to be a shift in the government's approach from curative and reactive, to preventive and proactive and the UK NISP came across as having the potential to contribute to this move.

### 8.1.2 Summary of the answer to Question Two

Some barriers to the effective use of the UK NISP as a key instrument of the UK government's 'green' market strategy are addressed below:

#### *8.1.2.1 Decentralisation of the UK environmental policy formulation and implementation*

Although all the UK countries followed the common strategy in achieving sustainable development in order to provide a consistent approach and focus across the UK (DEFRA 2005a), the powers to formulate and implement environmental policy remained with the devolved administrations. The landfill tax escalator was introduced at UK level, with a view - and promises from the UK Treasury - that central government would recycle the landfill tax to businesses. However, the approach adopted to recycle funds back into businesses was the responsibility of devolved governments. This increasing empowerment of devolved administrations is interpreted as decentralisation within the theory of Ecological Modernisation and it is also referred to as a 'downwards' hollowing out process by Gibbs and Jonas (2000). Increasing importance is given to the decentralisation of the environmental policy in the discourse of Ecological Modernisation (Frijns et al. 2000) and similarly, as the findings suggest, pressure is mounting for devolved solutions for devolved issues in all UK countries. Although broadly similar, policies can be very differently formulated and implemented in devolved administrations, which may result in the varying effectiveness of a policy instrument adopted by the individual governments. In the case of the UK NISP as a policy instrument, barriers were experienced in adopting the UK NISP as a key component of the UK government's 'green' market strategy, particularly in devolved administrations. The key barriers are outlined as follows: (1) The UK NISP was funded in each of the devolved administrations by different government bodies and in some

cases a mix of government bodies. This required the UK NISP to satisfy the individual targets of each of the funding bodies, making it difficult for the UK NISP to work towards a specific strategy; (2) Short term commitment of the individual funders, as well as the changing policy focus of each of the funders, influenced the continuity and stability of the UK NISP, e.g. there was a high staff turnover due to the uncertainty of the UK NISP's survival; (3) Without any regard to the promises made by the UK Treasury to return landfill tax to businesses, most of the landfill tax revenue was used in areas which were considered a priority for the then governments in devolved administrations. This resulted in an inconsistent focus on resource efficiency and waste management policies across the UK, which was particularly to the detriment of the businesses that operate UK-wide. It also resulted in inconsistent and, in most cases, inadequate level of environmental support for businesses in devolved administrations; and, (4) Different interpretations of legislation coming from the EU, as well as central government, also made it difficult for the UK NISP to replicate the same project ideas in other devolved administrations.

All the above reasons suggest that decentralization in the UK, in the context of the UK NISP, has failed somewhat and perhaps became a barrier to the effective use of the UK NISP as a key component of the UK government's 'green' market strategy. However, it is debatable whether the above barriers occurred due to the increasing empowerment of devolved administrations. It may be argued that extended and consistent empowerment of devolved administrations may be the only long term solution in moving away from the weak formulation and implementation of sustainable development policies.

#### *8.1.2.2 Limited role of non-state stakeholders in the decision-making process*

The implementation of different decision-making mechanisms in each of the UK countries, adopting the UK NISP as a policy instrument, has also been detrimental to the effectiveness of the UK NISP. Unlike BREW in England, there was no provision for a formal decision-making mechanism and no appropriate involvement of non-state stakeholders in the decision-making process in most devolved administrations. Involvement of individual businesses and/or trade organizations would have been instrumental in formulating and implementing an effective environmental policy, since it is claimed that the UK NISP was led by businesses. The landfill tax revenue collected from businesses was used to fund the UK NISP and businesses had superior knowledge

of how their processes worked and how best to deal with their environmental impacts. However, the majority of decisions were taken by government officials, with no, or limited input from any non-state stakeholders in devolved administrations. Notwithstanding this, research participants were satisfied with the extent and relevance of stakeholder involvement in the decision-making process of the BREW Programme in England. However, this did not mean that the non-state stakeholders were able to exert any influence on the policy outcome. There was dissatisfaction amongst the stakeholders on the decision outcomes which were not even presented to the stakeholders for discussion. Although a formal mechanism was employed with an appropriate involvement of non-state stakeholders, it was merely an exercise to demonstrate the government's commitment to a participatory approach to decision-making, with no actual heed given to non-state stakeholders' recommendations. The development of non-state stakeholder related capacities, in the decision-making process, would have had a profound impact on choosing the right mix of policy instruments and an appropriate proportion of the funding allocation for each of the chosen policy instruments. However, this has not been the case in the policy context of the UK NISP, which may have been detrimental in considering the UK NISP as a key component of the 'green' market strategy of the UK government.

### 8.1.3 Summary of the answer to Question Three

Organisational design of the UK NISP had a significant role to play in establishing and managing a large scale IS network. However, an element of the organisational design, which focuses on specific sectors, does not adhere to the diversity principle of IS. A summary of the findings, in relation to the effectiveness of the UK NISP's organisational design, as well as how well it aligns to the principles of IS is offered below:

The vision for a large scale nation-wide IS network, prompted an organisational design to be employed by the UK NISP that was innovative and unique. As the findings suggest, IS development cannot be classified as planned or emergent. The development of a large scale IS programme is a change process which may go through a transition from planned to emergent and vice-versa, depending on the contextual conditions. Similarly, most research studies classified the IS programmes as bottom-up and top-down. However, the findings suggest that in the case of the UK NISP, noticeable

movement from the bottom-up to top-down was evident. Thus, the development of a large scale IS programme may go through the transition of bottom-up to top-down and vice-versa, depending on the contextual conditions. The organisational design employed by the UK NISP has been a crucial element for the development and management of the UK NISP as it took into consideration the dynamic nature of the IS development. Korhonen (2004b: 299) suggested that “local authorities could serve as network brokers and ‘institutional anchor tenants’ initiating the actor networks and providing political and managerial support as well as informational and educational services and infrastructure support for the other participants of the industrial ecosystem”. The ‘institutional anchor tenant’ approach appears to fit a large scale IS initiative. However, there is little mention of the leadership elements in the literature, which are instrumental in handling the change process involved in the development of a large scale IS network. A study conducted by Hewes and Lyons (2008), which again focuses on the development of IS at local level, does place emphasis on the “importance of champions who are able to bring groups of actors together and motivate them to become personally involved in the construction of an EIP” (Hewes and Lyons 2008: 1339) . The presence of that champion may well have existed at the UK NISP and resulted in effective leadership and management at national level becoming the key element of the organisational design on which the development and survival of the UK NISP was based. All the aspects of leadership that could assist in change process were addressed by the UK NISP at national level. These included: having the vision for a nation-wide IS network; effective communication and knowledge transfer, using an information and communication system; securing funding by aligning strategies with the government bodies; public relations, including engaging with regulatory bodies, research institutions, and making business members aware, etc.; coordination of regional teams, including providing support and motivation, performance managing and creating a cooperative culture among the regional teams; and, the provision for learning and development from - and that feeds back into - all other leadership aspects for further and better development of IS network (see Chapter Seven, Figure 7.2).

The regional delivery strategy of the UK NISP is another key element of their organisational design which can significantly influence the development and management of a large scale IS. The regional delivery strategy of the UK NISP provided the opportunity to align the strategies of the regional operations to those of the strategies and priorities of regional government bodies. This offers the potential for



securing additional funding and support to deliver the programme more effectively in the region. This, however, may require the regional IS programme to focus on helping regional bodies in achieving their economic development targets. Nevertheless, the strong visibility of the regional IS programme as a potential contributor to the development of the region, makes it easier to engage with government bodies and regional businesses, and in the long term it helps the regional IS programme become established and survive. One research participant described regional development agencies as a 'hungry empire' which tends to fill gaps, if they identify the need for a specific service in their region. The UK NISP operating with a regional structure and regional teams deters RDAs from providing a similar service that helps with the long term survival of regional initiatives. In addition, each region is significantly different with regard to the dominating industrial sectors and how things work in a particular region. This knowledge can only be obtained by being geographically close to the region and by effectively engaging with both public and private sectors. Therefore it is significantly important that the IS delivery is approached regionally for a large scale IS network.

Another key element of the UK NISP's organisation design is its partnership with various regional organisations to deliver the regional IS programme. Wasserman (2001, in Gibbs 2008) suggests the involvement of third party organisations to facilitate the inter-firm networking. It is apparent that these partnerships were instrumental in launching and managing an IS network on a national/large scale. It can be argued that these partnerships with regional organisations may not have been possible without strong leadership and management at national level. Nevertheless, there are advantages and disadvantages associated with each type of partners that were contracted out delivery of the UK NISP. The two main issues identified include: (1) a strong sectoral focus in the development of the UK NISP projects. An effort to align with the sectoral priorities of the government and to meet the government's short term (landfill diversion) targets to secure future funding, justifies the strong sectoral approach adopted by the UK NISP. However, the sectoral approach, that restricts the engagement of diverse industries, may suggest a superficial attitude to IS and may not conform to Chertow's (2000) definition of IS; and, (2) limited knowledge and understanding of the IS concept and the difference between consultation and facilitation. Limited knowledge and understanding of the regional teams depend, to a certain extent, on the type of partners involved and the level of training offered to them. The provision for

comprehensive training to generate a better understanding of the IS concept, as well as enhancing facilitation skills among regional teams, may assist with these issues. However, the former of the two issues is a more strategic matter and outside the scope of this study. It would require further research to explore the quantitative outputs from the IS projects for each of the regional partners, in relation to the individual sectors that were involved in generating those outputs. This may provide further insight into whether a particular type of regional partner influences the sectoral approach being adopted at the UK NISP and whether this restricts the engagement of diverse industries in the development of IS projects. Nevertheless, in its current state, the UK NISP appears to focus strongly on particular sectors and does not appear to follow the principles of the IS concept. Notwithstanding this, the delivery partnership strategy of the UK NISP complements the rest of the organisational design and could play a significant role in establishing and managing a large scale IS network.

