Report by the Focus Group on:

Innovative Firm Networks

The OECD NIS-Project - Focus Group on Innovative Firm Networks

Summary

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Summary

As part of the Focus Group activities of the OECD NIS project, this report aims at summarising the main findings of the Focus Group on Innovative Firm Networks. One of the main objectives of the project is to provide a better understanding of the role of inter-organisational co-operation and industrial networks in promoting innovation.

Despite an increasing awareness of (and agreement upon) the importance of inter-firm linkages and linkages between firms and knowledge institutions in connection with product innovation, few attempts have actually been made to systematically collect empirical data mapping such relationships enabling cross-country comparisons. So far, comparative data have mainly been case study based. More comprehensive approaches to survey the collaboration of innovative firms include The Community Innovation Survey (CIS) and the PACE-survey (Policies, Appropriability and Competitiveness for European Enterprises). Undoubtedly, both surveys are providing a rich source of information about the interactions of various actors in a range of national innovation systems from the firm perspective. However, the surveys are also very broad in their scope and display inconsistencies in question phrasing and sampling as well as in the actual data collection. This in turn not only sets limits to the profundity in analysing those relationships but also impedes cross-country comparability.

Why CATI?

The dichotomy between an increasing focus on the collaborating, network-embedded firm on the one hand and the lack of systematic empirical data on how, why and with whom firms interact in product innovation on the other, has been a main impetus for the initiative of CATI-based (Computer Aided Telephone Interviewing) data gathering in connection with the OECD-theme on inter-firm co-operation. By using the CATI-approach and harmonising the method for collecting empirical data on patterns of inter-firm collaboration in product innovation, the focus group aims at generating truly internationally comparative data with the purpose of enhancing our understanding of this phenomenon in a range of participating countries.

There are at least two major differences with regard to the new data generated within this project applying the CATI-approach. *First*, the focal point with regard to collaboration in the CATI-survey is on innovation and not on R&D as in CIS[1].

[1] A second CIS survey, building on the methodological and analytical lessons learned in the first phase (1991-1993) was launched in 1997. Here, the question on R&D collaboration has been replaced with a question on innovation collaboration.

Second, in CIS the focus on the use of external information sources primarily concerns the spark to the process, whereas the CATI-data opens up the possibility for revealing with whom firms collaborate in carrying the process through. Comparisons between the Danish CIS-data and CATI-data have already revealed substantial differences due to this change in focus. Additionally, the second phase of the CATI-project might be helpful in analysing more *qualitative* aspects of firm interaction. In which ways do firms acquire knowledge? What do firms communicate between each other? Is the flow of knowledge codified in general or specific codes? How do firms "manage" their knowledge sources? Are knowledge acquirements very project specific or rather of a general character?

Status Quo

Thus far, two of the participating countries in the focus group have completed the first phase of the data collection using CATI (Austria and Denmark)[2]. Others are at different stages in the process: Spain is currently launching the survey. Australia is planning to implement the survey this summer. Norway and Sweden have confirmed participation. Finland has expressed some thoughts on incooperating some of the questions into a survey on SMEs. Italy, France and UK are willing to implement but are still awaiting clarification on funding matters. Still others are mapping firm interaction using CIS - (type) data rather than the comparative CATI-approach (Germany, Switzerland).

Needless to say, at this stage the very preliminary state of the art imposes severe limitations; both in terms of our ability to provide for a genuinely comprehensive understanding of the phenomena in question through empirical mapping and even more importantly in terms of posing unequivocal policy recommendations. In essence, the explorative nature of the work implies that policy considerations at this stage can be posed mainly in terms of trade-offs and dilemmas being more tentative and hypothetical rather than specific and recommendatory in character.

Preliminary Findings

Keeping all these limitations in mind, some general observations can be extracted.

First, the CIS-surveys as well as the first national CATI-surveys carried out in Austria and Denmark bear evidence to the fact that *firms rarely innovate alone*. In Austria 61% of the product innovating firms in the CATI-survey had collaboration with one or more partners. In Denmark, the proportion was as high as 84%. In fact, there is a clearly discernible tendency pointing to the fact that (product) innovating firms are interacting with other organisations and with a multitude rather than with a single external partner. The most central finding of DeBresson et al. (forthcoming) using CIS-data to analyse the characteristics of the innovation process, is that innovation is rarely performed by a single isolated firm. Often a whole range of necessary assets and

[2] Denmark has also just completed the second phase of the data-collection.

