Production and Innovation in Supply Platforms: Insights from the Innovation Systems and Value Chain Approaches

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Abstract This paper introduces the term ‘supply platform’ as a tentative and open-ended concept that captures characteristics of central importance for the study of export-oriented producers. As regional concentrations of export-oriented suppliers in China and India are maturing, many firms are now striving to build up innovation capabilities. How do we study the transition from production capabilities to innovation capabilities in supply platforms? This paper reviews the insights from the innovation systems and global value chain literatures and discusses how we may build on these approaches for empirical studies of transition. It is found that these literatures provide important hypotheses for empirical research but more conceptual work is needed in order to address adequately the question of interest.

Key words supply platforms; innovation systems; global value chains

1 Introduction

In recent decades a massive transfer of production competence from the developed to (some parts of) the developing world has occurred. This is the lesson from studies of a wide range of industrial sectors including textiles, electronics, and automobiles, and more recently also service sectors, notably software. This development has been has been cumulatively dependent on the rapid emergence of an increasingly mature set of suppliers in low-wage countries, not least in China and India. Hence, we now see the existence of developing country ‘supply platforms’ that cater for western lead firms in different sectors.

However, the dispersal of production capabilities from developed to developing countries contrasts with a continuing concentration of ‘innovation capabilities’ in the OECD-countries. But there are notable exceptions. In some cases local supply-platforms seem to have deepened their innovative capabilities. Some regions within China and India seem to have moved beyond production capabilities and appear to have built up a certain degree of ‘knowledge-based competitiveness’ in particular industries. For instance, according to some authors, this applies to electronics in China (most notably in the Pearl River Delta) and to software in India. But there are still few propositions and insights as regards how and how far these processes have unfolded.

An example and particular case in mind is the software supply platform in Bangalore. Software exports have risen sharply, from $2 million in 1990~1991 to a little over $8 billion in 2005~2006. The software industry in this city employs more than 250,000 people. This makes Bangalore the largest software-export platform in India and in the developing world. It is clear that firms in this city have increased software production capabilities dramatically over the last 15 years. But whether and how this maturity in production is leading to gradual transition towards an increasing share of innovative activities is an open question.

On the one hand, leading scholars have argued that innovation in Bangalore is still very limited. Elsewhere I have argued that both local and global forces have been constraining such a transition during the city’s growth phase, beginning in the 1990s. Locally the low degree of ‘collective efficiency’ in Bangalore was constraining those firms that wanted to aim for an innovation based growth-path. Globally, it seems that the particular niche that India had come to play in software was limiting. An analogy appears in the electronics industry in which the term ‘manufacturing services’ has been used to denote the complex and locally designed products, such as notebooks, in the first half of the 1990s; some firms, such as Acer, even have progressed into producing laptop computers under their own brand name.

Received 2006-09-15
1. Production capabilities are ‘knowledge using’ whereas innovation capabilities are ‘knowledge changing’ or ‘knowledge creating’.
2. The best example of such a transition may be the case of electronics producers in Taiwan (ROC), firms progressed from producing monitors and desktop PCs on a contract basis in the early 1980s to producing more
3. Hence one needs to be cautious in adopting the widespread assumption that there is always a high degree of articulation between actors in location where particular firms concentrate.
non-core character of certain suppliers’ activities. In a similar vein we may think of many of the offshore software service suppliers as more generic ‘service manufacturers’ with limited innovation capabilities.  

On the other hand, preliminary indicators from ongoing research suggest that some software firms in Bangalore are currently scaling up their innovative activities. We need to understand whether, to what extent and how the transition from production to innovation has been underway in the software supply platform Bangalore. This paper discusses in broad terms how such an endeavour can be brought forward.  

1.1 The Concept of Supply Platform  
The term ‘supply platform’ is used heuristically in this paper. It follows from two simple observations that are, nevertheless, sometimes neglected in the literature on industrial organisation and innovation in developing countries. First, certain spatial and sectoral agglomerations of firms are starkly export orientated and their global linkages may be equally or more important than their local ones. Second, these agglomerations of firms in developing countries do not necessarily resemble industrial clusters. As mentioned, the dynamics normally associated with clusters may or may not be present – but they cannot be assumed a priory (as is the sometimes done in the current literature). The important point to stress here is that the appropriate description and the type and degree of systemic dynamics should be determined empirically rather than assumed.  

