

A background paper on consideration of options for encouraging the setting up or strengthening of institutions such as national systems of innovation

A. Mandate and background

1. The Conference of the Parties (COP) endorsed the recommendations for enhancing the implementation of the framework for meaningful and effective actions to enhance the implementation of Article 4, paragraph 5, of the Convention, as contained in Annex I of decision 3/CP.13. The recommendations requested the Expert Group on Technology Transfer (EGTT) to consider options for encouraging the setting up of institutions such as national systems of innovation that could lead to the endogenous development of technologies in developing countries and countries with economies in transition.
2. In respond to this request, the EGTT proposed as activity 4.2 in its updated rolling programme of work for 2010-2011, to prepare a background paper to promote information sharing, including through consideration of options for encouraging the setting up or strengthening of institutions such as national systems of innovation that could lead to the development of technologies in developing countries and countries with economies in transition.

B. Scope of the paper

3. At the 5th regular meeting of the EGTT held in Bonn in May 2010, the EGTT discussed its priorities for delivering its programme of work in 2010. It requested the secretariat to prepare a brief scoping paper as a starting point for its consideration in order to determine how to proceed with the implementation of activity 4.2.
4. National systems of innovation (NSI) have been systematically and intensively studied in the last couples of decades. This paper present the basic concept and main development trajectory of NSI by outlining some influential efforts that have been made in this regard, with a view to provoking further in-depth elaboration by the EGTT on this topic.
5. To this end, this paper starts with a general overview of the concept of innovation from different perspectives and further introduces the concept of NSI as well as its development in the last two decades. The paper then focuses on the efforts that have been made at both international and national level to apply the NSI into policy making process regarding innovation.
6. The paper further review the understanding of the role of NSI in the context of climate change which indicates a like gap might need to be filled and therefore proposes the concept of 'climate friendly NSI' as a vehicle for consideration by the EGTT to proceed with this aspect of its programme of work..

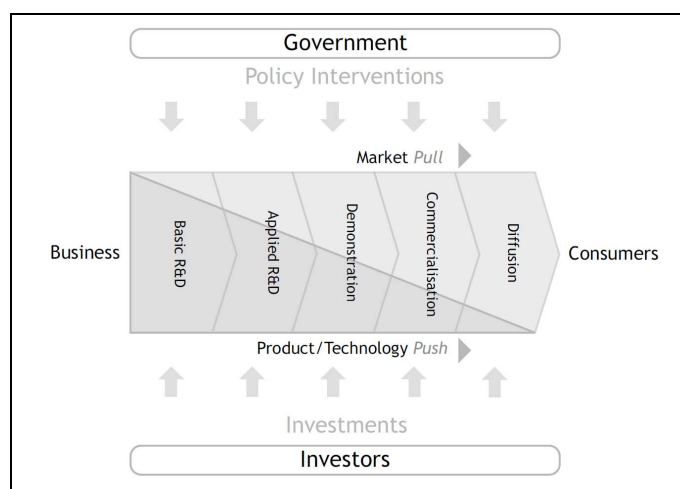
C. Innovation and national systems of innovation

1. Innovation

7. Within the literature there are two main perspectives on the concept of innovation. One perspective tends to be more product-oriented and associates innovation with the technology development cycle, as shown in the figure 1, below. As innovation might not occur in such a linear way (at least in the majority of cases), what the technology development cycle reflects is a theoretical model of the innovation process. In reality, innovation is more likely to be an

outcome of a complicated system with various input and influences, all with strong non-linear behaviour and uncertain and unpredictable outcomes that result from the strong dynamics of “market pull” and “technology push” as shown in figure 1.

Figure 1. Innovation and technology development cycle



Source: Carbon Trust (2003), *Inducing Innovation for a low carbon future: drivers, barriers, and policies*.

8. A second perspective on innovation, drawing upon the theories of the Austrian economist Joseph Schumpeter (see box 1.¹), identifies innovation as the critical dimension of economic change where the key actor in innovation is the entrepreneur and where innovation does not simply result from the process of invention but it also an consequence of and a driving force behind industrial mutation and transformation.