competencies needed in the process of innovation cannot be found internally in the firm and therefore it must co-operate with others. Accordingly, to an increasing extent, innovation is a result of the activities of co-operative systems, networks of firms and knowledge-based organisations. This general conclusion is also supported by the finding that innovative firms use a variety of external sources of information and that the most prevalent type of network is a complex one including a range of different types of actors. From these preliminary results, it can be argued that innovating firms seem to find it increasingly attractive to interact in networks and to be connected to the knowledge infrastructure and to suppliers by means other than price signals and information about quantities supplied and demanded. Innovations increasingly integrate several disparate technologies and each technology is becoming more and more dependent on a number of separate scientific disciplines. In prolongation, more and more strategic know-how and competence is developed interactively and shared within subgroups and networks. In this particular contextual setting, we therefore argue that accelerating (technological) change and fiercer knowledge-based competition seem to enforce the need for a greater ability of firms to establish flexible and learning organisations which in turn challenges the firm to innovate *especially* in terms of building new relationships both within as well as between organisations.

Second, the growing complexity of the knowledge base and the more rapid rate of (technological) change seems to make it attractive for most of the product innovating firms to establish selective relationships which are medium- to long-term. For instance, the preliminary results of the Danish CATI-data collection reveal that of the firms having collaborated with one or several partners in relation to product innovation within the last two years, only a minority were collaborating with these partners (domestic as well as international partners) for the first time. Also, the Austrian CATI-survey reveals some interesting findings on related aspects. More than 70% of the Austrian collaborating firms fully agree that trust and confidentiality is a very important basis for co-operation. However, this kind of basis has to be built ex ante before substantial resources are allocated to a common development project and as a rather logical consequence 55 % of the Austrian and 60% of the Danish product innovating firms indicate that past experience on collaboration and reputation of the partner is important or very important. The evidence of certain inertia in terms of *stability and continuity in the network formations and clusters* seems to suggest that it takes time and resources to build efficient communication channels which seemingly rest on more “soft aspects” such as culture, personal experience and mutual trust.

Third, the data referred to in the report indicates that *manufacturing firms today are increasingly interacting with knowledge-intensive service firms* which in turn implies that service firms and sectors play an increasingly important role in the innovation process. Both the preliminary CATI-data as well as CIS-type data show that roughly between 30-50% of the surveyed firms had established a co-operative link with consultancies, technological service firms etc.

Fourth, differences between domestic and international innovation relationships are fundamental for understanding the dynamics of globalisation and national systems of innovation. By investigating the patterns of collaboration, in terms of “with whom do which firms collaborate”, another central question to the debate might be highlighted

namely to which extent innovation systems are national or international respectively. Empirical data on such developments over time mapping changing configurations in this respect are still weak, but they do seem to indicate *a growing frequency of international relationships.* For instance, in both Denmark and Austria suppliers of materials and components are a frequent collaborating partner and in both countries over one third of the firms co-operate with foreign partners in this regard. The CATI-survey is an important tool enabling us to better understand which types of inter-firm relationships are domestic and which are international.

Fifth, the preliminary results also show considerable variation between national innovation systems both in terms of the extent to which firms interact with different collaboration partners and in terms of whether collaboration is pursued with domestic or international partners. In Austria, universities are a much more frequent collaborating partner (35% of the cases) than in Denmark (17% of the cases) and more often the Austrian firms are engaged in collaboration with a foreign university. Likewise, in Denmark, suppliers of equipment for producing the product rank as a much more frequent partner for collaboration (43% of the cases) than in Austria (28% of the cases), but in Austria a much larger proportion of this collaboration (22%) is with foreign partners than in Denmark (19%). At a first glance, the first results from the two countries, which have finished the first phase of the CATI data collection, point to some of the potentials inherent in this approach. It seems to be a fruitful way to reveal and compare national innovation systems not only in terms of what type of collaborating partners are the most frequent but also what type of partners and forms of co-operation (vertical, horizontal, lateral or conglomerate) are typically domestic and which are international.

Implications for policy

Are there any main general lessons for policy to be learnt from these broad findings? As already mentioned, the project is still embryonic in its nature. So far the scope of the study has been limited by time and by resources available. We still have to await the results from the surveys of a range of participating countries and it is also clear that much more can be undertaken with the data in the future than has been done so far. As a logical consequence, it is too early to point to specific policy recommendations. The following policy considerations are more hypothetical than recommendatory in their nature.

