

# The role of firms in the national system of innovation (NSI) framework: Examples from Hong Kong

## KEY WORDS

National System of Innovation (NSI); Hong Kong science & technology policy; Hong Kong innovation activity; small-to-medium sized enterprises (SMEs); NSI framework variation

*Since its introduction in 1987, the National System of Innovation (NSI) approach to understanding innovation performance has become well established in economics and policymaking within the OECD. This research asks whether the framework is applicable in Hong Kong, an economy that has recently staked its economic future on science and technology. It focuses on the main actors in the NSI framework – firms – and examines how their internal functioning compares with that propagated in the NSI literature. Based on in-depth interviews with four small-to-medium sized enterprises (SMEs) in Hong Kong, the research identifies a number of business traits or characteristics relating to innovative activity. The findings question the NSI framework's universalizing tendency and suggest that the concept cannot be unproblematically applied to a small, developing economy such as Hong Kong which demonstrates conditions markedly different, in a qualitative fashion, from those in advanced industrialized countries, from where the concept arose.*

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## INTRODUCTION

Since the idea of innovation systems was introduced in 1987 (Freeman 1987), a growing international body of literature documents its influence. Supranational organiza-

tions such as the OECD,<sup>1</sup> the European Union and UNCTAD<sup>2</sup> have absorbed the concept as an integral part of their analytical perspective. The OECD's definition of a national system of innovation (NSI) is the "set of institutions that (jointly and individually) contribute to the development and diffusion of new technologies. These institutions provide the framework within which governments form and implement policies to influence the innovation process. As such, it is a system of interconnected institutions to create, store and

1 OECD is an acronym for Organisation for Economic Co-operation and Development.  
2 UNCTAD is an acronym for United Nations Conference on Trade and Development.

transfer the knowledge, skills, and artifacts which define new technologies" (Metcalfe 1995 in OECD 1999: 24).

Even the World Bank and International Monetary Fund have begun to employ the concept. The US National Academy of Sciences, too, has recently brought the innovation systems concept into its vocabulary and now uses it as a framework for analyzing science and technology policy in the United States (Lundvall et al. 2002: 214). In particular, the innovation systems approach is widely used in Scandinavia and Western Europe, both in academic contexts and as a tool for policy making. While Finland was the first country to adopt the concept of NSI as a basic category of its science and technology policy, Sweden has given the concept legitimate status in its own way by naming a new central government institution (an 'åmbetsverk') VINNOVA, which stands for 'Systems of Innovation Authority.'

In short, the NSI concept has fared astonishingly well in its short history, at least in the OECD countries. Given its rapid spread, the question arises whether the NSI framework is equally applicable elsewhere in the newly developing economies. For example, is the framework applicable in Hong Kong,<sup>3</sup> an economy that has recently staked its economic future on science and technology? This paper specifically focuses on one of the main actors in the NSI framework – firms – in order to determine whether or not the framework can be applied to Hong Kong. It examines the internal functioning of private, small-to-medium sized enterprises (SMEs) in Hong Kong, and compares those observations with the ideal type propagated in the NSI literature.

This paper begins by introducing the role of the firm in the NSI framework; this lays the

ground for the remainder of the study. It then states the research questions to which answers are sought, followed by the research method and findings of the study. The paper ends by drawing conclusions based on the general question posed above – the applicability of the NSI framework to Hong Kong.

## THE NSI FRAMEWORK AND ROLE OF FIRMS WITHIN THE FRAMEWORK

The concept of a NSI provides a tool for analyzing country specificities in the innovation process in a globalized economy, as well as a guide for policy formulation. It highlights interactions and interfaces between various actors and the workings of the holistic system rather than the performance of its individual components (Lundvall 1992: 9). The main components of the innovation system approach are organizations and institutions. Organizations are formal structures with an explicit purpose that have been consciously created (Edquist and Johnson 1997: 47). Important organizations in innovation systems are *firms*, universities, venture capital organizations, and public innovation policy agents. Firms include suppliers, customers or competitors in relation to other companies, or indeed, venture capital organizations (Edquist 2001: 5). Institutions are sets of common habits, routines, established practices, rules or laws that regulate the relations and interactions between individuals, groups and organizations (which include firms and also universities and public innovation policy agents) (Edquist and Johnson 1997: 46). Examples of important institutions in innovation systems are patent laws and norms influencing the relations between universities and firms.<sup>4</sup>

<sup>3</sup> Hong Kong Special Administrative Region of China.