## **8.2 Contributions to knowledge**

Whilst exploring and understanding the UK NISP's place in the government's 'green' market strategy, as well as the organisational design employed by the UK NISP, this thesis has offered contributions to knowledge in four areas.

### **8.2.1 Decision-making mechanism**

The first major contribution to knowledge made by this research is the study of the UK government's decision-making context/mechanism in choosing appropriate policy instruments for their 'green' market strategy. The UK government, by adopting the UK NISP as a key component of their 'green' market strategy, demonstrates their intention to develop policies and programmes in line with the ecological modernisation theory. The literature review showed that the UK government has fully understood the importance of ecological modernisation in policy terms and has taken significant steps in making changes to the policies and the policy process using the ecological modernisation theory. The focus has been on the decision-making mechanism to make choices, with regard to the policy instruments (e.g. the UK NISP) adopted as key components of the UK government's 'green' market strategy.

The thesis adopts a qualitative approach to capturing the experiences of key stakeholders (both state and non-state stakeholders) and provides an overview of the decision-making mechanism adopted by the UK government as well as the devolved administrations. The key contribution is perhaps the use of the ecological modernisation theory to study these mechanisms that are adopted by each of the governments in the UK. Previous contribution to this field, within the context of IE, has been inspiring and perhaps a motivation to conduct this study. The originality of this study is witnessed in the empirical work undertaken and its interpretation using the key tenets of ecological modernisation theory. Another aspect where this research differs from any previous work is that it offers comparisons of the decision-making mechanism in each of the UK countries. Mechanisms employed in devolved administrations are generally ignored in most studies, which assume that the devolved administrations would apply very similar mechanisms, only minimally adjusting these to their cultural, political and industrial context. However the findings of this study suggest that there are significant differences in the decision making mechanisms employed in each of the UK countries. An example of such differences is reflected below through a summary of the findings in relation to one of the key elements, i.e. ‘closed policy making to participative policy making’ of Mol’s (1995) model of institutional transformation in the state’s role in employing the ecological modernisation theory.

Findings of the study indicated that the decision-making mechanism within the BREW programme in England and to a lesser extent, in Wales demonstrated the trend towards the greater involvement of non-state stakeholders, as argued by Frijns et al. (2000) and Mol and Spaargaren (2009). In contrast, decision-making in Scotland and Northern Ireland did not follow this trend, as would have been expected in an industrialised economy. Notwithstanding this, the extent and relevance of non-state stakeholders within the BREW programme decision-making mechanism was not an indicator of whether these stakeholders were able to influence the policy outcome. Although it is imperative that the decisions made would not be to the satisfaction of all the stakeholders given their different priorities, most stakeholders were disappointed with some of the outcomes which were not even presented to the stakeholders for discussion. Although a formal mechanism was employed with an appropriate involvement of stakeholders, it was merely an exercise to demonstrate the government’s commitment to a participatory approach to decision making. Thus, the findings reveal that the extent and relevance of stakeholder involvement may not confirm the influence of non-state stakeholders on the policy outcomes. This finding confirms the need for “a favourable structural framework within which to operate if they

[all stakeholders] are to influence the policy process”, as proposed by Gouldson and Murphy (1998: 12). Findings also suggest that the lack of adequate resources to employ an effective mechanism, the limited skills and knowledge of the decision makers, and the government’s limited effort to bring together relevant stakeholders are some of the issues that need to be dealt with. These issues are in line with what Gouldson and Murphy (1997) propose to be the elements that may assist in the development of a favourable structural framework. These elements include: “access to information and understanding, involvement in decision making and access to influence and the provision of suitable resources and expertise” (Gouldson and Murphy 1998: 12). It is evident that in devolved administrations, the participatory approach was least developed and development of this capacity is required using the elements suggested by Gouldson and Murphy (1998). This relates to another element of Mol’s (1995) institutional transformation, i.e. ‘centralised to decentralised’. The evidence available to this study suggests there is a certain level of decentralisation through the devolved powers. However, this thesis argues that extended and consistent empowerment of the devolved administrations as well as their capacity building, would offer a long term solution to develop a structural framework within which to operate. This would enable the non-state stakeholders to influence the policy process effectively, in order to divert from the weak formulation and implementation of the policies and programmes for decoupling environmental degradation from economic growth. Notwithstanding this, the findings suggest that centralisation of the policy formulation and implementation would have been more effective in the use of the UK NISP as a key component of the UK government’s ‘green’ market strategy, when compared to the current state of decentralisation/devolution in the UK.

This thesis is able to provide a more insightful understanding into the policy focus of the UK government and devolved governments, how the UK NISP objectives align with the government’s policy focus and the decision-making mechanisms employed by each of the governments. Therefore, it is able to provide better conclusions with regard to the UK NISP’s place in the UK government’s ‘green’ market strategy, the barriers to the use of the UK NISP as a key component of the UK government’s ‘green’ market strategy and how far the UK has managed to implement the ecological modernisation theory, at least in the policy context of the UK NISP.

### 8.2.2 EM and IS relationship

Another key contribution of this study is the bringing together of the two fields of study, i.e. the ecological modernisation theory and IS concept, through an empirical investigation of the UK NISP. This contribution builds on the works of Gibbs (2003b) and Deutz (2009), in which they have attempted to explore the relationship between EM and EID/IE approaches. EM provides a general approach to integrate environmental protection and economic growth, by influencing policy approaches and supporting technological development. In contrast, IS offers a specific way in which integration of environmental protection and economic growth can be achieved at industry level, through the sharing of utilities, services and by-product resources. Although IS is not specifically focused on technology development, as in the case of EM, it catalyses technological innovation. In the context of this study the relationship between EM and IS is illustrated in Table 8.1:

**Table 8.1: Relationship between EM and IS**

<b>EM</b>	<b>IS</b>
Theoretical	Practical
General approach to greening contemporary capitalism	Specific approach to greening contemporary capitalism
Supports integration of environmental protection and economic growth	Has potential to integrate environmental protection and economic growth
Influences policy and policy process	Partly influenced by policy and policy process
Focuses on - and supports – technological development	Catalyses technological innovation and Vice-versa
Applies at national and organisation levels	Applies at inter-organisational, local, regional and national levels
Supports IS through relevant policy	Supports EM by catalyzing technological innovation
Motivated by modernisation idea	Motivated by economic benefits

Source: Author generated

### 8.2.3 Organisational design for large scale industrial symbiosis

Another contribution of the study relates to the finding that IS can neither be categorised as planned or emergent, nor can it be categorised as top-down or bottom up. Within the context of the UK NISP, IS development is a change process that may move from being planned to emergent, and from being top-down to bottom-up. The organisational design, employed by the UK NISP, took this dynamic nature of the IS development into consideration. The understanding of the dynamic nature of IS development, as well as the organisational design presented in this study would perhaps assist in developing an enabling context for the development and management of a large scale IS network in other

countries. This is the first study in which executives, co-ordinators and practitioners of NISP were interviewed from each of the devolved administrations as well as from each English region. The study is insightful, in that it is able to highlight any criticism of the organisational design from the view of the UK NISP's own staff as well as contractors and this would allow the UK NISP to make the necessary changes to their organisational design. The leadership aspect explored in the study is one of the most novel contributions of this study. Some previous studies have particularly focused on champions of EID and others have looked at anchor tenants, but most of these studies relate to small scale developments. There is reference made to the use of an institutional anchor tenant in managing an IS network in Korhonen (2004b). However, this study is the first empirical investigation to provide insight into the effectiveness of leadership at national level and the associated challenges in establishing and managing a large scale IS network.

#### 8.2.4 Methodological contributions

A key methodological contribution is made by studying the policy and decision-making mechanism in all four countries of the UK, within the UK NISP context. It provided the possibility of comparing the decision-making mechanisms adopted in each of the UK countries and their impacts on the development and management of IS networks. It was a novel approach, as none of the studies in the past covered all UK countries when studying the decision-making mechanism in relation to the UK NISP. The study by Proctor (2005) focused on the impact of regional policy on the eco-industrial development initiatives in two English regions and Scotland, which were being developed at the time of the study. However, at that time, policies related to eco-industrial development were not that well developed. In contrast, this study has focused on an IS initiative that is fully developed and managed at national level and supported by government policy for many years. This generated superior information and insights from key stakeholders, which would not have been possible in the past.

