

THE CHARACTERISTICS OF THE INNOVATION ACTIVITY OF THE HUNGARIAN AGRICULTURAL MACHINERY MANUFACTURERS

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Abstract

The current production of the Hungarian agricultural machinery manufacturing sector, which used to see better days, lags behind the production of the previous years to a great extent. The organisational structure of the Hungarian agricultural machinery production has totally been transformed, primarily regarding its ownership structure. The general problem of this sector is that they can only spend slight amounts on development an innovation relative to foreign-owned concerns. As a consequence, loss of market is not surprising as a bit more than one-quarter (26-27 percent) of the current total domestic market turnover derives from domestic manufacturers. The extent of market loss and the general situation of the national agricultural machinery manufacturers justify that the present of this sector must be dealt with by searching the ways-out of the crisis and make steps to develop. Our study reveals some of the results of longer research work. To help finding the way-out of the present crisis the success factors of the innovation activities of the domestic agricultural machinery manufacturers are presented and the factors that hinder innovation are also classified.

Keywords

innovation, agro-technical development, key factors of innovations

Introduction

It is an empirical fact that besides the financial constraints, other problems also prevent the national technical innovations from being successfully developed. In Hungary the total expenditure on research and development reached 299.5 billion HUF in 2009, which was 1.14 percent of GDP (= GERD indicator). It means a 12.3 percent growth relative to the previous year at current prices (Statistikai Tükör, 2010). The share of the state of the GDP-related R&D expenditure is 0.42 percent of the total sum (state-owned research institutes and those in higher education altogether) while the expenditure of the business sector amounts to 0.58 percent of GDP. This proportion has been improving relative to the previous ones or, rather, approaches the international practice. However, approximately 60 percent of the R&D expenditure of the national business sector is realised by exclusively foreign-owned enterprises or those which are mostly in foreign hands (KSH (Central Statistical Office), 2007). In most of the developed countries the national companies spend more of their revenues on R&D expenditure than the foreign-owned ones. The high-level concentration of corporate R&D can also be observed: almost half of the expenditure derives from 17 big companies. The share of those employing fewer than 20 employees is only 12.6 percent. Unfortunately, in the sector of the national small-and medium-sized enterprises not only research and development but also the number of licenses and know-how purchase is slight, so the demand (pull) side of innovation is weak under the present system of conditions. All this is justified by the following facts:

- 72-74 percent of the segment is **inactive** regarding innovation or simply struggle to survive.
- 22-23 percent belongs to those **catching-up**, i.e. they show some initiatives in innovation that could prevail in the standard of their products and services by means of technological transfer, information and advisory institutions.
- Only 3-6 percent of companies make up the group of **promising** innovative companies (Losoncz, 2008).

According to our experience the above-mentioned facts can also hold true for **agro-technical** innovations more or less. Before the change of the regime only 27 agricultural machinery plants operated mostly "embedded" in the system of the national "agri-business". Due to this fact (among others), 60 percent of the requirements for agricultural machinery in the country were covered by these plants at a more advanced standard than the average of the former Comecon countries. During the past 15-20 years the organisational structure of the Hungarian agricultural machinery production **has totally been transformed**. Generally, the machine manufacturers operating as small-or medium-sized enterprises appear on the market with "separate" products usually not developed by themselves. Consequently, they are not price-setters, rather price takers. The product line of the companies that are successful in the international competition primarily consists of mass-produced and highly automated products. The national agricultural machinery manufacturers-partly due to their size- are not able to mass-produce in such an extent that they could compete with the West-European, American and Asian companies of huge capital power either in productivity, price or product range. A drastic innovation wave could mean a break out of this situation. Regarding **innovation**, the national agricultural machinery manufacturers also significantly lag behind as they can only spend slight amounts on development relative to foreign-owned concerns. As a consequence, loss of market is not surprising as a bit more than one-quarter (26-27 percent) of the current total domestic market turnover comes from domestic manufacturers.

In the first part of our paper the method of the empirical research is presented where the structure of the questionnaire used in the research and the process of data record are shown in details. Furthermore, of the results of the research based univariate descriptive statistics those of the success and hindering factors of corporate innovation activity are published afterwards.