Taking these observations into account, and stressing that both local and global dimensions are at the forefront, the discussion of innovation in supply platforms is placed in a challenging analytical field. For a long time, the literature on industrial organisation has been unable to break the deadlock between, on the one hand, those literatures that take as its starting point the national or local level and those concerned with ‘globalisation’ on the other. Arguably it is particularly pressing to bring these together for the analysis of supply platforms.  

1.2 Innovation Systems and Value Chains  
Acknowledging that the local and global perspectives needs to be pulled together for empirical analysis of the problem of concern, this paper draws on two different bodies of literature: that on (national) innovation systems (NIS) and that on global value chains (GVC). There is no space here to discuss the foundations and variations of these literatures here and I refer the reader elsewhere for introductions[5-6].  

Discussing these literatures in conjunction (and attempting to lay the groundwork to pull them together) seems particularly timely and relevant. First, these literatures are currently aligning in terms of research interests. For instance, the NIS approach has recently turned its attention towards developing countries and, conversely, recent GVC studies include issues of industrial development in the OECD countries[6-7]. Second, they are also aligning in terms of analytical foundations. In particular, both pay increasing attention to the role of codification of knowledge and information in inter-firm relations. However, despite these development there has been little previous cross-fertilisation between these two approaches.  

1.3 Key Questions and Outline  
The underlying question driving this paper is the following. How do we study the transition from production capabilities to innovation capabilities in supply platforms? It examines the particular insights from the innovation systems and global value chains literatures as regards the transition from production to innovation (section 2 and 3 respectively) and discusses whether these approaches are rival or complementary and how far the approaches can take us in answering the question above (sections 4 and 5).  

2 Innovation Systems and the Progression from Production to Innovation  
A central proposition in the innovation systems literature is that since interactive learning requires close contact between actors, local linkages will generally be more conducive to innovation than global ones. Hence, interactive learning is most easily developed in settings with few cultural and linguistic barriers to the transfer of knowledge and to the establishment of trust-based relationships[6,8]. The nation state often provides such a setting and this is a primary reason behind the ‘nationalism’ in much innovation systems research. Moreover, the technological specialisations of nations often differ according to local demand, that is, to the nature of ‘users’ or costumers residing within them.  

However, the unit of analysis is not always the nation. One approach has been to focus on the sub-national ‘regional’ or ‘local’ systems while another has been to focus on the systemic aspects of innovation within particular sectors[9-10]. These latter departures seem particular fruitful in order to address the issues raised here.
2.1 Innovation Systems and International Linkages

Innovation system theorists acknowledge that international forces play a role but provide few specifics. Lundvall et al. notes that the ‘the relationships between globalisation and national/local systems need to be further researched’. But, there are very limited insights deriving from this body of literature that one may use as a starting point to embark on such ‘further’ investigation. The approach does not provide clear propositions on the relationship between the local and the global, nor does it suggest any tools that one may utilise for investigating this relationship. This is problematic insofar as any tools that one may utilise for investigating this relationship. This is problematic insofar as international linkages may be important in structuring innovation patterns alongside the systemic dynamics associated with national policies and local interaction.

Some innovation system researchers concerned specifically with developing countries have paid more attention to the international dimension. In developing countries there is often a high reliance on foreign embodied technology and the importance of strong multinational companies in trade and investments is often apparent. Key authors have argued that innovation systems are moulded by their insertion into the global economy: they specialise in natural resource and labour intensive production with little (and imported) technological added value whereas innovation occurs predominantly in the West. This is an important observation. But at the same time these authors seem to fall back to a core-periphery view. This is problematic for two reasons. First, recent data suggest that there are at least three ‘layers’ in the global knowledge economy. As attractive R&D locations, India and China form an increasingly important middle. Second, these relations are not static. While acknowledging such structures, the challenge lies precisely in understanding better the factors that may allow for the transitions of interest.

2.2 Progression from Production to Innovation: Propositions

What are the key propositions with regard to developing countries’ possible progression from accumulating production capabilities to accumulating innovation capabilities? Despite the recent efforts in aiming innovation systems analysis at developing countries, there is still little (if anything) said about transition mechanisms. In particular, there are limited insights with regard to the progression from production to innovation as no clear distinction is made between these two types of capabilities.