Similarly, the management and organisational design of the UK NISP has for the first time, been studied in-depth, using empirical data from the interviews conducted in all UK regions. Most other studies in the past (e.g. Paquin 2008, Mirata 2005, Proctor 2005), have only focused on a few regions. An exception to this is Domenech (2010) who conducted a UK NISP case study. However, her case study did not include some of the English regions, as well as it failed to take into consideration the involvement of private sector

organisations in delivering the UK NISP in various regions. This study took a very broad approach in terms of covering all the regions of the UK, including devolved administrations and a focused approach in terms of studying the same EID initiative across the UK.

### **8.3 Recommendations for policy**

#### **(1) Policies to be aimed at IS**

This study established a relationship between ecological modernisation and IS; the former being a general approach and the latter being a practical implementation to decouple environmental harm from economic growth. There is a need for policymakers to understand this relationship in order to direct policy formulation and implementation aimed at supporting the development of IS networks.

#### **(2) Innovation to be aimed at IS**

The study found that although there is evidence of technological innovation being supported and funded by the UK government, the approach taken is very fragmented. The approach is described as fragmented, as it does not directly support technological innovation inspired by other government funded programmes, e.g. BESPs. BESPs, such as the UK NISP, are unable to be more effective as they do not have direct funds available for technological innovation that may be required to realise a potential IS project. The government may receive better value for money if the funding for technological innovation is aligned with the technological innovation needs of the projects inspired by business environmental support programmes. This will help the government to spend money in areas where it is most needed to stimulate industrial reform.

#### **(3) Extended and consistent powers to devolved administrations**

The limited and inconsistent empowerment of the devolved administrations came across as detrimental to the effectiveness of their decision-making mechanism. Extended and consistent devolution of power in the UK is the only long term solution to ensure an effective decision-making mechanism is adopted. Alternatively, the findings also suggest that centralisation of environmental policy formulation with flexibility in the

implementation approach for devolved administrations could be helpful for various reasons as discussed earlier, including maintaining policy consistency throughout the UK boundaries.

#### (4) Participatory approach to decision making

Involvement of non-state stakeholders in the decision-making process has been minimal in devolved administrations. Although it has been better in England, there were question marks over whether there was an opportunity for non-state stakeholders to actually influence the policy outcomes. As Gouldson and Murphy (1998: 12) suggest, there is a need for “a favourable structural framework within which to operate if they [stakeholders] are to influence the policy framework”.

#### (5) Capacity building of decision-makers in devolved administration

Capacity building of decision-makers is another key recommendation arising from the study findings. There is a need for the capacity building of decision-makers, with regard to enhancing their skills and knowledge in environmental matters, better relationships with trade organisations and other NGOs, greater communication between the decision-makers in each of the UK countries, and the availability of adequate resources to at least the same proportion as spent in similar projects in England. Research participants recommended the use of a formal decision-making mechanism, such as BREW in England, although the capacity building issues would need to be resolved prior to adopting a BREW type approach.

#### (6) Consistency in the way in which BESPs are funded

The findings suggested that inconsistency in the way funding was approached in each of the UK countries, with regard to which government departments fund the UK NISP and for how long, has been detrimental to the certainty and stability of the programmes. Different government departments funding the programme impose different targets, which makes it difficult for the UK NISP to devise a strategy to follow throughout the UK. Each of the UK countries funds the UK NISP for varying durations. Short term funding, in particular, makes it difficult make long term plans for national programmes such as the UK NISP. This also creates a feeling of uncertainty amongst staff about the survival of the



programme and thus, results in a high turnover of staff and the reduced efficiency of the programme. It is, therefore, recommended that a consistent and medium to long term approach for funding the national programmes needs to be adopted.

#### (7) Direct policy to deal with small businesses

Given the large proportion of small businesses in the UK, it is necessary that their needs are not ignored and that there are direct policies to deal with them. The research participants were surprised to learn that the BREW funding came with very limited conditions attached. This flexibility allows the BESPs to concentrate on achieving their targets by focusing only on large businesses, which perhaps makes it easier for them to achieve their targets and outperform, without having to take approximately 95% of the other UK businesses into account. A funding condition imposed on all BESPs to part-focus on small businesses would ensure that these companies are not ignored in terms of the government's promise to return part of the landfill tax revenue to all businesses.

### **8.4 Recommendations for the UK NISP**

#### (1) Long term survival of the UK NISP

The UK NISP has been funded by the UK government for a period of 6 years since it became national in 2005. As a rule of thumb, programmes are generally funded for a span of nearly 3 years, after which they are expected to support themselves. It is hard to judge whether the continuation of this funding in the long term has been an advantage or disadvantage for the UK NISP. The quantity of outputs claimed by the UK NISP clearly indicates that there is a case for the level of benefits it is able to deliver to businesses, thus suggesting that businesses would be prepared to pay for UK NISP services. More government funding would only make it difficult for the UK NISP to become independent. The UK government may decide anytime to stop the UK NISP funding, which may be hugely detrimental to its survival in the long term. An example of this situation is the UK NISP programme in Scotland which has come to an end because funding was discontinued by the government in 2011. There is also the possibility that the private sector may offer similar services in the future, in which case it would also not be possible for the UK NISP to remain fully subsidized/funded by the government. It is therefore recommended that the UK NISP should look for ways to raise money from the private sector to become

independent. This would not only help with the long term survival of the programme and staff retention, but it would also allow them to develop one strategy across the UK and to deliver the NISP programme within the boundaries of IS to all sizes of businesses, without the pressure of having to achieve government tonnage targets.

## (2) Extensive training for UK NISP staff and contractors

The understanding of the IS concept varied to a large extent amongst the UK NISP staff and contractors delivering the programme. Some believed their objective was ‘achieving tonnage targets’ and others were not sure whether they had ever been told about the UK NISP’s actual objectives. An understanding of the concept, as defined by Chertow (2000) was omitted from all descriptions. Therefore, it is recommended that the UK NISP staff and contractors are offered extensive training to develop their understanding and knowledge of the IS concept. Additionally, training is also required for co-ordinators or practitioners who have consultancy backgrounds. Consultancy differs from facilitation to a large extent and it is necessary for the co-ordinators and practitioners of the UK NISP to understand the boundaries of facilitation. This understanding of what they should or should not do during the facilitation process is necessary for the effective delivery of the UK NISP.

## (3) Failure to focus

The evidence available to this study suggests that the UK NISP was engaged in various projects that did not fall in the IS domain. This included projects which would have been realised even without the involvement of the UK NISP, as well as projects that may have been more suited to be handled by another BESP. A particular concern was raised about the BESP’s ‘treading on each other’s toes’ to achieve government targets and it resulted in confusion amongst businesses over which BESP to approach to address their specific problem. The key reason for this relates to the radical changes and the new system introduced by the NISP leadership that allowed only a limited time for the development of synergies and more time spent on data management and reporting. Therefore, the study recommends the involvement of UK NISP staff and contractors during the development phase of new systems, in order to ensure they are informed of any upcoming changes, as well as taking into consideration any concerns that they may have with regard to the proposed new system. The UK NISP would also need to make appropriate provision for

the training of all staff and contractors in the use of the new system. Moreover, the UK NISP would need to conduct an assessment of the time required to incorporate any changes in the delivery mechanism used by the regional teams, in order to ensure their resources are not stretched. This would ensure that the regional teams would not be distracted and would, therefore, focus on actual synergies which would have not been created without their involvement.

#### (4) Effectiveness of the national practitioners' team (NPT)

Although provision for a national team was a necessary step for the UK NISP, the approach taken by the NPT was not successful. Regional teams felt they were being overpowered by the NPT, as they were part of the national team and were concerned that the NPT would steal their regional outputs. The purpose of the NPT was to deal with organisations operating nation-wide, to make it easier for them to associate with the UK NISP without having to engage in individual regional programmes. Their role was also to facilitate inter-regional synergies. However, they were introduced as a 13<sup>th</sup> region and were given the right to claim outputs for their activities, which meant that the regions in which they worked would lose their outputs. It became the cause of conflict among the regional programmes and the NPT. The UK NISP could implement the NPT more effectively by using them to support the regional teams if required, to deal with the higher management of business members or to facilitate inter-regional synergies without the right to claim the outputs.

#### (5) Follow the diversity principle of industrial symbiosis

Findings suggested that the use of the sectoral approach was prevalent in most regions of the UK NISP and was perhaps complementary to the organisational design of the UK NISP. The sectoral approach was taken by the UK NISP in choosing the contractors from a particular sector, as well as in the recruitment of staff with experience in certain sectors. Sectoral diversity is one of the key principles of IS and therefore the use of the sectoral approach by the UK NISP is questionable. Although it is widely understood that it is easier to meet tonnage targets through certain sectors than others, and that there is a need to focus on government priority sectors, in order to align the UK NISP activities with government strategies to secure future funding, the UK NISP does not follow the principles of IS. It is recommended that the UK NISP rethink its strategies to ensure adherence to the IS

principles. IS applied to the sectors on a regular basis will become rooted in these sectors, which would ultimately result in the UK NISP no longer being required by these sectors. It would also result in the diversion away from innovative inter-organisational synergies from diverse sectors. This may be detrimental to the UK NISP's survival in the long term, as its sectoral approach to achieve the tonnage targets would have nothing novel about it and UK industry would realise this sooner or later.