Box 1: Definition of Innovation

- The introduction of a new good — that is, one with which consumers are not yet familiar — or of a new quality of a good.
- The introduction of a new method of production, which need by no means be founded upon a discovery scientifically new, and can also exist in a new way of handling a commodity commercially.
- The opening of a new market, that is a market into which the particular branch of manufacture of the country in question has not previously entered, whether or not this market has existed before

9. Since 1990s, the revival of the neo-Schumpeterian tradition started to bring innovation back into the focus of mainstream economics. A more systematic theory of innovation has been put forward based on the experiences of the economic growth of the last century. Several like-minded economists² looking for a more in-depth understanding of innovation process, started to summarize their innovation theory through the concept of NSI, which has been now widely diffused and adopted by various decision-makers to strengthen national innovation capacities.

2. National systems of innovation

10. For purposes of clarity, a NSI is not a tangible or physical system that is established to perform the function of innovation. A NSI is an abstract concept that is used to describe the

¹ Prophet of Innovation: Joseph Schumpeter and Creative Destruction, by Thomas K. McCraw, Cambridge: Harvard University Press

² Notably, Christopher Freeman, Bengt-Ake Lundvall, Richard R. Nelson and Charles Edquist.

innovation process in the national context. In another words, a NSI is actually the reflection of national economy itself through the lens of innovation.

11. Christopher Freeman's study on the success of the Japanese economy³, is referred as the groundbreaking research that formed the basis of the concept of NSI. In his study, Freeman concluded that the technological success of the Japanese was due to its strong research and development (R&D), but also to a number of other social and institutional changes, which were established in the country after the Second World War. These arguments successfully constructed the foundation for the concept of a NSI.

12. There are various definitions of NIS in literature, some of which are listed in box 2. Regardless of the language used to define the NSI, they all reflect the basic idea that a NSI rests on a multitude of contributing factors and components, reflecting the idea that innovation is not just the result of the behaviour of individual firms or entrepreneurs but the outcome of a complex interacting process of various institutions. In another words, the most importance aspect of NSI is not just the structure and composition of the system as shown in figure 2, rather than how the components interact which will significantly determine the performance of the system.

13. Having the concept of NSI well established and accepted is one challenge, it still needs further development to make it operational for policy making. In this connect, the OECD further formalized the concept of NSI by defining three distinctive attributes⁴:

(a) Input and outcome of the system, which includes patterns of scientific, technological and industrial specialisation and could normally be measured by publications, patenting activities, R&D intensity, as well export specialisations;

(b) Composition of the NSI or institutional profiles, which help to illustrate the different actors inside the system and their functions. It is noted that the institutional profiles are not intended to provide a standard for what the NSI should be, but rather, to illustrate the difference among countries in organizing their innovation process. An example of an institutional profile is shown in Figure 4;

(c) Internal behaviour of the NSI, in other words, interaction of different actors and knowledge flows, which are usually measured by collaborations, patents science links, labour mobility, foreign direct investment (FDI), etc.

14. In conclusion, though the theory of NSI cannot offer a simple, standard model to be rolled out that will perform an anticipated innovation function, the concept of NSI does provide an excellent tool for policy analysis to review the innovation capacity of a country in a systematic manner. The implementation of policy recommendations based on the NSI approach would be more effective and efficient way to deliver enhanced national innovation capacity.

³ Freeman, C. (1988), 'Japan: A new National Innovation Systems?', in Dosi, G., Freeman, C., Nelson, R.R., Silverberg, G. and Soete, L.,(eds.), Technology and economic theory, London, Pinter Publishers.

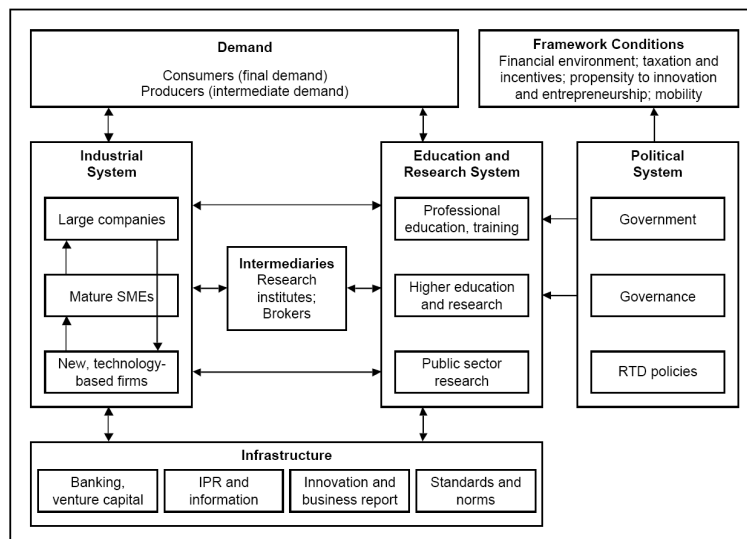
⁴ OECD (1999). Managing the national innovation systems.