Methods

Our examinations are mainly based on primary research. When formulating the research objectives, we relied on the theoretical conclusions drawn from the related specialist literature, earlier professional publications, empirical research results as well as our own professional experience. The basic objective of the research is to explore and analyse the innovation activity of the national agricultural machinery manufacturers, its results and influencing factors. Finally our objective is to have a picture of the innovation activity of the organisations involved, the special features of innovations, the partners taking part in the processes and the impact of innovation on the general situation of the companies through our examinations. Besides the brand-new or significantly developed products and technological procedure innovations, organisational features, marketing activity and the environment of the innovation are also considered. The questionnaire serving as the basis of primary research embraces three years, from 2007 to 2009. According to the estimations of experts the number of agricultural machinery manufacturing companies is between 160 and 170 in Hungary. (A great part of the enterprises are involved in more than one activity: a lot of predominantly small enterprises are also engaged in other

activities besides machinery production so that is why it is difficult to define the actual number of 'agricultural machinery manufacturers' exactly). Most of the organisations that are subject to our analysis are small enterprises whose annual revenue does not reach one billion HUF. As there was not an available list on all the companies on the basis of which a pattern of probability could have been compiled, the companies that could be drawn into the research had to be defined in another way. To find the companies necessary for carrying out the questionnaire, the address list of MEGOSZ (National Association of Agricultural Machinery Manufacturers) served as a basis and the heads of this professional organisation were also consulted. In the data recording phase of the research a multi-channel approach was applied whose main points are:

- 15 machine manufacturers (hopefully the most significant companies of the sector) were questioned at personal in-depth interviews;
- 20 organisations were provided with a questionnaire sent by post requiring them to send back the material filled in;
- 9 of the 25 organisations were part of on-the spot discussion either because of the difficulties they faced while filling in the questionnaire (3 cases) or because the interpretation of the responses required further information (6 organisations).

Sample-taking cannot be regarded **representative**. However, during the research it was not our objective to draw conclusions that can be generalised for the basic population. Our basic objective was to give a thorough examination of innovation activity and to achieve it, we tried to select the organisations regarded to be suitable on the basis of preliminary professional considerations. As such a thorough examination dealing with the innovation activity of agricultural machinery manufacturers was not carried out in the past 25 years on a national level, we consider our research is **to resolve discrepancies in the professional field**.

In compliance with the general methodological requirements first of all some pilot questions were asked on the basis of which the questionnaire was finalised. Data recording took place between March 2010 and September 2010. The duration of in-depth interviews was various, typically 90-100 minutes per

interview. A positive feature of them was that data providers mainly come from the senior management (chief executive officer, head of production or technical manager). In this way first-hand information on the general situation, actual projects and strategic plans of the organisation involved was gained besides the reliability of data. The atmosphere of the interviews was typically of honesty and intimacy. Some of our interviewees have already expressed their enquiry in our results. The questionnaires compiled on the basis of the interviews and sent out **by post** were also accompanied by a guide to filling in. A kind of evaluation of our preliminary work is that all the responding organisations gave answers that could be assessed. The statistical processing of data recorded by the questionnaires was carried out by using **SPSS 13.0** programme.

Results

a) Factors that hinder innovation

When examining the results (**Figure 1**) it is not surprising that most of all it is **the high cost of innovation** (3.42) that prevents Hungarian agricultural machinery manufacturing companies from their innovation activities like in the case of other companies in West Europe and other sectors of industry. Controlling innovation costs is rather problematic due to the uncertainties of the different sub-processes and their parts as unexpected costs can incur very frequently. **Lack of state and project funds** (3.08) is another significant hindering factor. However, our EU accession opened ways to innovation development sources but due to financing difficulties (slight share of own capital, credit regarded to be risky) only few agricultural machinery producers gain access to EU development funds. The **separation of financial funds within the company** (3.08) is a problem tightly linked to the previous one. A frequently made excuse is that the available funds are needed for other purposes so due to the necessity of ensuring everyday living uncertain developments are often sacrificed. High risk (2.81), taxation and its legal regulation (2.77) and the weakness of protecting intellectual property rights (2.28) are also seen as further obstacles.