### **8.5 Theoretical implications and recommendations for further research**

This research study is the first of its kind to explore and understand the policy context and organisational design of the UK NISP using the empirical approach. It takes a step further in establishing a relationship between the ecological modernisation and IS approaches (see Table 8.1). The adoption of the UK NISP as a component of the UK government's 'green' market strategy aligns with the government's desire to realise the ecological modernisation agenda. However, there were issues identified in the decision-making mechanism of the UK government and in particular devolved administrations. Findings suggest that government efforts to facilitate environmental policy reform are evident. However, there are weaknesses in the way the key tenets of EM are used to facilitate the environmental policy reform. In particular, the lack of a participatory approach comes across as a weakness of the decision-making mechanism which may consequently weaken the adoption of a mix of effective policy instruments to suit the 'green' market strategy of the UK government. On the other hand, the decentralisation of powers in the UK in its current state, has been detrimental in the adoption of effective policy instruments and the findings support the centralisation of the policy formulation, at least in the context of the UK NISP, to allow consistency throughout the UK for businesses operating nation-wide. This would create effective communication among the decision-makers, ease of knowledge transfer, the same interpretation of the EU and central government laws, as well as ensuring adequate and consistent resources are employed throughout the UK. This does not suggest ineffectiveness of the decentralisation aspect of EM theory, but highlights the lack of appropriate conditions, including the limited empowerment of devolved administrations, resulting in decision makers having limited skills and knowledge and a lack of adequate resources to deploy on an effective decision-making mechanism, etc.

With regard to the UK government's adoption of the ecological modernisation agenda, there has been some progress, specifically in England. However, the UK government still has a long way to go in making institutional changes as suggested by the ecological modernisation theory. As the findings of this study are based on analysing the decision making-mechanism in one particular context, there is a need for further empirical research to study decision making mechanisms in other environmental policy contexts in the UK, to enable wider inferences to be drawn, with regard to the government's progress in achieving the environmental policy reform, as well as the effectiveness of the key tenets of ecological modernisation in achieving this reform.

Another phase of the study explored the organisational design employed by the UK NISP. One of the key issues identified in the organisational design of the UK NISP relates to the use of regional delivery partners, which may not be in line with the diversity principle of IS. However, in order to establish this point further research is proposed, which involves a quantitative study of the outputs of the UK NISP regional delivery and an analysis of the outputs, in relation to the sectors involved, would also be required. This would provide a clear insight of whether the sectoral approach adopted by the UK NISP delivery partners is contrary to the diversity principle of IS. The next stage of research with regard to the organisational design of the UK NISP would be to explore the mechanism employed in delivering the UK NISP to businesses and how businesses perceive the quality of the UK NISP delivery. This would further add to the UK NISP's organisational design explored in this study.

This thesis is concluded with a notion that since the UK NISP is the only nation-wide IS network in the world, there are both conceptual and practical challenges associated with developing a large scale IS network. Having considered the policy implications on - as well as the UK NISP's approach to - establishing and managing a nation-wide IS network, I hope that that the findings of this study contribute towards addressing these challenges in the development of an enabling context for large scale IS networks.

## REFERENCES

- AGARWAL, A. and STRACHAN, P. (2006) Evaluation Methodologies to Measure Performance of Eco-industrial Development Initiatives. *Consultancy Report prepared for Databuild Ltd. and National Industrial Symbiosis Programme.*
- AGARWAL, A. and STRACHAN, P. (2007) NISP: Towards developing a new and integrative methodology to evaluate industrial symbiosis networks. *Industrial Symbiosis in Action: Report on the Third International Industrial Symbiosis Research Symposium, Yale F&ES Publication Series, 21-24.*
- AGARWAL, A. and STRACHAN, P. (2008) Is Industrial Symbiosis only a Concept for Developed Countries? *The Journal for Waste & Resource Management Professionals, 42-43*
- ALLENBY, B. R. & COOPER, W. E. (1994) Understanding industrial ecology from a biological systems perspective. *Total Quality Environmental Management, 3: 343-354.*
- ALTHAM and VAN BERKEL (2004) Industrial symbiosis for regional sustainability: an update on Australian initiatives. *11<sup>th</sup> International Sustainable Development Research Conference. 29-30 March 2004, Manchester.*
- ALVAREZ, R. (2002) Air pollution beyond boundaries: opportunities for ecological modernization in paso del norte. *Frontera norte, 14(28):83-102*
- AUSUBEL, J. H. (1992) Industrial ecology: reflections on a colloquium. *Industrial Ecology. Proceedings of the National Academy of Sciences, USA, 89: 879-884.*
- AYRES, R. U. (1994) Industrial metabolism: theory and policy. IN AYRES, R. U. and SIMONIS, U. E. (Eds.) *Industrial Metabolism: Restructuring for Sustainable Development.* Tokyo, United Nations University Press.
- BAAS, L. W. and BOONS, F. A. (2004) An industrial ecology project in practice: exploring the boundaries of decision-making levels in regional industrial systems. *Journal of Cleaner Production, 12: 1073-1085.*
- BAKER, S. (2006) When one firm's waste is another's resource. *Ends Report, 377.*
- BATCHELOR, A. AND PATTERSON, A. (2007) Political modernisation and the weakening of sustainable development in Britain. In R. Krueger and D. Gibbs (eds) *The sustainable development paradox: urban political economy in the United States and Europe*, New York and London, Guildford Press.
- BCSD (2002) Newsletter - *New Values*, Business Council for Sustainable Development – United Kingdom, May, Available from <http://www.bcsd-uk.co.uk/> [Accessed 07 December 2006].
- BLOWERS, A. (1997) Environmental policy: ecological modernisation or the risk society? *Urban Studies, 34: 845-871.*

- BOONS, F. A. and BERENDS, M. (2001) Stretching the boundary: the possibilities of flexibility as an organizational capability in industrial ecology. *Business Strategy and the Environment*, 10: 115-124.
- BOONS, F. A. and ROOME, N. (2001) Industrial ecology as a cultural phenomenon: on objectivity as a normative position. *Journal of Industrial Ecology*, 4: 49-54
- BREW (2005) Business Resource Efficiency and Waste Programme, Department for Environment, Food and Rural Affairs, Available from <http://www.defra.gov.uk> [Accessed 27 September 2005]
- BROUDER, A. and BERRY, L. (2004) Sustainable business clusters in the regions. *Regional Futures Research Report*, Forum for the Future.
- BROWN, G. (1992) Remarks on industrial ecology. *Proceedings of the National Academy of Sciences, USA*, 89: 876-878.
- BURSTROM, F. and KORHONEN, J. (2001) Municipalities and industrial ecology: reconsidering municipal environmental management. *Sustainable Development*, 9(1): 36-46.
- BUTTEL, F. H. (2000) Ecological modernisation as a social theory. *Geoforum*, 31(1): 57-65.
- CARR, A. (1998) Choctaw eco-industrial park: an ecological approach to industrial land-use planning and design. *Landscape and Urban Planning*, 42: 239-257.
- CHERTOW, M. (1999) The eco-industrial park model reconsidered. *Journal of Industrial Ecology* 2(3): 8-10.
- CHERTOW, M. (2000) Industrial Symbiosis: Literature and Taxonomy. *Ann. Review of Energy and Environment*, 25: 313-337.
- CHERTOW, M. (2002) Introduction, Developing industrial ecosystems –approaches, cases and tools, Bulletin Series, Yale School of Forestry and Environmental Studies, Bulletin 106.
- CHERTOW, M. (2007) 'Uncovering' industrial symbiosis. *Journal of Industrial Ecology* 11(1): 11-30.
- CHOY, E. (2007) A Quantitative Methodology to Test Ecological Modernization Theory in The Malaysian Context, *PhD thesis*, Wageningen University, The Netherlands.
- CHRISTESEN, I., SCOTT, J., KRRISHNAMOHAN, K., GABRIC, A. AND HEART, S. (2000), What is needed to encourage adoption of industrial ecology? *2<sup>nd</sup> Asia Pacific Cleaner Production Roundtable*, Brisbane.
- CHRISTOFF, P. (1996) Ecological modernisation, ecological modernities. *Environmental Politics*, 5: 476 - 500.
- CLOUGH, P. and NUTBROWN, C. (2007) *A Student's Guide to Methodology*, 2<sup>nd</sup> edition, London, Sage.