The integration<>specialisation dilemma

Firms rarely innovate alone. There is always a choice for the single firm of how to organise the production of the information and knowledge necessary to innovate. It can be produced in-house, it can be bought in a more or less anonymous market or it can be produced in an interaction with other firms and organisations. The CIS-study and the national CATI-surveys bear witness to the fact that in recent years networks have become more attractive because of the speed-up of change and the need to establish flexible and learning organisations. In this context, inter-firm co-operation can be said to often solve a paradox faced by firms in a changing environment. On the one hand, in order to become more competitive (or even to survive) firms must focus

on their specific area of competence. On the other hand, they must remain *receptive* to changes in the environment that might create new opportunities and threats. To resolve this, firms focus on their core activities while using relations with suppliers, customers, competitors and others as sources of complementary competencies when the need for them arise. Although the data show that co-operative agreements are an integral part of the innovation process, it should be stressed that co-operation itself is not cost-less. It has to be managed with a clear view of the outcome and depends very much on factors like trust and past experience as well as knowledge of the competencies of the partner.

An immediate implication of the observation is that innovation policy should not focus on the single firm in isolation but rather on its capability to interact with other organisations and on the formation of innovative networks. Another, that previous demarcations between competition and co-operation are becoming increasingly blurred. For the firms this constitutes and integration/specialisation dilemma. For innovation policy it points to the need for designing framework conditions, including competition policy, which do not inhibit the formation of networks. As pointed out by Lundvall and Borras (forthcoming) recent developments indicate, that the changes in the innovation process are at the very core of the transformation of the process of competition, and vice versa that new regimes of competition are crucial for the rate and direction of innovation. On a more general level, a scenario where inter-firm co-operation and alliances have become key elements in promoting innovation, forces us to reassert the relationship between (and constitutive elements of) innovation and competition policy. Recent initiatives on competition laws in US, Japan and Europe, more explicitly allowing for inter-firm co-operation in developing new technologies, might represent a first tentative step in this direction.

The continuity < > renewal dilemma

Stability and continuity in the network formations and clusters. The evidence of certain inertia in terms of stability and continuity in the network formations and clusters seems to suggest that it takes time and resources to build efficient communication channels which seemingly rest on more "soft aspects" such as culture, personal experience and mutual trust. This points to a dilemma for innovation policy in terms of continuity/renewal. On the one hand, certain continuity seems to be an important and necessary pre-requisite for establishing well-functioning channels and mechanisms for knowledge exchange (e.g. common codes of communication) and it is certainly easier for innovation policy to support network formations and clusters which are already well-established. On the other hand, there might be a need for policies that break up old relationships and establish new ones in order to prevent lock-in (myopia) of certain network formations. Hence, an important task for policy analysis is to apply a life-cycle perspective on industrial networks, including the possibility that some networks at some stages might hamper rather than promote innovation. More explicitly, an important element in innovation policy strategies will be to support the creation, renewal and destruction of industrial networks.

The increasing role of knowledge-intensive service firms in the innovation process. Manufacturing firms today increasingly establish co-operative links with

consultancies, technological service firms etc. At the core of the "products" of knowledge-intensive services lies specialised expert knowledge, research and development abilities, problem-solving know-how etc. (Strambach 1997). In this vein, it can be argued, that knowledge intensive services provide a diversity of specialist expertise, which (if the firms succeed in utilising this knowledge) might enhance firms abilities to adjust more rapidly to a continuously changing environment posing new threats and challenges. In prolongation, the growth of knowledge-intensive services can be said to illustrate an increasing demand for new learning and change within firms and organisations. This points to the need for an industrial policy that gives much stronger attention to networking around service firms and proactively encourages the use of these services as a way of enhancing the organisational and technological transformations of firms. Innovation policy must be alert in at least two respects. An important element of encouraging the use of knowledge-intensive services would be to build trust among potential users. As pointed out by Lundvall and Borras (forthcoming), quality control, i.e. instruments and institutions for controlling the quality of knowledge-intensive services, could be a crucial mechanism for achieving this. Another important element is to ease the *accessibility* of (especially small- and medium sized) firms to knowledge-intensive services by promoting networks and partnerships actively involving firms and specific knowledge-intensive services for the definition of strategic innovative actions.

A growing frequency of international relationships implies that policy analysis must take into account that networking is a potential source of successful innovation at *all* levels of geographical space which involves inclusion as well as exclusion. Accordingly, competitiveness of national firms will therefore reflect their capability to link up to international innovation networks. On the other hand, it is also important to keep in mind that from the first preliminary results of the CATI-survey, it has become evident that there is a considerable variation between national innovation systems both in terms of the extent to which firms interact with different collaboration partners and in terms of whether collaboration is pursued with domestic or international partners. The national system might be said to have become even more important than before in the phase of globalisation. There are important differences in the way innovation is pursued, differences which are also reflected in institutional frameworks. Therefore, any innovation policy faces the complex task of simultaneously building domestic relationships that increase the coherence of the national system while linking up domestic firms to international production and innovation networks. Taking the argument a step further, in a European context complex trade-offs between establishing local, regional, national, European and global networks might be anticipated.