However, Mytelka provides a useful starting point. Based on a review of firm agglomerations in developing countries she sets out with the acknowledgment that not all spatial and sector based clusters become dynamic innovation systems. To make this transformation ‘the habits and practices of actors central to the innovation process and the nature of their interaction must change’. From this point of view she identifies four sets of local preconditions – involving actors, competences and linkages – that are critical to make the transformation into innovation systems. First, knowledge institutions, such as universities and research organisations, need to be strong and their networks to productive enterprises and policymakers must be well developed. Second, productive firms must be efficient and have strong collaborative relations to suppliers and subcontractors. Third, trust-based relations between firms, policy makers and civil society must be in place. Fourth, these relationships must enable innovation system actors to solve problems and engage in long-term strategic planning.

These propositions are testable (although not in any straightforward way). They provide important reference points for empirical investigations of supply platforms and therefore they may prove helpful in taking this research agenda forward. Moreover, Mytelka’s perspective is particularly relevant because she is concerned with systems that are delineated by sectoral and regional (sub-national) boundaries as is typical of the supply platforms in the large countries such as China and India.

3 Global Value Chains and Innovation Capabilities

A key proposition in the global value chains literature is that the business prospects of exporting firms in developing countries is strongly influenced by value chain ‘governance’, that is, non-price coordination of linkages to customers. Governance forms range from purely market-based interactions over trust based (relational) linkages, to captive relationships based on power and control. The
modular value chain seems particularly important and combines a de-verticalised lead firm that focus on design and marketing with ‘turn-key’ supplier firms that manufacture for the lead firm (and other similar customers). The suppliers organise downstream processes independently and receive little or no support from customer firms. Although large amounts of information may be exchanged, the relationship between the lead firm and supplier is highly formalised, relies on general standards and interdependence is limited. This, in turn, allow for a high degree of competitive switching. This governance form is particularly dominant in the electronics sector but there is broad consensus that, the modular form appears to be playing an increasingly central role in the global economy.

3.1 Institutions and Extra-chain Linkages

Considering the objectives outlined here, the value chains model has two important problems that needs to be addressed. First institutions are exogenous to the value chains model. This is not trivial for a researcher wanting to investigate the particular circumstances that may facilitate innovation. By giving priority to inter- and intra-sectoral variations, this approach is not well equipped to analyse how the local institutional settings structure enterprise strategies and capability building. We are left in the dark when wanting to understand why some supply platforms succeed while others (in the same sector) fail. Second the approach does not capture extra-chain linkages across border, such as those associated with return migration and Diaspora networks. Such global extra-chain linkages have proven to be important, for instance, in the case of Taiwan’s (ROC) gradual progression towards more innovative activities in electronics. More attention needs to be given to the specific precondition behind successful cases of transition.

The sectoral innovation systems approach may be particularly useful for an endeavour to ‘open up’ the value chains approach which seems necessary for a better understanding of how learning (capability building) in value chains take place.

3.2 Progression from Production to Innovation: Propositions

What are the prospects of accumulating innovation capabilities through value chains? In this approach the innovation process is viewed through the lens of the types of knowledge and capabilities that is exchanged between lead firms and suppliers. The central claim is that innovation can be spurred through learning from lead firms rather than from actors in the innovation system. The key issue for global value chain scholars has been to understand how economic actors can move from low-value to relatively high value-adding activities in the chains or introduce higher value adding products. Such upgrading is thought to reflect a greater reliance on innovation capabilities as opposed to production capabilities.

The insights from the GVC literature with regard to the prospects associated with different kinds of value chain governance have been summarised elsewhere. As mentioned, modular value chain governance are becoming dominant across sectors. But it is also pertinent to focus on modular chains here because this type of chain has been associated with supply platforms catering for global markets in electronics and software. Arguably, this may be the case in platforms catering for other markets too. Two important propositions derive from the literature on modular chains: First, suppliers in modular value chains can rapidly accumulate process capabilities related to production but will be ‘de-linked’ from innovation. Second, suppliers fulfill a specialised role in larger value chains and therefore local agglomerations will be ‘open systems’. Considering the importance attributed in the innovation system literature to close local relationships, this last proposition may have important implications for the prospects of local capability building.

Again these propositions provide important reference points for empirical studies of production platforms.