Box 2. Definitions of a National System of Innovation

- "... The network of institutions in the public- and private-sectors whose activities and interactions initiate, import, modify and diffuse new technologies" (Freeman, 1987)
- "... The elements and relationships which interact in the production, diffusion and use of new, and economically useful knowledge... and are either located within or rooted inside the borders of a nation state" (Lundvall, 1992)
- "... The set of institutions whose interactions determine the innovative performance of national firms" (Nelson and Rosenberg, 1993)
- "... The national system of innovation is constituted by the institutions and economic structures affecting the rate and direction of technological change in the society" (Edquist and Lundvall, 1993)
- "... A national system of innovation is the system of interacting private and public firms (either large or small), universities, and government agencies aiming at the production of science and technology within national borders. Interaction among these units may be technical, commercial, legal, social, and financial, in as much as the goal of the interaction is the development, protection, financing or regulation of new science and technology" (Niosi et al., 1993)
- "... The national institutions, their incentive structures and their competencies, that determine the rate and direction of technological learning (or the volume and composition of change generating activities) in a country" (Patel and Pavitt, 1994)
- "... That set of distinct institutions which jointly and individually contribute to the development and diffusion of new technologies and which provides 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 transfer the knowledge, skills and artifacts which define new technologies" (Metcalf, 1995)

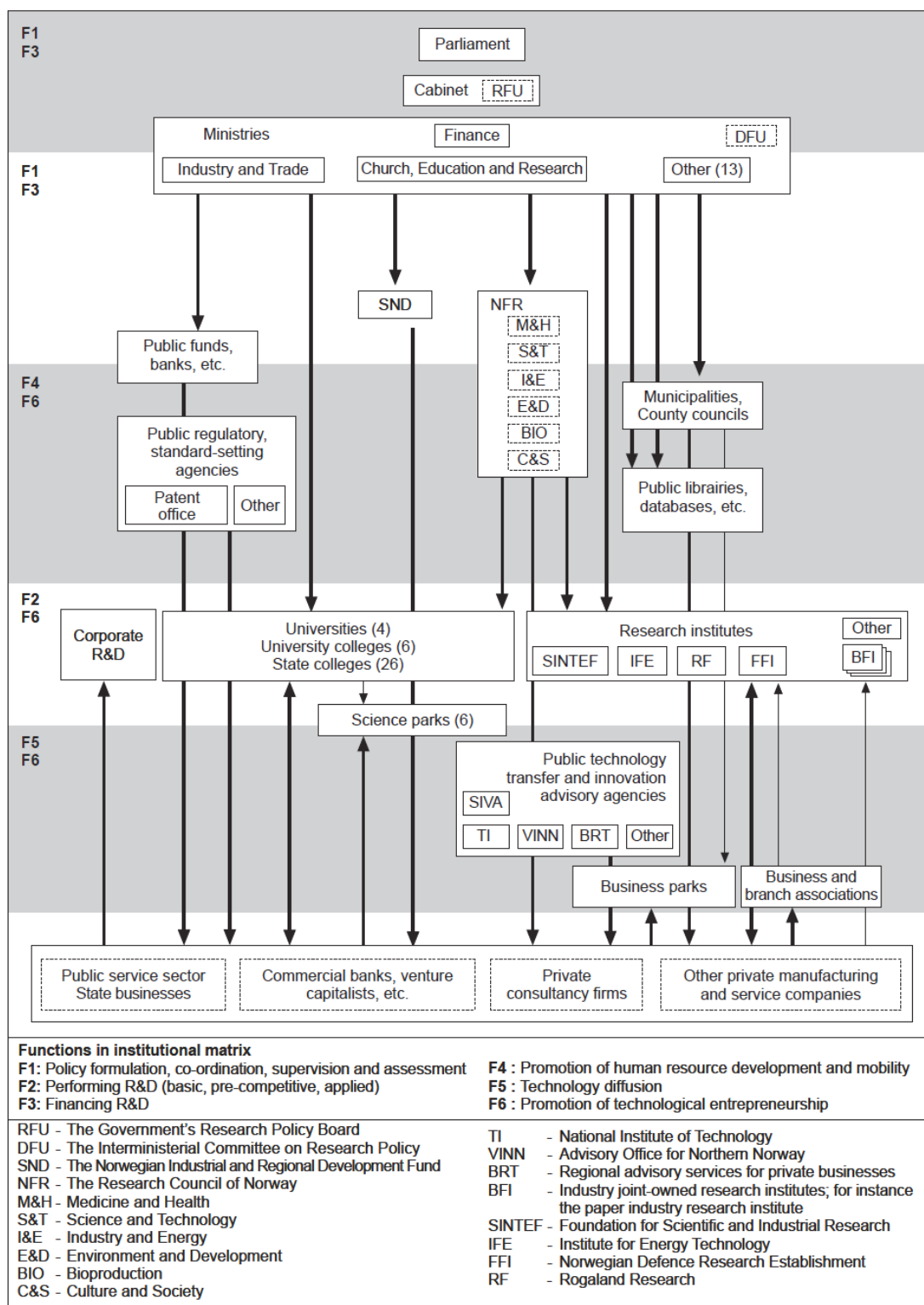
Source: Niosi, J. (2002). National systems of innovations are "x-efficient" (and x-effective): Why some are slow learners, Research Policy, 31.