<sup>4</sup> Although there is general agreement that 'organizations,' 'institutions' and 'firms' are the main components in systems of innovation, there is little agreement in the literature as to what should be meant by these terms. For example, institutions

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In addition to being an important organization in innovation systems, firms are also at the heart of the standard NSI schematic (for an example of such a schematic, see, OECD 1999: 23) and the locus of innovative activity. It is for these reasons that firms are taken as the subject for this study. The objective of many other studies is not only to understand the process of knowledge production, but also to evaluate the extent to which the elements participating in this production: a. contribute to firm-level innovation, and b. adequately perform their roles (and this is generally determined via comparisons among countries). However, focusing on the firms can elucidate a whole network because firms are the main vectors of technological innovation. Their capacity to innovate is partly determined by their own capabilities, and partly by their capacity to adopt and apply knowledge produced elsewhere (OECD 1999: 17).

In studying the role of firms in the NSI literature, two issues quickly become evident. First, the types of firms examined are usually large multinationals and not smaller, family-run enterprises.<sup>5</sup> Second, the NSI literature tends to focus on comparisons between types of firms or between firms in different geographical locations (regions, countries and so on). Despite these trends, there is nevertheless, some work that focuses on the roles that firms should *ideally* play.<sup>6</sup> Here, the edited volumes by Edquist (1997) and Edquist and McKelvey (2000) are the most useful because they contain scholarly pieces from a number of authors who adopt a variety of perspectives for exam-

ining firms in the larger innovation system framework. Various OECD publications also contain some relevant work on how the innovative firm within the NSI framework ought to look and/or behave (OECD 1997a, 1997b, 1999). The remainder of this section examines the ideal roles of firms based on the articles that appear in these edited books and OECD documentation.

Edquist and Johnson (1997: 58) state that the most important components among the private organizations relevant to innovations are the firms. Although the primary objective of capitalist firms is not innovation, innovation is often an important precondition for making a profit. Therefore a large portion of the innovation process in a capitalist market economy takes place within firms. This means that in addition to 'production,' firms must be able to have a *good overall innovation performance*; that is, they must be consistently able to innovate over long periods. Innovating firms must have certain competencies, such as the capacity to carry out a routinized search for new knowledge; change the search routines where necessary; utilize the search results; absorb new knowledge created elsewhere (in other firms, etc.); simulate the emergence of 'unexpected' new knowledge; and utilize unexpected new knowledge.

In drawing on work conducted at the Fraunhofer Institute for Systems of Innovation Research, Meyer-Krahmer (1997: 310) points to the growing importance of scientific development in the process of innovation. This has several consequences for firms, which leads to

for Nelson and Rosenberg (in Nelson 1993: 5, 9–13) are basically different kinds of organizations (such as firms, universities, and so on), while for Lundvall (1992: 10) institutions refer to the game. Hence the term 'institution' is used in at least two main senses in the literature and these senses are often also confused (Edquist 2001: 5).

5 This may be due to the historical legacy of the NSI concept. Having emerged from the developed OECD countries where multinationals control the greatest share of business volume they have come to dominate the corporate landscape. In this sense, it should be no surprise that the types of firm studied are typically multinationals in most NSI literature.

6 Here, only the literature that focuses on the role of firms (either MNEs or SMEs) in innovation systems is considered. Voluminous scholarly work pertaining to other aspects of NSI (in particular the relations between the components of the innovations system) are not considered directly as they are not as important for the purposes of this paper.

the necessity of firms to build structures to promote trans- and interdisciplinarity; strengthen their science base through linkages; and alter their publication pattern.

Meanwhile, the OECD identifies four levels of innovativeness that can distinguish a firm irrespective of firm size and activity (OECD 1999: 49–51). These levels reflect the varying competences firms have:

- Level 0 – *The static firm* innovates seldom or not at all, but may have a stable market position under existing conditions.
- Level 1 – *The innovating firm* has the capacity to manage a continuous innovation process in a stable competitive and technological environment.
- Level 2 – *The learning firm* has, in addition, the capability to adapt to a changing environment.
- Level 3 – *The self-regenerating firm* is able to use its core technological capabilities to reposition itself on different markets and/or create new ones.