- COENEN, F. (ed.) (2009). *Public Participation and Better Environmental Decisions, The Promise and Limits of Participatory Processes for the Quality of Environmentally Related Decision-making*. New York, Springer.
- COHEN-ROSENTHAL, E. (Ed.) (2003) *Eco-industrial strategies: unleashing synergy between economic development and the environment*, Sheffield, Greenleaf Publishing Limited.
- COSTA, I. and FERRAO, P. (2010) A case study of industrial symbiosis development using a middle-out approach. *Journal of Cleaner Production*, 18(10-11): 984-992.
- COSTA, I., MASSARD, G. and AGARWAL, A. (2010) Waste management policies for industrial symbiosis development: case studies in European countries. *Journal of Cleaner Production*, 18(8): 815-822.
- CÔTÉ, R. P. (2000) A primer on industrial ecosystems: a strategy for sustainable industrial development. Halifax, Industrial Ecology Research and Development Group, Dalhousie University.
- CÔTÉ, R. P. and COHEN-ROSENTHAL, E. (1998) Designing eco-industrial parks: a synthesis of some experiences. *Journal of Cleaner Production*, 6: 181-188.
- CÔTÉ, R. P. and SMOLENAARS, T. (1997) Supporting pillars for industrial ecosystems. *Journal of Cleaner Production*, 5: 67-74.
- CROWLEY, K. (1999) Jobs and environment: the double dividend of ecological modernisation. *International Journal of Social Economics*, 26: 1013-1027.
- DAVIES, M. (2007) *Doing a successful research project: using qualitative or quantitative methods*. Basingstoke, Palgrave Macmillan.
- DEFRA (2003) Our strategy 2003-2006, *Department for Environment, Food and Rural Affairs*, London.
- DEFRA (2005a) Our future different paths: the UK's shared framework for sustainable development, *Department for Environment, Food and Rural Affairs*, London.
- DEFRA (2005b) The BREW family of programmes – fact sheets: National Industrial Symbiosis Programme, Business Resource Efficiency and Waste Programme, *Department for Environment, Food and Rural Affairs*, London, Available from <http://www.defra.gov.uk/environment/waste/brew/background.htm> [Accessed 19 May 2006]
- DEFRA (2006) The UK's Fourth National Communication to the United Nations Framework Convention on Climate Change, *Department for Environment, Food and Rural Affairs*, London.
- DEFRA (2010) The government's national strategy on sustainable development, *Department for Environment, Food and Rural Affairs*, London. Available from <http://www.defra.gov.uk/sustainable/government/gov/strategy/index.htm> [Accessed 29 December 2010].



- DENSCOMBE, M. (2002) *Ground Rules for Good Research: A 10 Point Guide for Social Researchers*, Philadelphia, Open University Press.
- DENSCOMBE, M. (2007) *The good research guide for small scale social research projects*. 3<sup>rd</sup> edn. England, Open University Press.
- DESROCHERS, P. (2002a) Cities and industrial symbiosis: some historical perspectives and policy implications. *Journal of Industrial Ecology*, 5: 29-44.
- DESROCHERS, P. (2002b) Industrial ecology and the rediscovery of inter-firm recycling linkages: historical evidence and policy implications. *Industrial and Corporate Change*, 11:1031-1057.
- DESROCHERS, P. AND SAUTET, F. (2008), Entrepreneurial Policy: The Case of Regional Specialization vs. Spontaneous Industrial Diversity. *Entrepreneurship Theory and Practice*, 32(5): 813–832.
- DETR (2000) Waste Strategy 2000 for England and Wales. *Department for Environment, Transport and the Regions*, London.
- DEUTZ, P. (2009) Producer responsibility in a sustainable development context: Ecological modernisation or industrial ecology? *The Geographical Journal*, 175(4): 274-285.
- DEUTZ, P. and GIBBS, D. (2004) Eco-industrial development and economic development: industrial ecology or place promotion. *Business Strategy and the Environment*, 13(5): 347-362.
- DEUTZ, P. and LYONS, D. (2008) Editorial: industrial symbiosis – an environmental perspective on regional development. *Regional Studies*, 42(10): 1295-11298.
- DOMENECH T. (2010) Social aspects of industrial symbiosis networks. *PhD thesis*, University College London, London.
- EA (2006a) Environment Agency, Available from [http://www.environment-agency.gov.uk/commondata/acrobat/repac\\_min\\_jan\\_2006\\_1434366.pdf](http://www.environment-agency.gov.uk/commondata/acrobat/repac_min_jan_2006_1434366.pdf) [Accessed 09 December 2006].
- EA (2006b) Environment Agency, Available from [http://www.environment-agency.gov.uk/commondata/acrobat/item\\_08a\\_ann\\_report\\_1424915.pdf](http://www.environment-agency.gov.uk/commondata/acrobat/item_08a_ann_report_1424915.pdf) [Accessed 08 December 2006].
- EASTERBY-SMITH, M., THORPE, R. and LOWE, A. (2002) *Management Research: An Introduction*, London, Sage Publications.
- EHRENFELD, J. (1997) Industrial ecology: a framework for product and process design. *Journal of Cleaner Production*, 5(1-2): 87-95.
- EHRENFELD, J. (2000). Industrial Ecology: Paradigm or Normal Science? *American Behavioral Scientist*. 44(2): 229-244, 2000.
- EHRENFELD, J. (2004) Industrial ecology: a new field or only a metaphor? *Journal of Cleaner Production*, 12(8-10): 87-95.

- EHRENFELD, J. and GERTLER, N. (1997) Industrial ecology in practice: the evolution of interdependence at Kalundborg. *Journal of Industrial Ecology*, 1: 67-79.
- EILERING, J. A. M. and VERMEULEN, W. J. V. (2004) Eco-industrial parks: toward industrial symbiosis and utility sharing in practice. *Progress in Industrial Ecology*, 1: 245-270.
- EPA (2001) Briefing paper on industrial ecology and EPA: focusing on the environment from the point of view of resources, products, industrial systems and eco-efficiency, *EPA Industrial Ecology Workshop*, March.
- ERKMAN, S. (1997) Industrial ecology: An historical view. *Journal of Cleaner Production*, 5: 1-10.
- ERKMAN, S., FRANCIS, C. and RAMASWAMY, R. (2001) Industrial ecology: An agenda for the long term evolution of the industrial system, *Cashier de Propositions Industrial Ecology*, 27 August 2001, Institute for Communication and Analysis of Science and Technology, Geneva.
- FICHTNER, W. and TIETZE-STOCKINGER, I. (2005) Barriers of interorganisational environmental management. *Progress in Industrial Ecology*.
- FRIJNS, J., PHUONG, P. AND MOL, A. (2000) Ecological Modernisation Theory and Industrialising Economies: The Case of Viet Nam. *Environmental Politics*, 9(1): 257-292
- FROSCH, R. (1992) Industrial ecology: a philosophical introduction. *Proceedings of the National Academy of Sciences*, USA, 89: 800-803
- FROSCH, R. A. and GALLOPOULOS, N. E. (1989) Strategies for manufacturing. *Scientific American*, 261(3): 144-152.
- GARNER, A. and KEOLEIAN, G. A. (1995) Industrial ecology: an introduction. *Pollution Prevention and Industrial Ecology*. Ann Arbor, National Pollution Prevention Center for Higher Education, University of Michigan.
- GIBBS, D. (1998) Regional development agencies and sustainable development, *Regional Studies*, 32(4): 365-368.
- GIBBS, D. (2000) Ecological modernisation, regional economic development and regional development agencies. *Geoforum*, 31(1): 9-19.
- GIBBS, D. (2003a) Trust and networking in inter-firm relations: the case of eco-industrial development. *Local Economy*, 18(3): 222.
- GIBBS, D. (2003b) Ecological modernisation and local economic development: the growth of eco-industrial development initiatives. *International Journal of Environment and Sustainable Development*, 2: 250-266.
- GIBBS, D. (2008) Industrial symbiosis and eco-industrial development: an introduction. *Geography Compass*, 2(4): 1138-1154

- GIBBS, D. and DEUTZ, P. (2005) Implementing industrial ecology: planning for eco-industrial parks in the USA. *Geoforum*, 36(4): 452-464.
- GIBBS, D. and DEUTZ, P. (2007) Reflections on implementing industrial ecology through eco-industrial park development. *Journal of Cleaner Production*, 15(17): 1683-1695.
- GIBBS, D. and JONAS, A. E. G. (2000) Governance and regulation in local environmental policy: the utility of a regime approach. *Geoforum*, 31: 299-313.
- GOULDSON, A. and MURPHY, J. (1996) Ecological modernisation and the European Union. *Geoforum*, 27: 11-21.
- GOULDSON, A. and MURPHY, J. (1997) Ecological Modernisation: Restructuring Industrial Economies. *The Political Quarterly*, 68(B): 74-86.
- GOULDSON, A. and MURPHY, J. (1998) *Regulatory realities: the implementation and impact of industrial environmental regulation*, London, Earthscan.
- GOULDSON, A. and ROBERTS, P. W. (Eds.) (2000) *Integrating environment and economy: strategies for local and regional government*, London, Routledge Ltd.
- GRAEDEL, T. E. and ALLENBY, B. (2003) *Industrial Ecology*, 2<sup>nd</sup> ed. New Jersey, NJ, Prentice Hall.
- HAJER, M. (1995) *The Politics of Environmental Discourse*. New York, Oxford University Press.
- HARRIS, S. (2004) Drivers and barriers to industrial ecology in the UK, *PhD Thesis*, The University of Edinburgh.
- HAWKEN, P. (1993) *The Ecology of Commerce*. New York, Harper Collins.
- HEERES, R. R., VERMEULEN, W. J. V. and DE WALLEY, F. B. (2004) Eco-industrial park initiatives in the USA and the Netherlands: first lessons. *Journal of Cleaner Production*, 12(8-10): 985-995.
- HEWES, A. and LYONS, D. (2008) The humanistic side of eco-industrial parks: champions and the role of trust. *Regional Studies*, 42(10): 1329-1342.
- HUBER, J. (2008) Pioneer countries and the global diffusion of environmental innovations: theses from the viewpoint of ecological modernisation theory. *Global Environmental Change*, 18(3): 360-367
- ISK (1995) Industrial Symbiosis at Kalundborg, Available from <http://www.symbiosis.dk/> and <http://www.indigodev.com/Kal.html> [Accessed 2nd March 2006]
- ISL (2006) International Synergies Limited, Available from <http://www.international-synergies.com/layouts/Downloads/Bumper%20to%20bin.pdf> [Accessed 10 December 2006]

