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INNOVATIONS AND DEVELOPMENT

INNOVATION CO-OPERATION MODES IN HUNGARIAN CHEMICAL INDUSTRY

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Key words: Innovation, co-operation, chemical industry, innovation networks, Hungary.

Abstract: Innovation is becoming a fundamental tool of competitiveness of firms and economies. It is especially relevant in research intensive branches. Chemical industry belongs to one of the most innovative branches in Hungary. As innovation requires significant financial and knowledge resources company co-operations are crucial in carrying out a successful innovation by minimizing the costs and risks in the process. With the increasing number of collaborations the types and modes of co-operations are proliferating as well.

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Introduction

Nowadays managers should recognise the ways of adapting to the turbulent and rapidly changing global environment. Companies seek to reduce costs, create more flexible organisational designs and build competitive advantage around the core competencies of the organisations. Sustaining competitive advantage increasingly requires co-operation because a single organisation cannot execute its strategy without drawing skills and resources of other organisation (Powell, 1990). All that means that renewal of traditional organisational forms can be observed. It typically moves through three phases: vertical disaggregation, internal redesign and network formation (Miles and Snow, 1984; Quinn, 1992). Collaborative innovation agreements have a long history (Dogson et al., 1994; Freeman 1991). From 1980s a significant attention was paid on specific forms of organisations in which innovations are carried out, including strategic technology alliances (e.g. Doz and Hamel, 1997), collaborative arrangements for R&D (e.g. Fusfeld and Haklisch, 1985; Brockhoff et al., 1991), and innovation networks (Freeman, 1991; Beimans, 1992).

The definition by Seufert et al. (1999) gives a comprehensive overview about the term "networks", because it can be interpreted as relations between individuals, groups or organisations, as well as between collectives of organisations. The relationship evolving between actors can be categorised according to content (e.g. products or services, information etc.), form (e.g. duration and closeness of the relationship) and intensity (e.g. communication frequency) (Seufert et al., 1999). Typically network relations are characterised by a multiple mixture concerning form, content and intensity, for example a relationship between actors are of various forms, which may consist of diverse contents to be exchanged. Quinn (1992, p.213) characterises networks as "intelligent enterprises".

According to Easton (1992) relationships in industrial networks comprise four elements: mutual orientation between firms, dependence upon each other, bonds of various types (for example: economic, social, technological, informational and legal), investments each makes in the relationship.

According to another model of the network approach (Hakansson, 1990, p. 371), a company is defined "as an actor that uses different resources to perform its activities. It has relationships with a number of units and these relationships link the company and units together in a network structure. The relationships act as mechanisms that handle the various kinds of interdependencies generated by the activities and resources of the company being connected to and embedded in the activities and resources of the other actors".

This view of reality as exemplified by the notion that "no company is an island" (Hakansson, 1990; Hakansson and Snehota, 1989) emphasises the environment not as an external factor with opportunities and constraints (as in the contract-centered approaches), but as an extension of the firm and the firm's development is influenced by how this whole environment develops.

Hakansson (1987) sees innovation and technological development, in general as a product of an exchange among different agents. The network is made up of three classes of basic variables, namely the agents (those managing some activities or controlling some resources), the activities (divisible into two categories of transformation or transaction) and resources (physical, financial, human). These variables are interconnected.

Chesnais (1988) analyses the inter company linkages according to government involvement, technological characteristics, capital requirements and industry structures. Hagedoorn (1990) analyses firms relationships more from the R&D and innovation perspective. According to the mode of interdependence he distinguishes between joint ventures, joint R&D, technology exchange agreements, direct investments, customer-supplier relations and one-directional technology flow.

A variety of reasons are given in the literature for the growth of innovation alliances, but mainly firms enter into collaborations for innovation because they do not have internally all of the necessary resources (including knowledge) and/or because they wish to reduce the risks and costs associated with innovation (Tether, 2002). Camagni (1991) argues that the main reason of innovation networks is to attract external energies and know how. Through formalised and selective linkages with the external world local firms may attract complementary assets they need to own in the economic and technological race.