The OECD also identifies important common needs for both large and small firm: a commitment from the top (in the case of an SME, often the owner); an integrated view of innovation strategy and business strategy; a clear idea of the firm's distinctive competencies; an openness to constructive ideas and contributions from all staff; and a structured way of watching and responding to changes and opportunities in the business environment.

### HONG KONG AND ITS FAMILY-RUN SMALL-TO-MEDIUM SIZED ENTERPRISES (SMEs)

Although Hong Kong is geographically a part

of China, politically and constitutionally it is quite distinct. Since its handover on 1 July 1997, HK has been governed by the 'Basic Law.'<sup>7</sup> Today, Hong Kong is widely regarded as among the freest and most competitive economies in the world; with much of competitiveness stemming from the services sector. The relative importance of various economic sectors in Hong Kong can be assessed in terms of their value-added contributions to gross domestic product (GDP) and total employment. By both measures, primary production (including agriculture, fisheries, mining and quarrying) is very insignificant where natural resources are virtually absent. Secondary production<sup>8</sup> (comprising manufacturing), which was once a significant contributor to GDP, has dwindled in relative importance over the past two decades.

Indeed, the Hong Kong economy has become increasingly service-oriented since the mid-1980s as manufacturing has moved offshore to the Mainland – primarily to Southern China and the Pearl River Delta Region. The open door policy and economic reforms in the Mainland have not only provided an enormous production hinterland and market outlet for Hong Kong's manufacturers, but have also generated abundant business opportunities for a wide range of its service activities, particularly freight transport, storage, telecommunications, banking, real estate development, and professional services such as legal, insurance and accounting. By moving its secondary production to the Pearl River Delta Region, Hong Kong has become one of the most service-oriented economies in the world. Reflecting this, the share of the tertiary services sector in GDP rose appreciably from 67% in 1980 to 85% in 1999.<sup>9</sup> The structural

7 The Basic Law is a constitutional document formulated jointly by the British and Chinese before Hong Kong's handover to China, put into effect on 1 July 1997 for a period of 50 years.

8 Secondary production also includes the smaller components of construction, and supply of electricity, gas and water.

9 The tertiary services sector comprises the wholesale, retail and import/export trades, restaurants and hotels; transport,

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transformation in the economy has also been felt in the variation in sectoral composition of employment. The share of the service sector – dominated by small-to-medium sized enterprises – in total employment leaped from 48% in 1980 to about 82% in 2000.<sup>10</sup>

Small-to-medium sized enterprises (SMEs) are defined as non-manufacturing enterprises with fewer than 50 employees and manufacturing enterprises with fewer than 100 employees. Hong Kong's SMEs are the basic building blocks of its economy. With their relatively low start-up costs and flexibility in a changing business environment, SMEs are a significant force in Hong Kong's economic development and they create a large number of employment opportunities. Many of today's highly successful private or publicly listed corporations have grown and developed from their relatively humble SME, family-run origins.<sup>11</sup> Their vision, dynamism and effective response in a highly competitive local, regional or global business environment provide the role model and inspiration for today's SMEs with similar aspirations.<sup>12</sup>

The majority of SMEs are engaged in the import and export sector, followed by the wholesale, retail, restaurant and hotel sector. In 2001, there were approximately 300,000 SMEs in Hong Kong. They accounted for over 98.3% of the total establishments and provided job opportunities to 1.4 million people – about half of the employed workforce. Ranked in terms of size of value-added contribution to GDP, these sectors were the most important contributors in 1999, accounting

for 25% of the total (Hong Kong Yearbook 2000).<sup>13</sup>

## RESEARCH QUESTIONS, METHOD AND FINDINGS

Having chosen firms for the empirical focus within the NSI framework, the primary question this paper has set out to deal with can be summed up: what is the role of firms in Hong Kong as compared to that which is idealized in the NSI literature? Sub-questions to this include whether Hong Kong SME firms are thinking in terms of innovation, and if so, what are they doing to innovate? How, or what methods, are firms employing in order to engage in innovative activity? Finally, if there is a variation between Hong Kong firms' behavior with respect to innovation and the ideal type proposed by the NSI literature, what does that tell us, if anything?