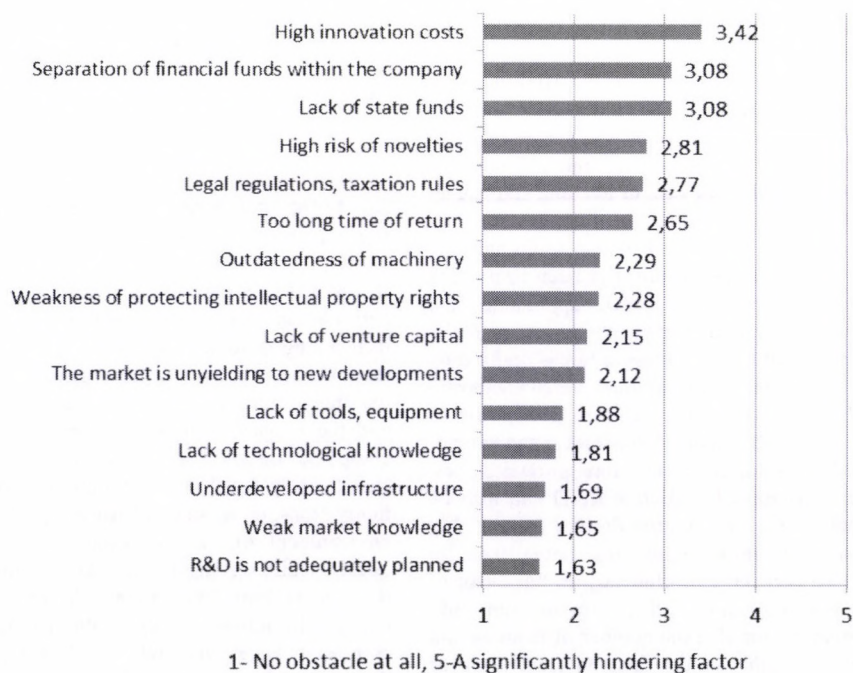


Figure 1. Factors that hinder corporate innovation (Source: own compilation)

(When looking at the gained results it can be discerned that the respondents ranked the impact of even the strongest hindering factor to be approximately 3.5. This can be due to the special nature of the scale and the questionnaire as a statement with a negative content had to be evaluated.)

We also examined the **human factors** within the hindering factors of spreading innovation separately (Figure 2). The results

are obvious as the factors in connection with lack of professionals and training are among the five most significant hindering ones. Unanimously the responding chief executives lack of professionals and training are among the five most significant hindering ones. Unanimously the responding chief executives lack „good vocational staff” most typically for welding, CNC operator, mechanic and cutting positions.



Figure 2. Human factors that hinder corporate innovation (Source: own compilation)

As far as graduates are concerned, there is a more intense need for traditional agricultural mechanics with language knowledge and production technician. The absence of technical professionals can **go back to several reasons**: the pulling power of other sectors regarding labour force is a problem and, furthermore, the small and medium sized agricultural machinery manufacturers cannot compete with the wages offered by the multinationals. As a further unfavourable process it was also mentioned that for the young it still was not too appealing to find placement at an agricultural machinery manufacturer in the countryside so labour supply often cannot be provided. Our findings also reflect that **according to the chief executives the motivation of their subordinates does not hinder** innovation processes. Interviews highlight that there was no resistance experienced among the employees (including the vocational staff of workshops), what is more, they are interested in a novelty, new developments and at several places new ideas are rewarded. **The managerial approach against novelties** (1.2) was ranked the lowest of the different hindering factors. It is important to note as the literature on innovation management regards the support of the senior management as one of the key criteria of successful innovation, which, in more details, means making the necessary resources available, risk taking, creation of an atmosphere that supports creativity and an adequate system of incentives, monitoring the development process and participating in decision making at the key points most of all.

b) The success factors of innovation

In our questionnaire **the criteria of the success of innovation** were also analysed (Figure 3). An answer was sought to the question what factors the companies regard as the most essential

ones for their successful innovation activities. Unanimously participation in **professional exhibitions** (4.32) was selected as the most significant success factor of implementing innovation. There can be two reasons why exhibitions are appreciated. On the one hand, the companies and their management can obtain first hand information on the developments of their competitors and the current market trends and it is also regarded as the primary means of marketing activities by the manufacturers as there is an opportunity of getting acquainted with new types, developments, different product and machinery (test) demonstrations in a concentrated form close to the potential customers, on the other hand. The ability of a quick technological reaction (3.93) was also regarded essential by the manufacturers in the innovation competition. The companies that are willing to take quick steps can closely monitor consumers' needs and can also overtake their competitors. Also, the ability of quickly rectifying a decision made possibly badly is important. To this end, the company must continuously monitor the newest technological solutions and the results of their competitors.

