ROLES OF THE STATE IN EMERGING PROCESS
OF INNOVATION SYSTEM

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Abstract:

The concepts of innovation were developed from studies generated from context of developed nations. The direct and mechanical application of this approach for developing countries could lead to wrong judgments. In developing countries with open economy, a type of innovation system is on emerging process where the main interactions develop between enterprises under intervention of foreign factors and limited roles of science and technology (S&T) agencies. This development should be assessed as quite natural feature for their context. The incompleteness of the system should not be taken into consideration as a weak point. Learning and scaling-up of innovations are found more important than R&D is itself. The role of the State in this process should be also re-considered. Policies should pay attention to institutions to support learning mechanisms where activities of technological promotion should be mobilized. The establishment of background for development of innovation system may be more important than segmented measures to target narrowly some beneficiaries.

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1. Innovation system

Joseph Schumpeter (1883 - 1950) is considered the first person to introduce the concepts of innovation in the modern interpretation as they are used today. The core feature of innovations is their "realisability" or "applicability". Innovations are different from research and in practice, they are not necessarily to be results of research. In many cases, innovations derive from use of existing technological knowledge in new ways.

OECD (2005) gives the definition: *Innovations are implementation of products (goods or services) which are new or considerably improved, or (implementation) of a new (technological) procedure, or a new organizational method for business activities, working organization or external relations*. There exist 4 types of innovations, namely: (i) Innovation of products, (ii) Innovation of procedures, (iii) Innovations of marketing ways, and (iv) Innovation of organizational ways. This paper is

focused on innovations of products and innovations of procedures.

For being classified as innovative, changes need to have certain level of "non-existence before" which means novelty. OECD (2005) gives three levels of novelty, namely: for enterprises, for markets and for the world. In developed nations, the novelty for markets and for enterprises is a popular notion. Chances exist, however, for the novelty for the world since each nation has its own specific features. The novelty for the world is not necessarily required to be results of R&D activities or high techs. The use of high techs in products, procedures and services may be more important than the creation of that technology itself.

In context of globalization, it is necessary to consider the question if "innovations" are "matters of" local enterprises. If an enterprise fabricates a product by order of clients, this cannot be considered as innovation of products, even in case the product is new for the enterprise. It turns out to be the innovation of products if the enterprise itself makes studies, designs and development of the product to meet requirements of clients and markets.

For the notion of "old for others but new for us", the learning and the collection of knowledge play the role more important than the creation of new knowledge from R&D does. Activities of supports for innovations have also different features. Here, activities of promotion of existing technologies, enhancement of technological learning culture, documentation and exploitation of existing technologies, and set-up of channels for effective scaling-up of knowledge are more important than R&D itself.

Differently to linear models of innovations where innovations are considered as next development step and results of R&D activities, the approach to innovations as a system is result of internal interactions between various entities governed by State-level institutions. Innovations should be based on processes of collecting and building of specific capacities, and learning of scientific knowledge and experiences. Differently to linear model based policies of enterprises which are focused on R&D activities and R&D based promotion for innovations, the innovation system based policies pay attention to streamlining and enhancing interactions between entities, developing support institutions for learning interactions, developing friendly environment for innovations and enhancing capacities of the system to respond to changes.

There exist various definitions of National Innovation System (NIS) but the most typical are the ones given by Freeman (1987), Lundvall (1992) and Nelson (1993) which are based on studies of elements of innovation systems in context of developed nations. Lundvall (1992) stated that NIS includes *"elements and interactive relations in generating and propagating new and economically useful knowledge... and they locate or root inside borders of a nation"*.

Lundvall's approach to NIS focused attentions on three groups of problems. The first group includes the main concepts of *origin of innovations*. Lundvall distinguished *learning* from *searching-exploring*. He emphasized the role of learning in innovations. The second group deals with *the nature of innovations* where he emphasized particularly the difference between *incremental innovations* and *radical innovations*. The third group is *non-market institutions* in the system.

Differently to other scholars who consider innovation systems in senses narrowly limited by studied systems, Lundvall considers innovation systems in broad senses with attentions focused on learning and competence-building. Innovations, in their majority, are not science based innovations or direct results from R&D activities but generate from DUI models (Doing, Using and Interacting). *Interaction based learning* of enterprises play central roles of innovation systems. In this broad vision, in addition to science and technology, the innovation systems include also social institutions, macro economic governance, financial systems, educational infrastructure and market conditions.

Above noted background studies of innovation systems lead to a trend to use this approach way for analysis of innovation activities in numerous countries and under various aspects. However, the concepts of innovation systems were developed from context of developed nations. The mechanical application of these concepts exhibited certain limitations, some of which might lead to wrong judgments and then to the issue of wrong policies. It is easy to see that the models of complete innovation systems which include capable entities and effective interactions on basis of full supports from market and non-market institutions have no ways to be used to "scan" the context of a developing country since this move would lead to wrong judgment that the country has no innovation systems or its innovation systems, if any, are full of shortages.

Many studies criticize this mechanical approach when indicating that the relative situation in a developing country is very far from innovations which were analysed in the above classical works. Then the governing interactions and the supporting institutions of this type of innovations in developing countries have different aspects. So it is found necessary to identify the way to build up an innovation system to fit the nature of innovations [1].