Figure 2. A generic national systems of innovation



Source: Arnold, Kuhlman (2001). A Singular Council - Evaluation of the Research Council of Norway

Figure 3. The Norwegian system of innovation - organizational structure



Source: OECD (1999). Managing national system of innovation.

3. Main trends of the development and application of national systems of innovation

15. There have been a vast number of studies carried out since the NSI theory emerged in 1980s and therefore a comprehensive review, covering all these efforts, would be outside the scope of this paper. This section is merely representative of the concepts surrounding the NSI,

which might help to outline the main trajectory and trends in the development and application of NSI over the last two decades.

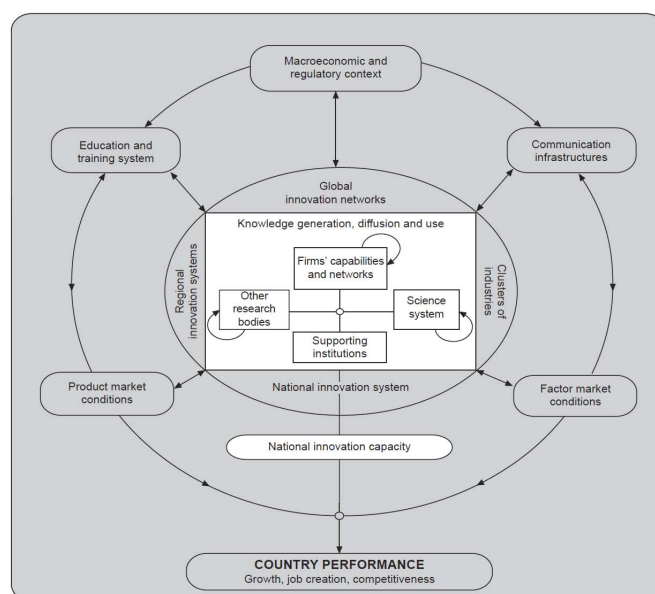
16. Since the birth of NSI concept the concept and theory of NSI has been under continuous improvement and research by both the academic community and international organizations. Many efforts have been made to standardize the framework of NSI with the aim of developing a formalized tool for innovation policy analysis. On the other hand, more and more policy makers have started to use the NSI approach in their real decision making processes. In essence, the theoretical and the practical activities are always interacting with each other and mutually stimulated by the progress of the other.

Development of the approach and theory of the NSI

17. The efforts to improve the theory and concept of NSI were usually undertaken at the early stage of development of the NSI approach and mostly by the academic community. The three well known books edited by Lundvall⁵, Nelson⁶ and Edquist⁷ set the basis for the theory of NSI. The engagement of the OECD in 1990s made more comprehensive and influential efforts which further formalized NSI theory and finally brought it into view of policy-makers.