The **further professional training** of employees was ranked relatively high (3.75) among the key factors of innovation. According to our experience a great part of the national agricultural machinery manufacturers does not have strategic plans and ideas on human resources management in its classical sense. The gained results stress that the managers realised that they were somehow forced as the development of products and technologies also requires the necessity of training the engineers who develop and run them together with the vocational staff. That is why the above mentioned visits to professional exhibitions and fairs are a must together with exchanging professional points of view and organising further trainings for the employees. In some

areas of vital importance such as product development, modern CAD technology and its application, optimising material content and TQM, regular updating and broadening knowledge is essential. At least organising the further trainings for SME managers and leaders is of similar importance. Courses, meetings and forums that shape attitudes, approaches and prepare the managers for managing innovation processes can help the creation of an atmosphere at work and a corporate culture that favour innovation. In the case of a small or medium sized enterprise the corporate culture must be adequate to retain the valuable employees and run efficiently as besides salary, corporate atmosphere, employee relations and those with the head of other companies are also decisive for the employee. The creation of common innovation projects **with universities and other research institutes** (3.04) came last in the system of success factors but, of course, satisfactory did not mean degradation. The weak flow of knowledge between university and corporate spheres is not only the problem of this sector, e.g. European paradox, which is not a comfort in this concrete situation. The problem is quite complex and several research was conducted in it. In our paper only the problems of the sector are highlighted. Although technology transfer offices operate at main universities whose task would be to establish and maintain contacts with companies and assist professors in creating corporate contacts but mostly their typical activities embrace keeping an eye on national and international project applications and preparing the applications of the employees of the university.

It must also be noted that often the motivations of universities and those of the companies are in a conflict. The interest of the company is profit making in the short and medium run and strengthening competitiveness in the medium and long run. Further points are subordinated to these guiding principles in cooperation most of the time. The short and medium run motivations of the research institutes are mostly directed at including additional financing sources, solving a scientific problem or accomplishing the compulsory publication tasks. Universities, which themselves cope with quality capacity problems due to the increase of teachers' assignments and mainly outdated laboratory equipment, conduct their external research commissioned by a big corporation. (It is also general that part of the funds deriving from it is spent on financing „daily” operation instead of spending on research projects.) The **partnership between the competitors and development cooperations** is underranked in the sector (2.54). There are no forms of cooperation or partnerships; usually there are no agreements on cooperation, consortia and networks between the companies. In our opinion there are **still significant reserves** in this area. The partnership of companies provides further opportunities for the small and medium sized enterprises as participants to reduce their expenditure on certain areas such as technological investment, common procurement, developing foreign market relations (leaflets, advertisements, participation in exhibitions) joint marketing activity etc. besides sharing knowledge and technology transfer.



Figure 3. The success factors of innovation and R&D activity (Source: own compilation)

Conclusion

The characteristic features of the companies that were involved in the examination reflect the Hungarian conditions properly. Innovation is the key factor in catching up as it is the engine of developments. During the examination of innovation processes special attention must be paid to the market factors that especially help or hinder innovation activities. The exploration, identification and combatting these factors are primarily the tasks of the manager and our paper wishes to make a little contribution to their work.

The following must, by all means, be highlighted of the success and hindering factors of innovation explored during our analysis:

- **The high costs of innovation**, lack of financial funds within the company and the unfavourable system of state and project funds are such determining factors that can significantly limit the innovation scope of the national agricultural machinery manufacturers.
- Our examination justified the problem according to which the most acute problem of the sector is **lack of vocational employees**. Downsizing that can be experienced in the past 20

years makes it extremely difficult for the competitive agro-technical supporting industry to be established in the long run. It is obvious that the development and operation of the complicated agricultural mechanisms and technical subsystems is not viable without skilled staff. New expectations are formulated for the employees in accordance with the altered situation of small and medium sized enterprises. The single work phases require basics from several other scientific branches and besides biology and chemistry, economics, technical-technological and managerial skills are also essential. As far as the lack of vocational training is concerned, vocational schools such as educational institutions at different levels and even adult training institutions are given some tasks. Technical innovation is typically such a professional area where the halving time of knowledge is quick so there will always be a need for such training schools that impart updated and competitive knowledge.

- According to most respondents markedly one of the main bases of the **successful** innovation activity is visiting professional **exhibitions**. Manufacturers realised that machine exhibitions and fairs nowadays played the role of a complex marketing

tool. They are a channel of communication through which the buyer and the seller can meet in time and space. These events can be regarded as a media surface for the manufacturers that helps companies with communication. The companies as an exhibitor can target certain groups of potential customers with their message. Moreover, they can also present their technical solutions at different machinery presentations and tests. At the same time, keeping an eye on the competitors and getting acquainted with the clients' opinion are a good way of orientation to innovation.

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