Collecting recent studies of innovations and innovation systems for developing countries Lundvall, Chaminade and Vang (2009) proposed a concept of *emerging innovation systems* as solution to identify innovation systems for developing countries. The main features of this system are described in the following part.

2. Emerging innovation systems

Taking into account the context of developing countries, Lundvall, Chaminade and Vang (2009) proposed a broader definition on NIS according to which *the national innovation system* is an open, evolutive and complex system. It includes internal relations inside an organization or between organizations, socio-economic institutions and structures, and governs the speed and orientations of innovations as well as *the competence-building process* on basis of science-based learning and *experience-based learning*.

Lundvall, Chaminade and Vang (2009) proposed the concept of emerging innovation systems where they emphasized learning, innovation acceptance, openness and international links, vocational competence-building, learning through DUI with suppliers, clients and other enterprises, roles of science knowledge and experience knowledge. The crucial element in consideration of an emerging innovation system is the viewpoint to some missed actors. The latter should not be considered as shortage but natural feature of actual development status of developing countries. The emerging innovation system may have certain basic actors such as enterprises, research organizations, universities... and some interactive structures subject to features of the economy. Some entities, institutions and links have appeared and operate but many others may be absent.

The differences between developed innovation systems and emerging innovation systems are illustrated in *Scheme 1* and *Scheme 2*.
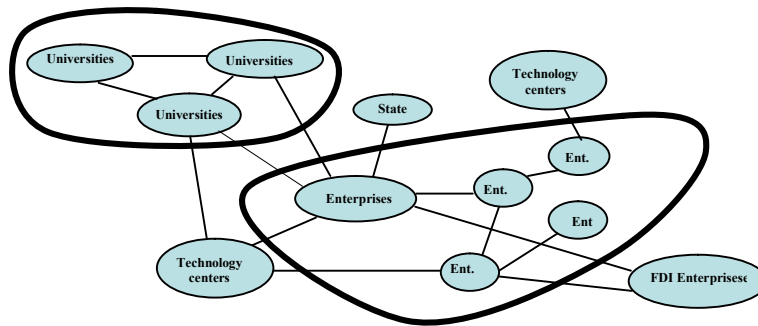
Source: Lundvall et al. 2010

Scheme 1. Illustration of developed innovation systems
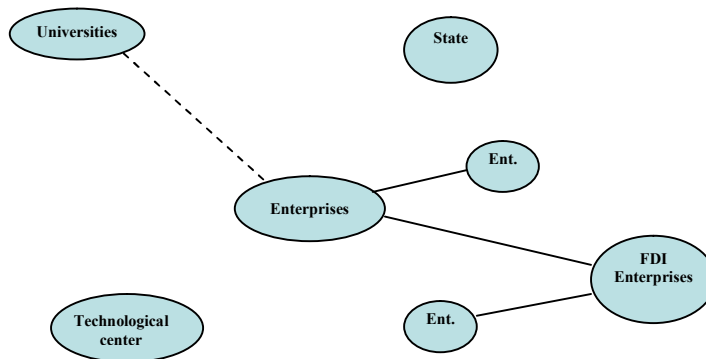
Source: Lundvall et al. 2010

Scheme 2. Illustration of emerging innovation systems

3. Features of emerging innovation systems

3.1. Incompleteness

Complete innovation systems are understood to have the full set of organizations, institutions and interactions which help to create the dynamism of the systems and to support innovation activities. Emerging innovation systems do not have such a full set but this shortage should be taken into consideration as a feature rather than a disadvantage. For example, for emerging innovation systems, links between S&T organizations are not close, loosen and even absent. Mechanical application of fully established innovation systems could lead to a largely popular

judgment that this shortage exhibits a weakness and absence of policy efforts for links. The absence of these links, however, might be an ordinary feature when particularities of production-business activities of local enterprises are taken into consideration. In many cases, interactions with equipment suppliers and clients are found to be important learning channels for enterprises but not links they develop with S&T organizations. Naturally, enterprises need supports and collaborations from S&T organizations. The ones they expect first from them are not research results in form of laboratory rised technologies or non-standard prototypes produced by these organizations, but assistances from these organizations to settle rising problems from mastering of import technologies.

3.2. Prevailing roles of interactions by enterprises

Interactions between enterprises in emerging innovation systems are the dominating type of interactions. This type of interactions, however, does not usually implement well potentials yet. High transaction costs cause certain impacts to the full exploitation of benefits from specialization. Many enterprises need to do themselves many operational procedures that they, in fact, might out-source. The broad presence of FDI enterprises makes important contributions create interactions and dynamic movement of the system. The exploitation of chances offered by FDI enterprises, however, remains subject to capacities of local entities and management models of global value chains (GVC) into which local enterprises get involved.