4 Combining and Complimenting the Literatures

To understand the trajectories of supply platforms both the local interactions and relationships to global

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7. The central drivers of the shift towards modular value chains are improved information technologies, standards and supplier capabilities combined with the core competence strategies of lead firms.

8. Thus, although this framework is clearly influenced by the earlier work by Sturgeon it deviates from this previous work in the sense that he explicitly emphasised that modular production networks was part of historical processes of industrial transformation in which national specific models of industrial organisation co-evolve.

9. While this is true there may, in fact, also be a significant scope for innovation within each ‘stage’.

10. However, the wider framework is useful, first, because value chains as such are unlikely to take a pure form as in these theoretical descriptions and, second, because there may well be variations across suppliers even though they belong to the same sector and locality.
buyers need to be considered. Hence the approaches need to be combined for empirical analysis. The approaches are summarised and compared in Tab. 1.

These approaches are compatible by way of their shared focus on inter-firm relations and upgrading/innovation. And they are in many ways complementary too since one approach focusing on local linkages and the other focusing on global relationships. We can go a great distance by combining the value chain and innovation systems approaches but we still miss an important element. This is because both approaches are inherently relational. It reflects their strengths and contribution in bringing to the forefront the issue of inter-firm networks. But the danger is to push this agenda too far which may result in the neglect of local firms’ own change-generating capabilities, strategic intent and active efforts of learning. The relational approaches seem to have lost sight of the intra-firm dimension. Transitions in supply platforms are likely to be spearheaded by particular firms while a large base of ‘production oriented’ firms continues to dominate. We need to understand the enabling circumstances behind the pioneering firms. Therefore the literature on firm-level capability formation seems to be an important, perhaps even necessary, compliment to the literatures that have been discussed in this paper.

Although these approaches are complementary to a large extent, they still have rival overall propositions with regard to one key question: from where do firms most effectively acquire innovation capabilities? One approach emphasises local sources of learning while the other highlights global sources as the superior route to the acquisition of innovation capabilities. The merits of these arguments obviously depend on the object of analysis and may in some cases be straightforward. However, in many supply platforms this not clear cut, for instance (as mentioned earlier) this is case in the supply platform in Bangalore. Testing this hypothesis may be a way forward for empirical analysis, but more importantly studies need to acknowledge that capability building in platforms is not likely to depend on either local or global sources alone. There is a need to focus on blending of domestic and international knowledge linkages, i.e. on the co-evolution of the domestic and international sources of capability formation. Future conceptual and empirical work need to address this issue and develop hypothesis regarding how local and global knowledge interact in the process of capability formation.

### Tab.1 Global value chains and innovation systems compared

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<th>National innovation systems</th>
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<td>Networks within countries or regions (horizontal and vertical)</td>
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<tr>
<td>Dimensions of variability</td>
<td>Value chain governance: • Market • Modular • Captive • Relational • Hierarchy</td>
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<td>Acquisition of Innovation capabilities</td>
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5 Final Remarks

This paper started out by proposing that the ‘supply platform’ may be useful as an open-ended concept that captures features that are of central importance when dealing with a large group of producers in mid-income developing countries. Many of these producers are aiming at undertaking more innovative activities, hence transcending gradually from ‘production’ towards ‘innovation’, in their efforts of avoiding the race to the bottom.

The paper then briefly reviewed two influential bodies of literature, NIS and GVC, in order to extract the proposition related to the likelihood and the circumstances that may enable producers to embark on such a phase of transition. The brief review of these literatures pointed out some proposed opportunities but also emphasised immense constraints facing producers in supply platforms. It identified contestable propositions regarding the progression from production to innovation in supply platforms. It found that these literatures are largely complementary, one focusing on local relationships and the other on global in the process of capability building. Moreover, many individual weaknesses can be remedied by the combination of these approaches. But both approaches also tend to neglect the firm-internal aspects of capability building which is arguably a particularly...
important dimension when studying transition. Conceptual work needs to address how this dimension can be brought in.

Nevertheless, despite certain weaknesses, these literatures – individually and when combined – provide useful conceptual fix-points that may guide empirical work. The empirical challenge lays in bringing to light the enabling circumstances that have allowed supply platform producers to move ahead in the global economy.

References


Brief Introduction to Author(s)

LEMA Rasmus is a DPhil candidate at the Institute of Development Studies (IDS), University of Sussex. He is currently visiting scholar at the Indian Institute of Management, Bangalore.