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THE ROLE OF KNOWLEDGE NETWORKS IN THE INNOVATION ABILITY OF THE HUNGARIAN AGRICULTURAL MACHINERY MANUFACTURERS

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Summary: innovation is a basic condition of the competitiveness. The advantage of the innovation could be enforced only, if the new products and technologies are supported by suitable marketing and strategic abilities. The conclusions of our paper are based on the examination results of questionnaires and in-depth interviews that were carried out at 58 Hungarian agricultural machinery manufacturing companies. The characteristic features of the companies that were involved in the examination reflect the situation of the entire sector in Hungary properly. In our paper, we present the knowledge networks activity of the Hungarian agricultural machinery manufacturers in the innovation process efficiency.

Keywords: innovation, marketing, knowledge networks, key factors of innovations.

1. Introduction and objectives

The success of the innovation is decided on the market, therefore it is important that the product development how it is prepared and followed by market research and marketing. It is possible that the earlier phases deficiency can be corrected by marketing activity, but it can also happen that the previous good results can be destroyed by a wrong market activity. Therefore, the harmonization of agro-technological innovation processes is essential.

The technical advantage of the innovation can only be realized if adequate marketing skills can support and complement the new products and technologies.

The innovation processes have been described by the first linear models that product ideas are born, based on these new product is planned, produced, and sold. However, it is more effective when the process starts out from the market needs, the new products are planned, manufactured based on these, and during the selling process the satisfaction of the needs is controlled. Nowadays it is essential that the marketing has to link all the processes, including the innovation, too.

The task of the innovation marketing is not just selling the novelty, but to acquaint the expectations of the relevant stakeholders and with this to help for the management to increase the support of the strategy by satisfying the market demands on a reasonable and legitimate way, and on the other hand, to promote the acceptance (diffusion) of planned and implemented results of the innovations as well.

Strategy in the competitive market is such a guideline of corporate function that defines the long-term goals and the system of means and methods that are necessary to reach them. Strategic planning plays an important role at all types of companies especially in the case of the innovative ones as it is they who dare to enter an uncertain area in its technical and economic sense due to their special activities (Edquist, 1997). A thoroughly planned conscious strategy is the basis for creating innovations and operating an innovative organisation. Innovation strategy has to derive from and serve corporate strategy. The main point of innovation strategy is how the company can reach the market starting from research and development via product/service/technology production in the easiest way (Husti, 1999). An effective innovation strategy is implemented in a simple, concentrated way to a small

extent so at the beginning scarce resources (funds, labour) are used and simultaneously, the way out is also considered.

Our research objectives are summarised in the points below:

1. Preparing and improving a questionnaire and a method of examination that can be used to collect primary data on the innovation activities of agricultural machinery manufacturers.
2. Preparing a thorough picture of the present situation and performance of agricultural machinery innovations as well as the direction of developments on the basis of the empiric research and methodology.
3. What is the cooperation activity of enterprises like, what are the characteristics of their social network and how can they affect innovation activities?

2. Material and method

Basically our research is based on primary research within the framework of which a questionnaire was compiled. When drafting the questions the results of our secondary research data on this industry were considered and also the 2005 edition of 'Oslo Handbook' was consulted that formulates OECD guidelines for collecting and interpreting technological innovation data. According to the general methodological requirements some pilot interviews were made a first and afterwards the questionnaire was finalised on the basis of our experience.

In Hungary more than 150 enterprises deal with producing agricultural machinery and machine parts. Experts estimate that the number of companies engaged in agricultural machinery production as the main profile is approximately forty. The contact addresses of all the enterprises necessary for the questionnaire were gained through MEGOSZ (National Association of Agricultural Machinery Manufacturers). The multi-channel approach was used when recording the data of the research whose main points are the following:

- 15 machine manufacturers were interviewed personally;
- Questionnaires were sent to 25 organisations by post asking them to send it back after filling in the questionnaire.
- The electronic version of our questionnaire was sent to organisations that were incorporated in the MEGOSZ database. Altogether 18 questionnaires were returned.