18. The efforts on NSI undertaken by the OECD are more policy oriented and focus intensively on the interaction of actors and associated knowledge flows. The project on “National Innovation Systems” established by the OECD undertook a series of pilot-country case studies⁸ and developed an actor and inter-linkage oriented framework for NSI analysis as illustrated in figure 4. It also developed a list of indicators to measure NSI as shown in table 1⁹, below, which greatly influenced the application of NSI afterwards.

Figure 4. Actors and linkages in the innovation systems



Source: OECD (1999). Managing national system of innovation.

⁵ Lundvall, B-Å. (ed.) (1992), National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning, London: Pinter Publishers.

⁶ Nelson, R.R. (ed.) (1993), National Innovation Systems: A Comparative Analysis, Oxford, Oxford University Press.

⁷ Edquist, C. (editor) (1997), Systems of Innovation: Technologies, Institutions and Organizations, Pinter Publishers/Cassell Academic, London.

⁸ http://www.oecd.org/document/3/0,3343,en_2649_34273_1893507_1_1_1_1,00.html

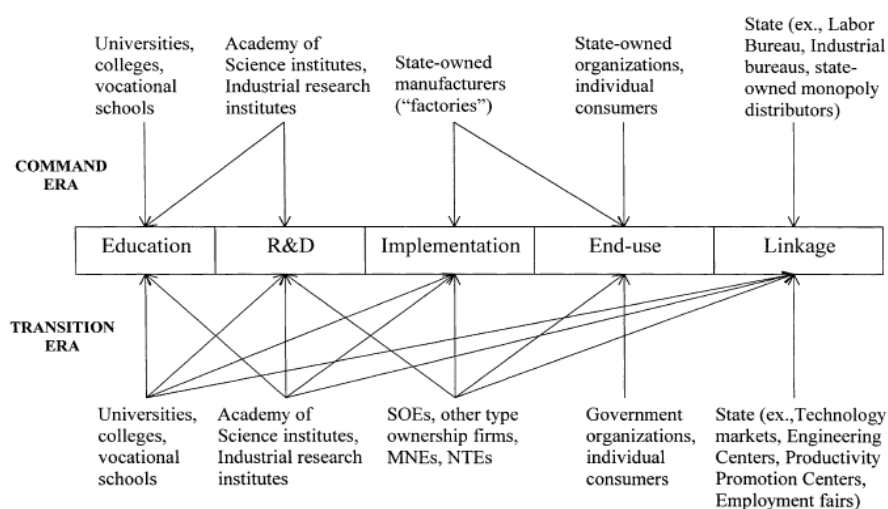
⁹ OECD (1997). National innovation systems.

Table 1. Core knowledge flows in national system of innovation

Type of knowledge flow	Main indicator
Industry alliances	
Inter-firm research co-operation	Firm surveys Literature-based counting
Industry/university interactions	
Co-operative industry/University R&D Industry/University co-patents Industry/University co-publications Industry use of university patents Industry/University information-sharing	University annual reports Patent record analysis Publications analysis Citation analysis Firm surveys
Industry/research institute interactions	
Co-operative industry/Institute R&D Industry/Institute co-patents Industry/Institute co-publications Industry use of research institute patents Industry/Institute information-sharing	Government reports Patent record analysis Publications analysis Citation analysis Firm surveys
Technology diffusion	
Technology use by industry Embodied technology diffusion	Firm surveys Input-output analysis
Personnel mobility	
Movement of technical personnel among industry, universities and research	Labour market statistics University/Institute reports

19. In the meantime, the improvement in NSI theory continues within the academic community, stimulated by the idea of reflecting real “system” behaviour in an integrated manner. One example that is often referred is Liu (2001)¹⁰ which tried to introduce a framework of NSI built on five different activities: research, production, end-use, implementation and education and adopt it in his study of the national innovation system of China.

Figure 5. Distribution of activities and primary actors in China’s innovation system under central planning and since reforms



Source: Liu (2001). Comparing innovation systems: a framework and application to China's transitional context

¹⁰ Liu (2001). Comparing innovation systems: a framework and application to China's transitional context. Research Policy 30 (2001).

20. Many derivations from NSI have also been proposed by many others over the last decade which focuses on levels of the economy other than the national level. Among them, some representative derivations include:

- (a) Technological systems;¹¹
- (b) Regional systems of innovation;¹²
- (c) Sectoral systems of innovation.¹³

Application of the approach and theory of the NIS in decision making process

21. During the same period, the NSI concept was gradually accepted by policy makers and integrated into their science and technology or innovation policy making process.