3.3. Openness and roles of foreign actors

Together with the involvement into GVC at different levels, emerging innovation systems in developing countries have openness and they are found under important influence from foreign actors. This can be considered as chances of learning for local enterprises and entities. These chances, however, are governed and limited by GVC management models of participation of local enterprises, their capacities and other support institutions *(Pietrobelli and Rabellotti, 2010).*

For small and medium enterprises (SMEs) in developing countries, the participation in value chains plays a dominating role to get information on types and quality of products and technologies required by world markets, as well as the ways to get access into these markets. This information,

however, needs to be combined with capacities of local enterprises for better exploitation. Learning may help local enterprises to innovate at the same segments they hold in GVC or help them to get activities of higher added values.

3.4. Research organizations and universities play assistance roles rather than innovation guiding roles

S&T organizations in developing countries usually are not positioned as technology suppliers for local enterprises. The roles of assistance of these organizations for local enterprises in learning process may fit better the practice, then it is necessary to adjust mechanisms to encourage S&T organizations to follow this orientation. Universities also have only functions to supply trained labor forces. However, in case of wrongly set-up motivation and incentive mechanisms, universities may turn out to be a machine to produce people with certificates but not really help to supply qualified labors with adequate knowledge.

3.5. Official institutions remain lacked and weak

In a developed market economy, the most important institution is markets, particularly the rules and regulations to ensure competition and competition-based selection mechanism. In developing countries, official legal regulations and rules are less built-up and, more than that, the enforcement is incredible and case-by-case based. This situation encourages enterprises to search privileged benefits and does not encourage them to do innovations.

3.6. Government makes dispersed priorities for other various objectives

Altenburg (2010) emphasized that majority of developing countries are poor and they have the poverty reduction as first priority. This leads to two problems towards innovation policies. *First*, the State limited budgets have priorities for social welfare objectives and development of infrastructure and basic services. Then the low shares of budgets remain for innovation programs and S&T activities. *Second*, the minor part of budgets destinated to support innovations needs to be focused on activities to create sustainable living background and better incomes for poor people.

Another problem is the trend that developing countries try to imitate policies of developed nations or immerging nations (particularly South

Korea, Taiwan, Singapore) in their way to make investments for advanced technologies in ambitious technological programs. Practice in developing countries show that, being provided with limited budgets, equipped with low management capacities and impacted by other basic priorities, many ambitious programs get lost and cannot achieve the initially expected objectives.

4. Roles of the State in emerging innovation systems

According to neo-classical economic theories, the main factor which makes necessary the intervention from the State is the existence of *market failures*. Every State intervention policy measure appears to be necessary and worthy for application if it satisfies the two criteria: i) it targets the rectification of certain market failures, and ii) costs for implementation of that policy are found higher the benefits it can bring in. Neo-classical economic theories see the innovations as results of R&D activities. The way to assess scientific knowledge as public goods is a kind of "market failure", then this requires the State interventions to ensure social supplies for R&D to be not lower than the optimal threshold of the whole society. Another type of "market failure" is "positive externalities" of technological innovations. The IP legal system can deal with part of this problem. Then the State interventions, such as various schemes of supporting allowances and bonuses, are necessary. The State interventions are required also due to *the uncertainty* of technological innovations and "thin market" problems. Innovations need largely technical, commercial and legal services, but, as it is observed in developing countries, service markets are too small sized which cannot be enough for market-based supply operations. In this context the State interventions are required.

In innovation system approaches, the State has a dual role, namely: an element of the system and a regulation issuing actor which designs policies to govern motivations, behaviours and interactions between elements in the system.

Here we have two visions to policy designing. *Market failure* based policies are oriented to rectify certain failure and *Innovation system approach* based policies are oriented to enhance *learning and interactions among entities* of the system then to push up smooth operation of the system. Here, *system failures* are found as obstacles to interactions and learning. The failure to make the system operate as expected is the focus of policy interventions.

The set of policy tools includes the full contents of educational, industrial, financial, commercial and regional policies. It is not a new kit of policies to replace the policies to rectify market failures but a new interpretation and a new reasoning way for policy interventions from the State side.

Being an entity in the system, the Government and policy making organizations are also part of the system with their own objectives. Therefore, policy makers need work in the system itself and this would bind them more. As actors in the system, policy makers have no way to design the system in "top-down" concepts. Policies have to be adaptive and incremental. Such policies, in many cases, are found specific for the system where they generate from, and they cannot operate effectively in other contexts.

Being equipped with objectives to push up interaction based learning, to enhance innovation activities of enterprises, to help to build capacities of entities and the whole innovation system, and to identify and to recover "system failures", WB (2010) indicated *the four roles to be taken by the State* for the NIS, namely: (i) Supporting entities who conduct innovations through incentive measures and suitable mechanism, (ii) Removing obstacles to innovative initiatives, (iii) Building responsive research structures, and (iv) Creating a progressively oriented and innovatively capable population.

In order to carry out well the above mentioned roles, it is necessary to identify the nature of the innovation system of the concerned country. In the actual context of Vietnam, the important factors are *to identify the dominating interactions which have governed the formation of the innovation system;* to explore and to untap potential chances and interactions; to indicate structure and system failures. All of these, if well adjusted, will make a kick-off for development of the whole innovation system. Also, it is necessary also to have critical visions to identify and to indicate excessive ambitions and policy deviations./.

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