- JELINSKI, L. W., GRAEDEL, T. E., LAUDISE, R. A., MCCALL, D. W. and PATEL, C. K. N. (1992) Industrial ecology: concepts and approaches. *Industrial Ecology*. Washington, DC, National Academy of Science.
- KIRSCHTEN, U. (2005) Sustainable innovation networks: conceptual frameworks and institutionalisation. *Progress in Industrial Ecology - An International Journal*, 2(1): 132-147.
- KORHONEN, J. (2001) Four ecosystem principles for an industrial ecosystem. *Journal of Cleaner Production*, 9(3): 253-259.
- KORHONEN, J. (2002) Two paths to industrial ecology: applying the product-based and geographical approaches. *Journal of Environmental Planning and Management*, 45: 39-57.
- KORHONEN, J. (2004a) Industrial ecology in the strategic sustainable development model: strategic applications of industrial ecology. *Journal of Cleaner Production*, 12(8-10): 809-823.
- KORHONEN, J. (2004b) Theory of industrial ecology. *Progress in Industrial Ecology*, 1(1/2/3): 61-88.
- KORHONEN, J. (2005a) Industrial ecology for sustainable development: six controversies in theory building. *Environmental Values*, 14(1): 83-112.
- KORHONEN, J. (2005b) Theory of industrial ecology: the case of the concept of diversity. *Progress in Industrial Ecology*, 2(1): 35-72
- KORHONEN, J., MALMBORG, F. V., STRACHAN, P. A. and EHRENFELD, J. (2004) Management and policy aspects of industrial ecology: an emerging research agenda. *Business Strategy and the Environment*, 13(5): 289-305.
- KORHONEN, J. and STRACHAN, P. A. (2004) Towards progress in industrial ecology. *Progress in Industrial Ecology*, 1(1/2/3): 1-23.
- LOWE, E. A. (1997) Creating by-product resource exchanges: strategies for eco-industrial parks. *Journal of Cleaner Production*, 5: 57.
- MACKINNON, D., CUMBERS, A. and CHAPMAN, K. (2002) Learning, innovation and regional development: a critical appraisal of recent debates. *Progress in Human Geography*, 26(3): 293-311
- MADSEN, H. and ULHOI, J. P. (2001) Integrating environmental and stakeholder management. *Business Strategy and the Environment*, 10: 77-88.
- MALTIN, M. (2004) Industrial symbiosis and its alignment with regional sustainability: Exploring the possibilities in Landskrona. *MSc Thesis*, Lund University, Lund.
- MANGAN, A. and GROBERG, D. (1998) By-product synergy: A BCSD-GM blueprint for implementing sustainable development on a microeconomic scale. *World Energy Congress*. 13-18 September 1998, Houston.
- MANGAN, A. and OLIVETTI, E. (2010) By-Product Synergy Networks: Driving Innovation through Waste Reduction and Carbon Mitigation, in Sustainable

Development in the Process Industries: Cases and Impact (eds J. Harmsen and J. B. Powell), New Jersey, John Wiley & Sons, Inc.

- MASON, J. (2002) *Qualitative Researching*, London, Sage.
- MILANEZ, B. and BUHRS, T. (2007) Marrying strands of ecological modernisation: A proposed framework. *Environmental Politics*, 16: 565 - 583.
- MIRATA, M. (2004) Experiences from early stages of a national industrial symbiosis programme in the UK: determinants and coordination challenges. *Journal of Cleaner Production*, 12(8-10): 967-983.
- MIRATA, M. (2005) Industrial symbiosis: a tool for more sustainable regions? *PhD Thesis*, Lund University.
- MIRATA, M. AND EMTAIRAH, T. (2005) Industrial symbiosis networks and the contribution to environmental innovation: The case of the Landskrona industrial symbiosis programme. *Journal of Cleaner Production*, 13(10-11): 993-1002.
- MISP (2004) Mersey Banks industrial symbiosis project: a study into opportunities for sustainable development through inter-company collaboration. North West Chemical Initiative and Business Council for Sustainable Development, 1-28.
- MOL, A. P. J. (1995) The refinement of production: ecological modernisation theory and the chemical industry, *PhD Thesis*, Amsterdam, University of Amsterdam.
- MOL, A. (1997) Ecological modernization: industrial transformation and environmental reform. In *The International Handbook of Environmental Sociology*, Redclift M, Woodgate G (eds), Cheltenham, Edward Elgar, 138-149.
- MOL, A. (2000) The environmental movement in an era of ecological modernisation. *Geoforum*, 31: 45-56.
- MOL, A. (2002) Ecological Modernisation and the Global Economy. *Global Environmental Politics*, 2: 92-115.
- MOL, A. and SPAARGAREN, G. (1993) Environment, modernity and the risk society: the apocalyptic horizon of environmental reform, *International Sociology*, 8(4): 431-459
- MOL, A. AND SPAARGAREN, G. (2009) Ecological Modernisation and Industrial Transformation, In (eds N. Castree, D. Demeritt, D. Liverman and B. Rhoads) *A Companion to Environmental Geography*, Wiley-Blackwell, Oxford.
- MURPHY, J. (2000) Ecological Modernisation. *Geoforum*, 31: 1-8.
- MUSNIKOW, J. and SCHLARB, M. (2002) Eco-industrial development community participation manual. In *Cohen-Rosenthal, E. (ed.) National Centre for Eco-industrial Development*, Cornell University.
- NEALE, A. (1997) Organising environmental self-regulation: Liberal governmentality and the pursuit of ecological modernisation in Europe, *Environmental Politics*, 6(4): 1-24.

- NISP (2004) National Industrial Symbiosis Programme – a year of achievement, Business Council for Sustainable Development, UK, 1-37.
- NISP (2005) West Midlands Quarterly Newsletter, The UK National Industrial Symbiosis Programme, August, Available from [www.nispreion.org.uk/westmidlands/](http://www.nispreion.org.uk/westmidlands/) [Accessed 07 December 2006]
- NISP (2006a) The UK National Industrial Symbiosis Programme website, Available from <http://www.nisp.org.uk> [Accessed in between 2006 and 2011]
- NISP (2006b) NISP BREW metrics report for 2005/2006. National Industrial Symbiosis Programme and Databuild Ltd., Birmingham.
- NISP (2007) NISP in action – case study index, The UK National Industrial Symbiosis Programme, Available from [http://www.nisp.org.uk/case\\_study\\_index.aspx](http://www.nisp.org.uk/case_study_index.aspx) [Accessed in between 2007-2011]
- NISP (2009) *National Industrial Symbiosis Programme: the pathway to a low carbon sustainable economy*, International Synergies Limited, Birmingham.
- O'LEARY, Z. (2004) *The essential guide to doing research*. London, Sage.
- PAQUIN, R. (2008) Actions of institutional entrepreneurship in managing the underlying processes in diffusing new inter-firm practices, *PhD Thesis*, Boston University
- PATAKI, G. (2005) The theory of ecological modernisation from a critical organisation theory perspective. *7th Conference of the European Sociological Association: Rethinking Inequalities*. Torun, Poland.
- PELLENBARG, P. (2002) Sustainable business sites in the Netherlands: a survey of policies and experiences. *Journal of Environmental Planning and Management*, 45(1):59-84
- PIASECKI, B. (1992) Industrial ecology: An emerging management science. *Proceedings of the National Academy of Sciences*, USA, 89: 873-875.
- PIU (2001) Resource productivity – making more from less, *Performance and Innovation Unit*, Cabinet Office, London, 20 November 2001.
- POSCH, A. (2004) Sustainability networks. *Progress in Industrial Ecology*, 1: 331-347.
- PROCTOR, A. (2005) Governance, partnership and sustainable industrial development, *PhD Thesis*, University of Hull.
- RANGLES, S. and BERKHOUT, F. (2006) Industrial Ecology and Spaces of Innovation: Emerging Themes' in Green, K. and Randles, S. eds (2006) *Industrial Ecology and Spaces of Innovation*, Cheltenham, Edward Elgar, Chapter 14.
- RE-KTN (2006) Resource Efficiency- Knowledge Transfer Network, Available from [http://ktn.globalwatchonline.com/epicentric\\_portal/site/KTN/menuitem.f981218737f76ebc0a255921eb3e8a0c/](http://ktn.globalwatchonline.com/epicentric_portal/site/KTN/menuitem.f981218737f76ebc0a255921eb3e8a0c/) [Accessed 12 December 2006]