The same questionnaire was used in all three approaches so figures can be compared. Fifty eight organisations supplied data in the examination. An approach based on proportion estimate was selected to ensure the reliability and accuracy of the research. The accuracy level of the entire sample is $\pm 7,7$ per cent points with fixed 95 per cent reliability on the basis of the statistical calculations that were carried out. However, a positive feature is that mainly the senior management (chief executive officer, production or technical manager) provided the data. As a result, hands-on information was gained about the general situation, current plans and strategic way of thinking of the organisations concerned.

3. Results – The innovation knowledge networks of agricultural machinery manufacturers

According to our survey almost 87 percent of the companies concerned in research-development cooperation have already taken part in a form, which can be regarded a fairly good proportion.

Results show that for those who have never taken part in cooperation (although their proportion is slight, 6,9 %) the number of successful innovations is low. In this aspect the most active ones are who have always incorporated a partner in their innovation processes. A decisive part of the sample, i.e. 79 percent occasionally participate in co-operations. In this

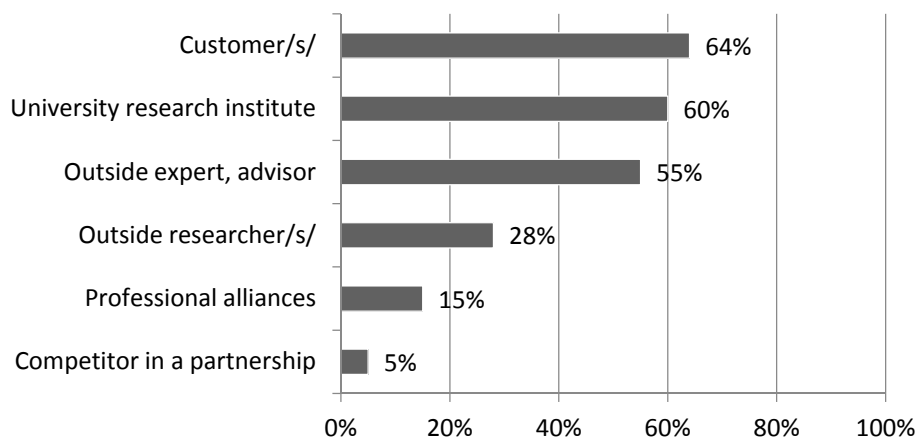
case a significant difference can also be noticed as the ratio of the active ones is approximately 70 percent. There is a significant correlation between product, process innovation and R&D cooperation and the strength is the correlation is close to satisfactory.

Table 1: Correlations between R&D co-operations and product- and process innovations

The proportion of R&D cooperation (%)	Product inn.(%)		Total %	Procedure inn. (%)		Total %
	No	Yes		No	Yes	
Never	75,0	25,0	13,8	100,0	0,0	13,8
Sometimes	34,8	65,2	79,3	30,4	69,6	79,3
Always	12,5	87,5	6,9	0,0	100,0	6,9
Total (%)	34,5	65,5	100,0	31,0	69,0	100,0
n (item)			58			58
Significance			0,016			0,008
Cramer V			0,377			0,406

The extent of R&D activity (Figure 1) reflects the most decisive directions of knowledge flow. These results illustrate the demand-driven nature of innovations in the agricultural machinery sector. Companies are trying to cooperate closely with their customers in order to know their needs. Sixty percent of the sample examined has already taken part in a common research-development project with a university research institute.

Figure 1: The proportion of R&D cooperation agreements of agricultural machinery manufacturing companies (Relative frequency, more than one answer could have been given)