Briefly about the Hungarian chemical industry

In the last decade the profitability and efficiency indexes of the chemical industry have been improved more than the same indexes in the whole processing industry. This is indicated by the fact that from 2000 till 2003 the profitability grew from 5% to 16.4% (Szepvolgyi, 2006). According to the Technology Vision 2020 the present trends and the future is influenced by five factors (Szepvolgyi, 1999):

- globalization of the economy;
- the effort of the society to moderate the effect of chemical technologies and products;
- pressure of the financial market to increase the profitability of the chemical industry;
- boosting consumer expectations;
- increasing expectations towards the employees.

All these factors encourage innovation competitiveness within the industry (ICEG EC, 2004). Consumer expectations primarily concern the real value, quality and price of chemical products. The economical performance of chemical products/technologies and the reduction of environmental effect play also a crucial role. All these mean that chemical companies have to focus continuously on the development and innovation because by using the result of the chemical innovations the life quality of the society can be improved.

More than 60% of the people working on research and development in the processing industry is employed in the chemical industry (Szepvolgyi, 2006). Giant chemical companies have their own research and development departments and they also have intensive contact with research institutes. Chemical industry belongs to the most effective and efficient branches of the processing industry. It is characterised by enormous capital investments (both in human and financial sense) and slow returns of investments. All these features indicate that company co-operations are extremely important in this branch, especially in the field of innovation which is a very risky, costly and knowledge-intensive activity.

Empirical research on innovation co-operation in the Hungarian chemical industry

The significance of the innovation in the chemical industry encouraged me to carry out a research in which some of the typical characteristics of the Hungarian innovation activity are highlighted. As this industry is highly capital-intensive most firms can only carry out a wide-reaching innovation activity, when they co-operate with other companies so that they can share the cost, risk and knowledge. All this inspired me to examine the company collaborations in the chemical industry.

101 companies were included in my sample. The members in the sample were chosen in accordance with the suggestions of the head of the Hungarian Chemical Industry Association. His help was crucial because he knows which firms represent the best the Hungarian chemical industry.

The research was based on questionnaires and in-depth interviews. With the mean of questionnaire my aim was to highlight the focal points of innovation co-operation and with the in-depth interviews I wanted to shed light on the real motives why companies innovate and I was curious about the intentions why firms co-operate with each other.

The first part of the research questions concerned to the types of innovation. There are two basic versions of innovation, product and technological innovation. Majority of the examined firms confirmed that product innovation was carried out parallel to technological innovation. It is proved by the fact that on the average 47 innovation projects were carried out by a company within 5 years and 21 of them aimed at technological innovation. It can be assigned to the fact that if the invention was successfully tested and introduced to the market an efficient production method should be developed to ensure the economies of scale.

It was also interesting to examine the aim of the innovation. The categorisation of innovations developed by the company Booz, Allen and Hamilton (1982) was used for the analysis. People were asked to choose the most typical innovation type from the following categories that the company they are working for has carried out in the last five years:

- new to the world product/technology;
- broadening of the product/technology line;
- introduction of a new product/technology line;
- modernization of the existing product/technology;
- cost reduction;
- repositioning of the product/technology.

40% of the companies expressed that they developed new products and/or technologies for their current market, so they broadened their existing product/technology line. One third of the firms researched and developed new product/technology lines. 11% of companies repositioned their existing products and technologies. Only 6% of the firms developed and launched brand new products/technologies to the market which was new to the world. 8 companies focused mainly on cost reduction during their innovation activities. 5 companies dealt mainly with modernisation.

I used Hagedoorn's model (1990) as a basis of my study to investigate the innovation co-operation forms, but I did some modifications (Figure 1). Hagedoorn (1990) analysed the co-operation modes from the point of view of organisational interdependence. I broadened the perspective as I investigated company co-operations both in terms of the degree of control and the degree of interdependence. On the other hand I added one more category to Hagedoorn's model because from the aspect of the chemical industry it is crucial to analyse not only joint R&D but also joint innovation as well. The difference between these two categories is that the first concerns only the research and development process, the second one includes also activities in connection with the market launch.