- RITCHIE, J. and LEWIS, J. (Eds.) (2003) *Qualitative research practice: a guide for social science students and researchers*, London, Sage Publications.
- RTI (2001) Eco-Industrial Parks: A case study and analysis of economic, environmental, technical and regulatory issues, Research Triangle Institute, Available from [www.rti.org/pubs/case\\_study\\_summary.pdf](http://www.rti.org/pubs/case_study_summary.pdf) [Accessed 14 January 2006]
- ROBERTS, B. H. (2004) The application of industrial ecology principles and planning guidelines for the development of eco-industrial parks: an Australian case study. *Journal of Cleaner Production*, 12: 997-1010.
- SAGAR, A. D. and FROSCHE, R. A. (1997) A perspective on industrial ecology and its application to a metals-industry ecosystem. *Journal of Cleaner Production*, 5: 39-45.
- SCHLOSBERG, D. and RINFRET, S. (2008) Ecological modernisation, American style. *Environmental Politics*, 17: 254 - 275.
- SINDING, K. (2000) Environmental Management beyond the Boundaries of the Firm: Definitions and Constraints. *Business Strategy and the Environment*, 9(2): 79-91.
- SPIEGELMAN, J. (2001) Eco-industrial development in review. *Georgia Basin Futures Project*.
- SPAARGAREN, G. (2000) Ecological modernisation theory and the changing discourse on environment and modernity. In *Environment and Global Modernity*, Spaargaren G, Mol APJ, Buttel FH (eds), London, Sage Publications, 41-72
- SPAARGAREN, G. and MOL, A.P.J (1992) Sociology, environment and modernity: ecological modernisation as a theory of social change. *Society and Natural Resources*, 5(4): 323-344
- STAKE, R. (1995) *The Art of Case Study Research*. Thousand Oaks, CA, Sage Publications.
- STARLANDER, J. (2003) Industrial symbiosis: a closer look on organisational factors. *MSc Thesis*, Lund, Lund University.
- STERR, T. (2000) Inter industrial materials flow management – Rhine-Neckar experience. *Proceedings of the Helsinki Symposium on Industrial Ecology and Material Flows*, 285-293
- STERR, T. and OTT, T. (2004) The industrial region as a promising unit for eco-industrial development--reflections, practical experience and establishment of innovative instruments to support industrial ecology. *Journal of Cleaner Production*, 12(8-10): 947.
- THORESEN, J. (2001) Implementation and maintenance of ecopark co-operation. *Productivity 2005 - Industrial Ecology*. Trondheim, Ostford Research Foundation, Norway.

- TIBBS, H. (1993) *Industrial ecology: an environmental agenda for industry*. Global Business Network.
- TPD (2003) *Eco-industrial development feasibility study: City of Fairborn, Bath and Mad river townships*. Trillium Planning and Development Inc., Wright State University, B-W Greenway Community Land Trust
- van LEEUWEN, M., VERMEULEN, W. AND GLASBERGEN, P. (2003) Planning eco-industrial parks: an analysis of Dutch planning methods, *Business Strategy and the Environment*, 12(3): 147-162
- VARGA, M. and KUEHR, R. (2006) Integrative Approaches towards Zero Emissions Regional Planning; Synergies of Concepts. *Journal of Cleaner Production*.
- VERGUTS, V., DESSEIN, J., TERMEER, C., WERKMAN, R. AND LAUWERS, L. (2010) Development of eco-industrial parks: planned or emergent change? *International Sustainable Development Research Conference*, Hong Kong.
- VON MALMBORG, F. (2004) Networking for knowledge transfer: towards an understanding of local authority roles in regional industrial ecosystem management. *Business Strategy and the Environment*, 13: 334-346.
- VON MALMBORG, F. and STRACHAN, P. A. (2005) Climate policy, ecological modernisation and the UK emissions. *European Environment*, 15(3): 143-160.
- WBCSD (2007) About the WBCSD, World Business Council for Sustainable Development, available from <http://www.wbcd.org> [Accessed in 2007]
- WELFORD, R. J. (1995) *Environmental strategy and sustainable development*. London, Routledge.
- WELFORD, R. J. (2004) Commentary: regional environmental management systems: lessons and challenges for industrial ecology research. *Progress in Industrial Ecology*, 1(1/2/3): 286-291.
- WHITFIELD, M. and HART, D. (2000) American perspectives on economic development and environmental management: changing the federal-local balance. IN GOULDSON, A. and ROBERTS, P. (Eds.) *Integrating environment and economy: strategies for local and regional government*. London, Routledge Ltd.
- YIN, R. K. (1994) *Case Study Research: Design and Methods*. Thousand Oaks, CA, Sage.
- YOUNG, S. (2000) *The emergence of ecological modernisation: integrating the environment and the economy*. London and New York, Routledge.



## APPENDIX A: INTERVIEW SCHEDULE FOR PHASE ONE

- Q01. What government policies in your view are supporting & funding the UK NISP in the wider context?
- Q02. What drivers are promoting the development of these policies?
- Q03. Is your organisation, or an organisation you are aware of, involved in the design of these policies? What role do these organisations play in the design of these policies?
- Q04. At what government level are these policies designed and implemented? In your view, at what level would the design and implementation may be more effective?
- Q05. To what extent do these policies facilitate the invention and innovation of clean and resource efficiency technologies?
- Q06. To what extent do these policies encourage self-regulation of industry and increasingly rely on market forces for the protection of the environment?
- Q07. Are there any specific initiatives under these policies, that you are aware of, supporting and funding the UK NISP?
- Q08. How are these policy initiatives funded? Do you think it is effective the way they are funded? Why?
- Q09. In your view, how does the decision regarding distribution of funding made among the UK NISP and other similar programmes?
- Q10. Which stakeholders within the government and external to the government are involved in the decision making process? In your view, how relevant is the participation of stakeholders in this process?
- Q11. To what extent does government act as a facilitator to bring together different stakeholders in the decision making process?
- Q12. To what extent are businesses engaged by government in the decision making process? In your view, how government can engage businesses effectively?
- Q13. What are the principal drivers promoting the UK NISP in the UK?
- Q14. What role do national, regional and local governments play in the development and management of the UK NISP?
- Q15. UK NISP receives additional funding from some organisations e.g. RDAs in some of the regions and not in others. What is your view about it?
- Q16. What is your view about UK NISP's partnership with Environment Agency, Resource Efficiency-Knowledge Transfer Network, and Local Government Association?
- Q17. What role, if any, have other stakeholders e.g. business, academia, NGO's, public etc. played in the development and management of the UK NISP?
- Q18. In your view, what objectives are expected to be achieved through UK NISP activities?
- Q19. "UK NISP claims to be a business opportunity programme". What is your view about it?
- Q20. In your view, is UK NISP just a business opportunity programme or is it related to broader political, economic and environmental interests of the government?

- Q21. Do you think that industrial symbiosis concept and in particular UK NISP enables economic activities without undermining the ecological objectives?
- Q22. In your view, how successful has the UK NISP been?
- Q23. To what extent does the tick-box culture of government targets leads UK NISP to focus on short term targets instead of taking a more sustainable long term view?
- Q24. What in your view would be the best way to measure performance of the UK NISP?
- Q25. How would you compare the UK NISP with other similar government funded programmes (e.g. Envirowise, Waste and Resources Programme (WRAP), Market Transformation Programme (MTP), Carbon Trust etc.) in terms of the value for money for the government?
- Q26. What in your view are the strengths and weaknesses of the UK NISP?
- Q27. To what extent does the UK NISP focus on all industrial sectors?
- Q28. To what extent does the UK NISP focus on small businesses?
- Q29. In your view, what does the future hold for the UK NISP in terms of availability of funding and support from the national and regional governments?
- Q30. In your view, are there changes required in regulations and policies to make conditions more favourable for industrial symbiosis / UK NISP?
- Q31. As UK NISP is a first programme of its kind at a national level, what influence in your view does the industrial symbiosis concept and in particular the UK NISP may have on the future policy development in the United Kingdom and internationally?
- Q32. In your view, how suitable is the industrial symbiosis concept for developing countries?
- Q33. Any additional comments?