Given the predominance of SMEs – usually family-owned and at least partially family-run – in the overall business and economic landscape, the data for this study was collected through a number of in-depth interviews, mainly with the founders or family patriarch of four such Hong Kong firms.<sup>14</sup> The four firms were selected based on two criteria – the sector in which they were engaged and the author's personal contacts. All the companies selected were very small, with four to twelve employees. Two of the firms were engaged in the import/export or trading sector. A third was involved with manufacturing and trading, and the final firm interviewed was a university based, hi technology startup. In other words,

storage and communications; financing, insurance, real estate and business services; community, social and personal services; and ownership of premises

10 On the other hand, the share of manufacturing sector in total employment contracted noticeably, from 42% in 1980 to 28% in 1990, and further to only about 7% in 2000.

11 Two such examples include Li and Fung and Johnson Electric.

12 It is difficult to determine exactly how many of Hong Kong's SMEs are family-run because of the difficulties associated with accurately defining where the family boundaries and involvement in the firm begin and end.

13 This was greatly aided by the robust performance of external trade and inbound tourism in that year.

14 Although no deliberate effort was made to select firms where the head of the firm were males, it is a relatively commonly observed feature of family firms in Hong Kong.

all of the companies were involved in the services sector.<sup>15</sup> Face-to-face interviews were the preferred means of gathering information pertaining to these firms, but because of the difficulty with conducting such interviews at times, telephone interviews were used as a substitute, when necessary. The research period spanned five months: interviews were arranged and began during the winter of 2001, and continued throughout the first half of 2002.<sup>16</sup>

The main results of the interviews was identification of a number of Hong Kong SME characteristics or traits – ‘the way they conduct their business’ – that provide a feel for the business culture of the SMEs interviewed, and more importantly, the effect of those characteristics on innovation or innovative activity.<sup>17</sup>

- *Nepotism / High level of family orientation in the firm.* Through the interviews, I found that trust in the family businesses is vested in persons, not institutions and this fact inhibits or dramatically slows down the introduction of formal structures of professionalism in the organization. This idea was found in the responses of two of the four firms interviewed, which were very reluctant to employ professional managers, who might have different ideas about how the firm should innovate. They preferred to employ their own progeny regardless of their education and work experience in

implementing innovations in a firm. This caused the firms to remain as small (or large) as the pool of trusted people in the family. One firm mentioned how they had in fact *refrained* from innovating by entering new markets and new product groups because they did not have sufficient numbers of trusted family members who could perform the new business roles necessary.

- *Overlap of ownership and management.* Three of the firms, which are family owned and managed, do not separate ownership and management. Thus managers had the ultimate stake in the firm’s prospects. For innovation, this leads to distrust of outsiders and justification for the owners’ actions as being ‘right’ simply because they are the ones who wholly own the business.<sup>18</sup>
- *Centralized decision making.* A frequently noted, although not unique, characteristic of the SMEs I interviewed was a high degree of centralized decision making. Once again, other than the university-based start-up, every business proprietor is a hands-on entrepreneur. This means that only a limited amount of innovation can occur – limited by the knowledge that the entrepreneur (which is quite considerable in the industry, however) and his trusted family members have or come across.
- *Make widespread use of personal networks and connections to learn of innovations.* All

15 It is important to note that there is a large literature on service innovation characteristics, and while important, is not addressed in this paper (see, for example, Miles 1994; OECD 2000; Metcalfe and Miles 2000).

16 In order to maintain consistency in the survey data, it was important that all respondents employ similar meaning of terms. One of the most important, yet problematic terms was the concept of ‘innovation.’ Although widely used, I found it meant different things to different people. This was a difficulty encountered in this study, and in order to circumvent this problem, guidelines were drawn up to agree on what does and does not represent an innovation. Using these guidelines, consistency across the interviewees was ensured.

17 It is important to state that the characteristics of Hong Kong’s SMEs outlined below may not, individually, be an identifying characteristic, but rather a function of such firms usually being family owned and managed. Collectively, these characteristics provide a picture of how the typical HK SME functions. For future research, it would be useful to discern whether HK SMEs share the same characteristics with SMEs in other parts of the world, with differing or similar innovation systems. In other words, to establish the extent to which innovation features of HK SMEs are unique.

18 In the fourth firm (the university based, hi-tech startup) ownership and management has been separated so there is less of this problem.