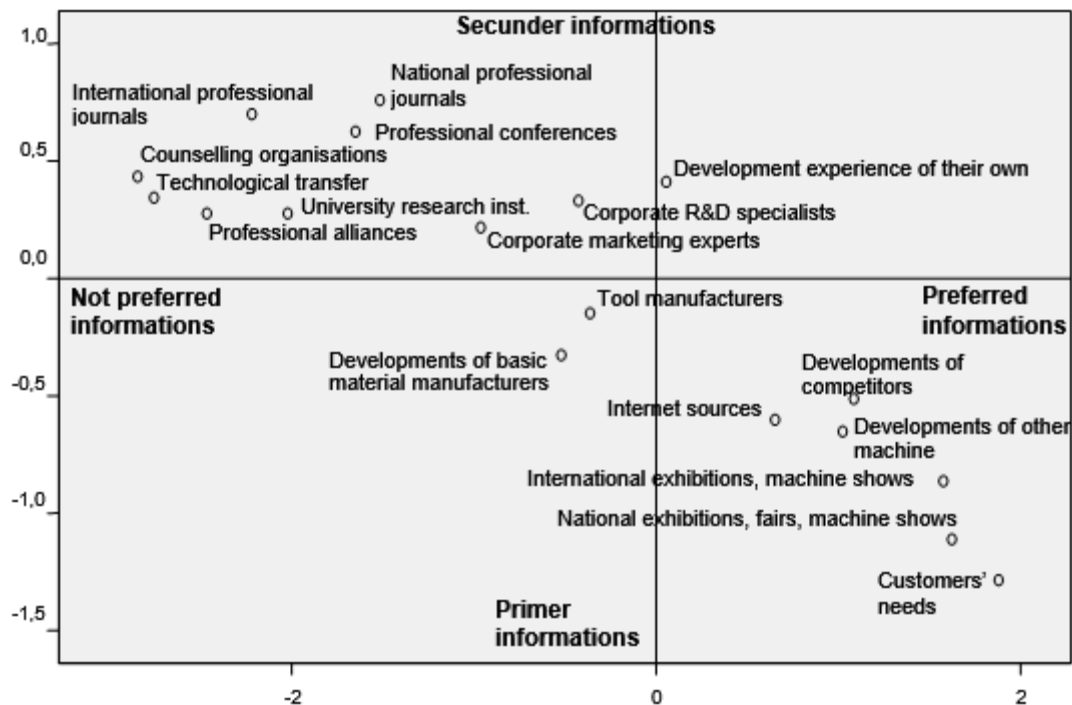


In order to get to know the typical groups and alliances the information managing habits of enterprises were also considered in the multidimensional scaling. The fitting of the model is good (RSQ = 0,95413) and the quality of solution can also be regarded good (Stress = 0,09959). When analysing the MDS map of information managing habits (Figure 2) we can find the typical groups that were described alongside two dimensions. The first dimension is the preferred-not preferred information on the horizontal axis while information (primary/secondary) is included on the vertical axis.

Typical groups:

- *Preferred primary information:* customers' needs, national and international machine exhibitions, and a further preferred source is the information of competitors and other machine manufacturers.
- *Slightly preferred information:* development experience of tool manufacturers, basic material manufacturers and of their own, information deriving from corporate R&D specialists and marketing experts.
- *Less preferred secondary information:* The use of national and international professional literature can be described as a less preferred secondary source. Another less preferred group is the one of counselling, technological transfer organisations and professional alliances.

Figure 2: MDS map showing the information managing habits of enterprises



On the basis of the cross table and Chi-square analyses a positive connection can be observed between the two variables, i.e. different co-operations promote the innovation activities of agricultural machinery manufacturers in Hungary. According to the examination on the use of information sources we can state that of the information for their innovation activities enterprises prefer market like information sources most such as their customers and different professional exhibitions.

4. Conclusions and suggestions

We stated that of the information used for innovation activity the national agricultural machinery manufacturers mostly prefer primary like sources. With the help of a multidimensional map information managing habits connected to innovation activities were divided into three groups along two dimensions: preferred primary like, slightly preferred and less preferred secondary information. We proved that for the Hungarian agricultural machinery manufacturers there is a positive significant correlation of medium strength between innovation activity and cooperation. Our further examinations explored that in

innovation cooperation it is typically the customers and university research institutes who are the preferred partners.

Manufacturers must show a greater interest in exploring and applying the new knowledge accumulated outside their organisational boundaries. In order to keep pace with market and technological changes as well as integrate new scientific results cooperation with professional alliances and specialist universities must be prioritised in their innovation processes. We would also highlight the role of strategic behaviour in the success of innovation processes. The management has to make decisions on investment and development on the basis of a strategic approach in line with systematic innovation objectives.

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