## **APPENDIX B: INTERVIEW SCHEDULE FOR PHASE TWO**

- Q01. Role and contribution of the UK NISP employees
- Q02. What are the main obstacles faced when implementing synergies and how do you overcome these obstacles?
- Q03. Does the regional programme manage to cover the whole region or is it limited to particular areas?
- Q04. Is regional level an appropriate spatial level for managing IS networks? Why or why not? If not, at what level the UK NISP can be managed better?
- Q05. When and how was the regional programme initiated?
- Q06. When and why was it chosen to be a part of the UK NISP? Is it a mutually beneficial relationship? How?
- Q07. What were the reasons behind any unsuccessful projects i.e. projects that have not reached implementation stage or the ones gone obsolete or their value declined to zero after implementation?
- Q08. What steps are being taken to maintain the value of these projects in long term?
- Q09. Any uniqueness of the regional programme if compared to other regions
- Q10. Any complexities that may have been encountered in the development and management of the programme
- Q11. What is driving industrial symbiosis network development in your region?
- Q12. How is the regional programme funded?
- Q13. Who are the main stakeholders? Do these stakeholders contribute to the programme? How and why?
- Q14. Do funding institution(s) and / or other stakeholders influence your way of managing the programme? How does it impact your performance?
- Q15. How does the UK NISP core team contribute? Do they influence your way of managing the programme and does it impact on your performance?
- Q16. What is the role of the Programme Advisory Group (PAG) if in place?
- Q17. What are the criteria for an organisation to be a member of the PAG?
- Q18. Is there any significant contribution of the PAG and / or influence in the management of the regional programme?
- Q19. What sort of projects you are mainly involved in?
- Q20. What are the main objectives of the regional programme?
- Q21. What is your overall approach towards achieving these objectives?
- Q22. What constitutes success for the regional programme?
- Q23. What are the factors that you consider critical for success?
- Q24. What are the managerial skills that you consider critical for success?
- Q25. What is the anticipated and actual level of success i.e. target and member satisfaction aspect of success?
- Q26. Any additional comments?

## APPENDIX C: CODE SHEET FOR PHASE ONE

- 1. Background of the UK NISP**
  - 1.1. Nature / intention / scope of UK NISP
  - 1.2. Early stages of development
  - 1.3. Stakeholder support in early stages
  - 1.4. Support / resources for national launch
  - 1.5. Principal drivers promoting the UK NISP in the UK
  - 1.6. National / regional delivery of the UK NISP
  - 1.7. Other
- 2. Reflections on environmental / waste policy in the UK**
  - 2.1. Substantial shift in policy development
  - 2.2. Driving force behind the shift
  - 2.3. Landfill tax / reinvestment
  - 2.4. Degree of reliance on market forces
  - 2.5. Complications with wide range of delivery bodies doing similar things
  - 2.6. Policy / legislation powers in the UK
  - 2.7. Other
- 3. Growth and delivery of the UK NISP**
  - 3.1. Government policies / key objectives
  - 3.2. Consistency of UK NISP objectives with policy objectives
  - 3.3. Variations in the supporting/funding approach
  - 3.4. Decision making process
  - 3.5. Stakeholder involvement
  - 3.6. Strengths of the approach taken
  - 3.7. Weaknesses of the approach taken
  - 3.8. Other
- 4. Key stakeholders**
  - 4.1. Reflection on Programme Advisory Group
  - 4.2. Opinion about policy / government intervention
  - 4.3. Relationship with regulator
  - 4.4. Opinion about partnership with Resource Efficiency – Knowledge Transfer Network
  - 4.5. Relationship with economic development agency
  - 4.6. Other delivery bodies
  - 4.7. Other
- 5. Opinion on measurement, monitoring and reporting mechanism of the UK NISP**
  - 5.1. Output measurement / reporting mechanism
  - 5.2. Measures / indicators of success
  - 5.3. Strengths of measurement approach
  - 5.4. Weaknesses of measurement approach
  - 5.5. Expectations of - and recommendations from - stakeholders
  - 5.6. Government's approach to output measurement / reporting
  - 5.7. Other
- 6. Overall performance**
  - 6.1. Strengths of the UK NISP
  - 6.2. Weaknesses of the UK NISP
  - 6.3. Barriers to UK NISP activities
  - 6.4. Opinion on overcoming barriers
  - 6.5. Overall assessment of the UK NISP
  - 6.6. Key factors for success
  - 6.7. Future prospects for the UK NISP
  - 6.8. Recommendations for the UK NISP
  - 6.9. Recommendations for policy / government
  - 6.10. Other
- 7. Other important themes**
  - 7.1. Small businesses & the UK NISP
  - 7.2. Sector focus of the UK NISP
  - 7.3. Other

## APPENDIX D: CODE SHEET FOR PHASE TWO

- 1. Background of UK NISP regional programmes**
  - 1.1. Variation in regional context
  - 1.2. History and length/maturity of programme
  - 1.3. Support/funding from central/regional government
  - 1.4. Complexity of funding mechanism and related objectives
  - 1.5. Good/bad impacts of central/regional government funding/support
  - 1.6. Other
- 2. Strategy and support/resources from core UK NISP team**
  - 2.1. Strategic leadership & coordination
  - 2.2. IT expert management system
  - 2.3. Intellectual support
  - 2.4. Expectations from regional teams
  - 2.5. Reflection on delivery strategy and delivery partners
  - 2.6. Strong points of the delivery approach
  - 2.7. Weak points of the delivery approach
  - 2.8. Other
- 3. Regional coordinators and practitioners' experiences of delivery**
  - 3.1. Regional teams' understanding of the UK NISP and its objectives
  - 3.2. Regional teams' skills set
  - 3.3. Role of regional team
  - 3.4. Management /leadership style in regional programmes
  - 3.5. Human resource; turnover and influence
  - 3.6. Awareness of the UK NISP among businesses
  - 3.7. Motivation of businesses to engage
  - 3.8. Type of projects undertaken
  - 3.9. Barriers faced during synergy projects
  - 3.10. Overcoming synergy related barriers
  - 3.11. Other
- 4. Key stakeholders**
  - 4.1. Reflection on Programme Advisory Group
  - 4.2. Opinion about policy / government intervention
  - 4.3. Relationship with regulator
  - 4.4. Opinion about partnership with Resource Efficiency – Knowledge Transfer Network
  - 4.5. Relationship with economic development agency
  - 4.6. Other delivery bodies
  - 4.7. Other
- 5. Opinion on measurement, monitoring and reporting mechanism of the UK NISP**
  - 5.1. Output measurement / reporting mechanism
  - 5.2. Measures / indicators of success
  - 5.3. Strengths of measurement approach
  - 5.4. Weaknesses of measurement approach
  - 5.5. Expectations of - and recommendations from - stakeholders
  - 5.6. Other
- 6. Overall performance**
  - 6.1. Strengths of the UK NISP
  - 6.2. Weaknesses of the UK NISP
  - 6.3. Barriers to UK NISP activities
  - 6.4. Opinion on overcoming barriers
  - 6.5. Overall assessment of the UK NISP
  - 6.6. Key factors for success
  - 6.7. Future prospects for the UK NISP
  - 6.8. Recommendations for the UK NISP
  - 6.9. Recommendations for policy / government
  - 6.10. Other
- 7. Other**
  - 7.1. Other

## APPENDIX E: SELECTED CONFERENCE PAPERS, PUBLICATIONS AND CONSULTANCY REPORTS

- LOMBARDI, R., LYONS, D., SHI, H. AND AGARWAL, A. (2012) Industrial symbiosis: testing the boundaries and advancing knowledge. *Journal of Industrial Ecology*, 16(1): 2-7.
- POSCH, A., AGARWAL, A. AND STRACHAN, P. (2011) Managing industrial symbiosis networks. *Business Strategy and the Environment*, (20(7): 421-427.
- COSTA, I., MASSARD, G. and AGARWAL, A. (2010) Waste management policies for industrial symbiosis development: case studies in European countries. *Journal of Cleaner Production*, 18(8): 815-822.
- AGARWAL, A. (2010) The UK National Industrial Symbiosis Programme: exploring the policy context. *International Sustainable Development Research Conference*, Hong Kong, China.
- COSTA, I., MASSARD, G. and AGARWAL, A. (2009) Waste management policies for industrial symbiosis development: case studies in European countries. *International Society for Industrial Ecology (ISIE) Conference*, Lisbon, Portugal.
- AGARWAL, A. and STRACHAN, P. (2008) Is Industrial Symbiosis only a concept for developed countries? *The Journal for Waste & Resource Management Professionals*, 42-43.
- COSTA, I., MASSARD, G. and AGARWAL, A. (2008) The legislative framework on waste management in the European Union: a key issue of industrial symbiosis. *International Sustainable Development Research Conference*, New Delhi, India.
- AGARWAL, A. and STRACHAN, P. (2007) NISP: Towards developing a new and integrative methodology to evaluate industrial symbiosis networks. *Industrial Symbiosis in Action: Report on the Third International Industrial Symbiosis Research Symposium*, Yale F&ES Publication Series, 21-24.
- AGARWAL, A. and STRACHAN, P. (2007) Regional context of the UK National Industrial Symbiosis Programme: a regional coordinators' perspective. *International Society for Industrial Ecology Conference*, Toronto, Canada.
- AGARWAL, A. AND STRACHAN, P. (2007) Performance Evaluation of Eco-industrial Development Initiatives: A Review of Tools and Techniques. *British Academy of Management Conference*, York, UK.
- AGARWAL, A. and STRACHAN, P. (2006) UK National Industrial Symbiosis Programme: towards developing a new and integrative methodology to evaluate industrial symbiosis networks. *International Industrial Symbiosis Research Symposium*, Birmingham, UK.
- AGARWAL, A. and STRACHAN, P. (2006) Evaluation Methodologies to Measure Performance of Eco-industrial Development Initiatives. *Consultancy Report prepared for Databuild Ltd. and National Industrial Symbiosis Programme*, UK.