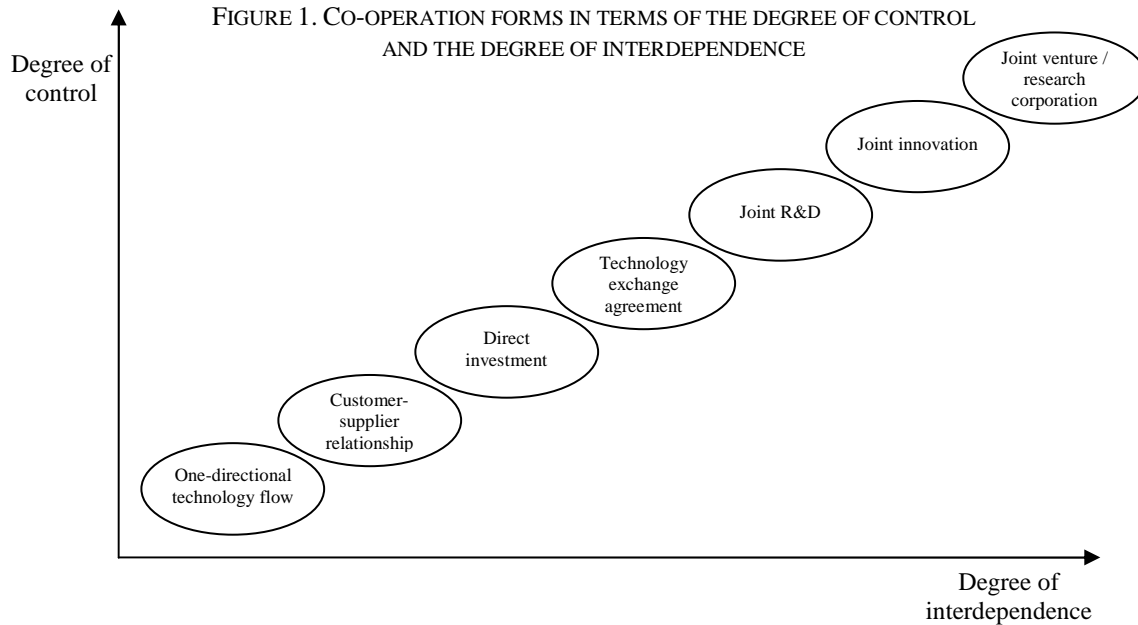
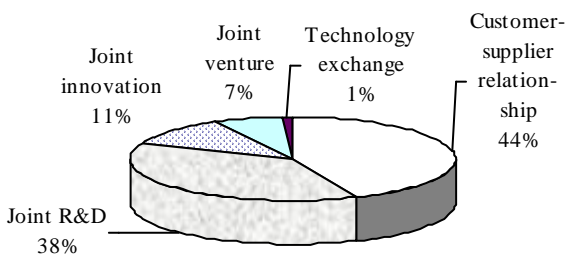


Figure 2 indicates that nearly half (44%) of the companies have customer-supplier relationships with their innovation partners. This is also supported by the fact that 54 per cent of the sample expressed that the main innovation partners their clients are. All this suggests that in the chemical industry intentional innovations are carried out specifically to meet the clients' needs and wants. Joint R&D was also significant innovation co-operation form (38%). 11% of the firms carried out joint innovation. All this indicates to us that firms co-operate only for a specific phase of innovation, not for the whole innovation process. This points out that companies prefer a lower degree of control and interdependence during the innovation process. Joint ventures and technology exchange agreements are not typical co-operations forms among Hungarian chemical companies (5% and 1%, respectively).

FIGURE 2. INNOVATION CO-OPERATION FORMS IN HUNGARIAN CHEMICAL INDUSTRY



A remarkable growth of innovation co-operations is predicted by the fact that majority of the companies perceived that co-operation contributed to the increase of their technological competitiveness. They also experienced an improvement in the R&D efficiency and the image of the company.

Conclusion

Summarising all it can be stated that innovation, the efficient and effective transformation of new ideas into marketable products, services or technologies, has become a decisive factor for survival in the competitive structure and proved a key concept for the present socio-economic development (Hubner, 1986). Innovation is increasingly seen as best conducted in networks and understood through a synthesis of evolutionary economic and sociological perspectives (McLoughlin et al., 2001). The benefit of joint innovation is based on pooling of complementary (financial, knowledge etc.) resources provided by different partners. Especially in case of chemical industry - as one of the most capital and knowledge intensive branches - co-operation highly influences the successfulness of the whole innovation process.

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