22. In the OECD, the NSI approach was used by the programme of Reviews of Innovation Policy which aims to offer a comprehensive assessment of the innovation system of individual OECD member and non-member countries, with a focus on the role of government. Reviews have been conducted in several countries including Switzerland, Luxembourg, New Zealand, South Africa, Chile, Norway, China, Hungary, Korea and Mexico.¹⁴

23. A new project called MONIT (monitoring and implementing national innovation policies) has also been established by the OECD as a follow up to the NIS project. The key objective of the project is to create a more comprehensive adaptive governance model that could implement innovation policies in a coordinated, coherent and integrated manner.¹⁵

24. An NIS model was also adopted in the recently released plan called "*Innovation Union*" by the European Commission. It is considered a "flagship" of innovation policy in the Europe 2020 Strategy.¹⁶ Among other initiatives, the *Innovation Union* includes a comprehensive Innovation Scoreboard based on 25 indicators to measure the performance of innovation systems.¹⁷

25. Many individual countries also include the NSI in their decision making process. For instance, the Australian government established a comprehensive review process of its national innovation system in 2008 conducted by a panel of appointed independent experts¹⁸, which influenced the development of new innovation policy of the Australian government¹⁹. At the same time, the Finnish government also invited a team of experts consisting of 6 foreign and 12 national innovation policy experts to evaluate the Finnish national innovation system. The results of the evaluation were published in October 2009.²⁰

26. Except the efforts mentioned above which mostly happened in developed countries, there is increased interest in applying the NSI approach to developing countries over the last decade and has even seemingly become the mainstream. The following section will further illustrate this new trend.

¹¹ Carlsson, Bo and Rikard Stankiewicz (1995), On the nature, function and composition of technological systems, in Carlsson, B. (ed.) 1995.

¹² Maskell, P. and Malmberg, A. (1997) Towards an explanation of regional specialization and industry agglomeration. *European Planning Studies*, 5: 1 pp. 25-41.

¹³ Breschi, S. and Malerba, F. (1997), 'Sectoral innovation systems', Edquist, C. (ed.), *Systems of innovation: Technologies, institutions and organizations*, London, Pinter Publishers. .

¹⁴ http://www.oecd.org/document/62/0,3343,en_2649_34273_38848318_1_1_1_1,00.html

¹⁵ The OECD (2005). *Governance of innovation systems*.

¹⁶ http://ec.europa.eu/research/innovation-union/index_en.cfm

¹⁷ www.proinno-europe.eu/.../eis_2003_tp5_national_innovation_systems.pdf

¹⁸ <http://www.innovation.gov.au/Section/AboutDIISR/FactSheets/Pages/ReviewoftheNationalInnovationSystemFactSheet.aspx>

¹⁹ <http://www.innovation.gov.au/innovationreview/Pages/home.aspx>

²⁰ <http://www.tem.fi/index.phtml?l=en&s=3161>

4. National systems of innovation in the context of developing countries

27. There is increased attention on NSI in the context of developing economies in recent years, particular for the big emerging economies, such like Brazil, China, India and South Africa. This might be due to, on one hand, that developing countries (whose science and technology institutions are, in many cases, fragmented, uncoordinated and poorly adapted to meeting industry's needs) require new approaches and, on the other hand, the experiences of emerging economies would be more helpful for most developing countries to see how they moved from developing into the emerging economy phase. Hence, it would allow them take stock of their NSI, enable them to assess their strengths, weaknesses and opportunities and thereby promote their innovation capacity in order to benefit from globalization and reduce marginalization.

28. It is common understanding that the innovation systems in developing countries differ from developed economies in many aspects. In developed economies, the innovation system usually serves the role of maintaining or improving an already established level of competitiveness and growth, while developing countries are faced with the task of “catching-up.”²¹

29. The different objectives and circumstance have triggered some fundamental consideration on the general principles that innovation strategy of developing countries should follow. Some argue that the international market mechanisms are able to appropriately assign innovation resources efficiently to relevant actors. Others recognise that there is a critical dependency on foreign technologies and requirement to enhance the role of indigenous innovation capacities. The third view, is combination/middle-path that asserts the need to achieve the right combination of imported technologies and local innovative capacities. While the latter view may reflect the real experiences of many recently emerging economies, certainly it further increases the complexity of the real innovation process in front of developing countries.²²

30. Many studies have been conducted to define ways of adopting and integrating the concept of NSI into the economic situation of developing countries. Among them, one frequently referred to example is the concept called Systems of Innovation for Development (SID) by Charles Edquist.²³ He identified four, unique and key NSI features for developing countries, which are:

(a) Product innovation is more important than process innovations because of effect on the product structure;

(b) Incremental innovation is more important and attainable than radical ones;

(c) Absorption (diffusion) is more important than development of innovations that are new to the world;

(d) Low to medium technology sector innovation is more attainable than those relating to high technology systems.