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of the firms expressed the sentiment that being organized through formal and, more commonly, informal networks were the most important organizational feature in allowing them to learn, understand and implement innovations. All of the respondents said that they make great use of networks of various kinds, both local and international, giving them access to a wide range of personal contacts, credit, market information and sources of supply. The strength of network ties was identified as one of the fundamental sources of strategic effectiveness of the SMEs interviewed, which tended to possess strong linkages. One firm described how they implemented a new software program after hearing about its use from their competitors and it allowed them to not re-hire a member of their staff who left because the computer program was able to perform the employees' functions.

- *Firms are flexible and adaptable to change.* The SMEs demonstrated a high degree of strategic adaptability, in large part facilitated by the dominant decision maker, and made necessary because failure compromises the economic fortunes of the founder and his family. Given their limited resources, small firms have to adapt quickly and must avoid expensive mistakes. For example, one firm indicated that one innovation they employed was not to use their own warehouse for the storage of their goods, but rather to use sub-contracted warehouses for which they paid higher rates, but which they could stop using at short notice without having to shift vast resources.
- *To be pragmatic* is more important than being legalistic. This characteristic applied in differing degrees for each of the four firms interviewed. This skill at compromise favors innovation because it saved many man-hours, costs and other resources. For instance, one entrepreneur faced some resistance in conducting his business from

one US-based customer, who expressed strong dissatisfaction with the communication between the two firms (because of difficulties communicating in English). Motivated by economic self-interest the entrepreneur did not allow any hint of personal animosity to get in the way, but rather arrived at the innovative solution of asking his highly educated daughter (who was a student) to be responsible of all foreign communication. By being ready to compromise their previously firmly held rules of doing business, innovation becomes more likely when Hong Kong SMEs are willing to mix the old with the new.

- *Methods of raising finance.* To maintain financial flexibility, one of the SMEs occasionally used an extremely innovative way of raising finance. This was the use of post-dated checks as a major source of short-term working capital. To obtain short-term financing, they issue post-dated checks to their suppliers. The checks can be either held to maturity or sold at a discount to a bank. This method of controlling finances was employed especially during times of a liquidity crunch, and is not a method that is found in any standard business textbook. Similarly, three firms recounted how – because they are involved in several steps of a trading chain – they sell some goods at a loss if required, because such a deal is considered to be a financing cost in which the cash generated from the sale has been collected long before the accounts payable by post-dated check matures.
- *Possibility of family friction arising within the organization.* This was a characteristic found in two firms and sometimes makes it difficult to run the firm in general, and implement innovations in particular. The point at which the family ends and business begins is hard to discern. Furthermore, it may genuinely be difficult for the subsequent generations to work in the shadows

(literally) of the founding father of the family business, as caution may look like timidity, excessive innovativeness like foolishness.

- *Seldom obtain external assistance in order to innovate* (for example, professional management or marketing) in the firm. As one firm aptly put it, “[the] company depends less on data and more on intuition, feelings, and people for innovation.” Another respondent similarly characterized the owner’s approach as involving greater risks with respect to innovations, and relying more on intuition. More importantly, all the respondents said that they are seldom willing to pay the necessary costs consumed during a formal search for innovative activity taking place beyond the realms of their firm (in their industry or overseas). This was not to say that the firms do not have their finger on the pulse of the industries in which they operate – they do. However, it is all informal, intuitive and grapevine-led which, according to the firms, seemed to have worked well. This characteristic clarifies part of the reason why they are able to remain highly flexible, and also highlights a related characteristic discussed – the importance of being pragmatic – whereby they do not spend money unless it is absolutely necessary (that is, it will result in a direct improvement in the firm’s bottom line). An example of this was when a firm cut an innovative deal with its shipping company to use their shipping line exclusively for a rebate on every container shipped. The director of the firm pushed for this based purely on a hunch because he had heard that the shipping line was losing a lot of business during the economic downturn (which began in 1997) and was actively looking for business. As the firm had been

using this shipping line for many years prior, they decided to push for a significant concession simply because they felt the opportunity existed to push such a special consideration, albeit with the threat of taking their business to their competitors.

- *Do not engage in innovation for its own sake.* The main theme that emanated from my interviews was that a product or process is only a means to reduce costs or increase revenues. If that product or process needs to be changed (innovated upon), the primary goal is for it to result in higher profits. *That* is the motivation behind the firm’s actions, rather than a desire to innovate – either for the sake of innovation, or to make improvements to streamline processes. In other words, the dual dimensions of income and cost characterize efficiency. That having been said, however, it is clear that SMEs *do* engage in a wide variety of innovations, but they do not conceive of it that way themselves.<sup>19</sup>

## CONCLUSIONS

The enterprise of this paper was to study Hong Kong SMEs to examine whether or not the NSI framework is applicable in Hong Kong. The method employed was to understand the internal functioning of private, SMEs and comparing the findings to that of the ideal type of firm, propagated in the NSI literature. Having studied how firms in the NSI literature operate in relation to how four Hong Kong SMEs operate, several conclusions can now be drawn. Before doing so, however, it is important to reiterate that the companies interviewed were in fact very small, and they did not fall into the ‘medium-size’ range of Hong Kong SMEs, belonging very much in the ‘small’ category. Nevertheless, the findings

<sup>19</sup> Many of the examples provided in this section, for example, were not viewed or categorized as innovations by the interviewees themselves.

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are still valuable because much literature on East Asian Businesses suggests that larger, medium-sized companies also display similar characteristics as that manifested by the small companies (see, for example, Tsang 2001).

The main conclusion seems to be the problematic nature of the NSI literature in accounting for SMEs and for qualitative differences among SMEs. Whereas NSI literature has largely focused on multinational firms, Hong Kong's corporate landscape is dominated by a large number of smaller firms with a fraction of a multinational's employees and usually a fraction of their corporate functions. In these SMEs, many of which are family-run, there is no managerial capitalism (cf. Chandler 1977) as one would witness in larger corporations. Additionally, while Hong Kong is by no means unique in its preponderance of SMEs, these SMEs are run in a qualitatively unique fashion as demonstrated by the business traits relating to innovative activity identified in this study. This means that many of the functions that the NSI literature prescribes or ascribes to firms are absent from Hong Kong's SMEs. As a result, Hong Kong SMEs do not, for example, publish or have publication patterns to alter. Similarly, SMEs in Hong Kong primarily engage in process innovations and not product innovations (related to concept generation, product design and development, and product development) because of their service-oriented nature. Furthermore, there is seldom any hint of formal 'scientific' enquiry among the SMEs interviewed, as compared to the multinationals described in the NSI literature that do engage in basic and applied scientific and technological research. This leads to a second conclusion that suggests that the NSI framework is problematic in describing the scientific and technological institutional setup in developing countries in general. If for example, SMEs are not sufficiently accounted for in the mainstream NSI literature, it is likely the case that other aspects of smaller economies, or develop-

ing economies are similarly unaccounted for in the NSI framework/literature.

These dual problems in the NSI concept lead one to ask whether the NSI framework is in fact universalizing in nature where the framework originally developed for OECD countries encounters problems when applied to a small developing economy such as Hong Kong. In this case, other aspects of the NSI can be opened to question too, such as the role and place of other institutions in the framework. In addition to these speculations, it is also possible to conclude from this study that the categories of the NSI framework cannot be applied unproblematically. Of specific relevance to this study was the idea of what constitutes an 'innovation.' Even as basic an idea as this was open to multiple interpretations and understandings that makes the term hugely difficult to operationalize in practice. Whereas the NSI literature does specify with some success product innovations, it is less clear on process innovations – the very type that the SMEs interviewed for this study predominantly engaged in.

Given these problems, it is not surprising to learn that innovation and policy researchers have constantly run into difficulties in attempting to define NSI on a theoretical level and different scholars have adopted different meanings of the term, depending on their frame of research. Even in the words of Edquist, the status of the term is "diffuse" and "ambiguous" (Edquist 1997: 26–27). Nonetheless, the term continues to be widely used for policy-making purposes in order to identify the institutions relevant to innovation and also to identify ways to support technological change and innovation. The NSI concept has become an instrument of governance, and a powerful organizing metaphor in research projects, policy programs, and in some cases, even public debate (Miettinen 2002: 14). Used as rhetoric, the innovation systems metaphor has provided a framework

for guiding national science and technology policy.

It is important for future research to determine exactly how the NSI concept gained such a status and how it is deployed in politics and governance. Is it simply rhetoric, or does it achieve genuine political, economic or other ends? This study has shown that such an agenda for future inquiry is necessary in order to gain a deeper, more accurate understanding of the NSI framework.

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