31. At the same time, an increasing number of efforts have been made to apply the NSI approach to many developing countries in the context of development in order to systematically strengthen their innovation capacities. Some well known organizations dedicated to this area include, UNCTAD, OECD, World bank, GTZ, to name but a few.

²¹ Stephen Feinson (2003). National Innovation Systems Overview and Country Cases.

²² Edquist, C. (2001). Systems of Innovation for Development (SID). Background paper for the UNIDO World Industrial Development Report (WIDR).

²³ OECD (2010). Innovation and development agenda.

32. In UNCTAD, the Science and Technology Policy Reviews (STIPs) project has been conducted under the mandate of tenth session of UNCTAD and the United Nations Commission on Science and Technology for Development (CSTD). The main purpose of STIPs is to enable participating countries to evaluate the effectiveness of their National Science, Technology and Innovation (STI) systems in order to provide policy support to Governments when they design their science, technology and innovation (STI) systems.²⁴ The reviews have been conducted and planned in many developing countries including: Jamaica, Colombia, Uganda, Ethiopia, Iran, China, Angola, Egypt, Sierra Leone and Sri Lanka.

33. Policy recommendations to national governments are one of the outcomes from these reviews. Some typical recommendations that might be common to developing countries include:²⁵

- (a) Better linkages between universities and industry;
- (b) Establishment of science and technology parks and business incubators;
- (c) Stimulation of international technology transfer and learning;
- (d) Adoption of special measures to retain and attract young, talented scientists.

34. Recently, the OECD also initiated systematic and action-oriented studies regarding innovation systems in developing countries. In its publication on “*Innovation and the development agenda*”²⁶, it reemphasized the importance of putting innovation onto the development agenda and advocated innovation systems as an important tool for understanding how to design systems that foster and encourage innovation in developing countries. Efforts to adopt such innovation system frameworks to Sub-Saharan Africa by the OECD echoed the four key areas identified above and further indicated the importance of:

- (a) The recognition of informal organizations and institutions;
- (b) Mechanism that promote knowledge flows within and between traditional and modern knowledge system, which is often considered important in the context of technologies for adaptation;
- (c) Upgrading individual components within the system as well systematically reducing fragmentation within the nation’s innovation system.

35. Efforts have also been put forward by the World bank to support the development of NSI for developing countries as a way of promoting knowledge-based economies. It is estimated that during 1990-2003, over US\$ 4.2 billion was invested into 51 individual innovation system support projects, which include efforts to set up research and development institutions, improve enabling environments such as intellectual property rights (IPR) regimes, as well as upgrading the innovative capacities of enterprises.²⁷ Meanwhile, the Skills & Innovation Policy (SIP) program of the World Bank Institute also provides policy advice to client countries on four Knowledge Economy (KE) pillars, which include innovation systems.²⁸

36. Some other bilateral development assistance organizations also recognize the advantage of the NSI approach. For instance, recently GTZ concluded that even though different approaches, programmes and projects to facilitate innovation were conducted at different levels, these efforts often had limited impact due to a lack of systematic understanding of the innovation process. GTZ has therefore started to consider to use the concept of promoting

²⁴ <http://www.unctad.org/templates/Page.asp?intItemID=3434&lang=1>

²⁵ Science, Technology and Innovation Policy (STIP), Dr. Mongi HAMDI, <http://www.investintunisia.tn/document/293.pdf>

²⁶ OECD (2010). Innovation and development agenda.

²⁷ World bank, 2004 Innovation systems: world bank support of science and technology development

²⁸ <http://go.worldbank.org/AW9KZWJB10>

innovation systems in order to develop a coherent approach for German development cooperation.²⁹

37. To conclude, it would be worthwhile to note that the development of NSI in developing countries is certainly more complicated and challenging than in developed economies that are advanced due to the presence of pre-existing and mature infrastructure systems. In addition, the specific circumstance of developing countries vary . Therefore, there is no one-size-fits-all solution. The efforts to support developing countries to establish innovation systems must be country specific and significantly detailed.

38. Another conclusion by the OECD is that the price of policy and strategy failures usually means significant costs (both monetary and credibility) for developing countries and especially for the LDCs and therefore closer and more in-depth collaboration among relevant stakeholders and long term efforts are expected in order to help strengthen innovation capacities in these countries.

D. Elaboration of a climate friendly national systems of innovation

39. Efforts over the last decade show that innovation concerns or more specifically with regard to the NSI were already beyond the context of science and technology policies. Innovation and a functioning innovation system are considered critical driving forces to stimulate economic growth and achieve the multiple goals of development within a developing country.

40. In the meantime, the importance of innovation to address climate change is already well understood. This can be seen in a statement by the IPCC³⁰ that: “Technological change is particularly important over the long time scales characteristic of climate change. ... The importance of technological change for future GHG emission levels and hence the magnitude of possible climate change has been recognized ever since the earliest literature reviews.”

41. However, even though it recognised that full ‘national systems of innovation’ should be involved as a robust base for the development and use of technological knowledge. Seemingly it doesn’t give a specific and in-depth view on this matter in the context of climate change. This may give an indication that a systematic study of innovation to address climate change has not yet been intensively conducted.

42. In this regard, the elaboration of climate friendly NSI would be helpful to strengthen the understanding on how to systematically promote innovation to address climate change, in particular at national level, with a view to promoting endogenous development of technologies in developing countries and countries with economies in transition to address climate change. Specific questions could be addressed on elaboration of the concept of climate friendly NSI, which include but are not limited to the following:

(a) What kinds of innovations are needed to address climate change and do they have different features from other general innovations?

(b) Due to the possible different characteristics, what specific consideration (if any) should be given to mitigation and adaptation?

(c) What are the impacts of the efforts to develop NSI on innovations needed to address climate change?

(d) How to ensure the NSI could be developed and strengthened towards more environmental sound technologies and able to promote more climate friendly innovation?

²⁹ GTZ (2010). Strengthening innovation systems in the context of development cooperation.

³⁰ IPCC (2007). Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change.

How the concept of climate friendliness could be integrated into current efforts to strengthen nation systems of innovation?

(e) What can be learnt from current NSI experiences and to what extent can we draw upon these to establish climate friendly NSI?

(f) What specific circumstances and features should be considered in order to support establishment and improvement of climate friendly NSI in developing countries and countries with economies in transition?

(g) What kind of concrete measures and actions could be taken under the Convention to support the development of climate friendly NSI in developing countries?

43. Elaboration of climate friendly NSIs could fit well into the work of the EGTT or its successor, such as in areas that promote collaborative R&D and elaboration of operational modalities of the Technology Mechanism. From a NSI point of view, collaborative R&D is an important means to facilitate interaction and knowledge flows which are crucial to the improvement of innovation performance. On the other hand, as concluded by GTZ mentioned above, systematic study on climate friendly NSI would help to identify real bottle necks in the system and provide better guidance on implementation of the options to promote collaborative R&D.

44. The elaboration of climate friendly NSI would also contribute to the elaboration of the operational modalities of Technology Mechanism. As contained in the current negotiation text, there are two relevant points which are generally agreed by Parties and directly linked to work on climate friendly NSI:

(a) Firstly, development and enhanced of endogenous capacities and technologies of developing countries Parties including cooperative RD&D programmes is included as one of the activities to be supported;³¹

(b) Secondly, promoting the establishment and/or strengthening of NSI including, as appropriate, national technology innovation centres is included as one of the cooperative actions on technology.³²

45. The EGTT, or its successor, may consider seeking collaboration with a range of relevant IGOs including those mentioned above via an expert meeting or other means to initiate the elaboration of climate friendly NSI. It may also be considered useful to develop a technical paper to systematically review the concept of climate friendly NSI as a basis to guide further in-depth study of concrete options to strengthen the climate friendly NSI in all Parties and in particular to support these in developing country Parties.

³¹ FCCC/AWGLCA/2010/14. Chapter IV, para 4.(a)

³² FCCC/AWGLCA/2010/14. Chapter IV, para 14.(a)