

Transition of the Hungarian Research System, Public and Private

Koty Lapid

ABSTRACT

This paper discusses three strategies that helped in the transition of the Hungarian research system. The strategies that helped in transforming what used to be an isolated research system were: privatization, restructuring and formation of new institutions, i.e. the formation of spin-off firms.

A SHORT HISTORY OF THE MACRO-ECONOMIC CLIMATE AND THE RESEARCH SYSTEMS

After the first free elections in 1990, there was a sharp decline in Hungary's GDP. This was accompanied by loss of markets and institutional reorganization which led to the disappearance of more than 50% of the previous R&D institutions. An official science and technology policy was devised during 1993. The government formulated general aims for encouraging links between technology and economic development. The main objectives of government policy involved institutional changes: renewal of the legal framework, including methods of financing R&D, and restructuring the ownership of institutes (Mosonyine, 1993).

Hungary was one of the countries under the influence of the Soviet Union and, therefore, its economy was centrally planned. Within this framework, education belonged to the universities and research to the Hungarian Academy of Sciences (HAS). HAS was founded in 1825 and it was run to pursue basic research in discipline-based research institutes. One such research institute belonging to HAS is The Research Institute for Technical Physics (MFKI). It has five departments with a staff of 24, among them ten scientists. As in the past, their contracts today come from HAS (60%) and from the government (40%), with hardly any from industry.

The Central Research Institute for Physics

(KFKI), founded in 1950, is one of the HAS's five scientific institutions and it has undergone some restructuring accompanied by a certain amount of privatization. It consists of five independent departments with a central administration and management. Its activities involve applied research, mainly in material science and laser technology. Part of the Institute's activities after 1989 were transferred to limited liability companies. More than ten such companies were founded by an 'innovation holding' company, that remained Institute property. The small firms were set up by obtaining capital from the Institution. Buildings and capital were not transferred to the firms but rented from the Institution by the new start up companies.

Industrial research, which included applied research, design, experimental development and testing for the manufacturing industries etc., was the task of sectoral institutes. Their research was carried out on a contract basis, and most of this work came from the State. The supervisors of these institutes were mostly the respective ministries. Those institutes supervised by firms were operated quite independently from the firms' activities.

Contacts between research institutes and companies were good when the given industry was Western market oriented. To gain access to Western markets, firms in the tobacco industry improved their cigarettes with the help of the Hungarian Tobacco Research Institution in Debrecen. The newly developed cigarettes which were lighter with a lower tar content and similar to the Western brands did not succeed in the West but did gain an important market share in Hungary.

The Hungarian Tobacco Research Institution had an excellent research relationship with the Hungarian tobacco companies, and helped them to develop many successful products prior the privatization of the Hungarian tobacco companies. When these companies were privatized by Western multi-national companies, HTRI lost its

contracts from the Hungarian tobacco companies. The Hungarian Tobacco Research Institution was itself privatized and works as an independent legal entity, existing mostly on government contracts that involve the improvement of tobacco plants (Lapid, 1996).

The separation of research institute activity from firms was almost stopped after the free elections, regarding firms which supervised their own research activities. Tungstram, the Hungarian light bulb manufacturer, restructured its entire organization, which included the reorganization of its research department to a team-based entity which was product focused.

The restructuring process included not just the research institutes themselves but also the restructuring of industry, which allowed the emergence of the service sector. Hungarian heavy industry was given resource allocation priority during the previous thirty year period. As in other similar socialist countries, Hungary relied on heavy industry. In this sector, the main pattern was mass production. Like other countries in Eastern Europe prior to 1989, Hungary had chosen to push mass production to its logical limit: many basic goods were produced entirely by one single factory.

Hungary has a large budget deficit and, to reduce it, severe restrictions have been implemented. Despite the restrictions, some industrial restructuring programs commenced where first priority was given to the service industries to forge ahead. Service industries under the socialist system were viewed as a non-productive sector. The percentage of employees in commerce, goods shipment and other non-material services in the Hungarian GDP in 1989 was 47%. Today it is 64%, which is important not just for providing a better service for the population, but also from the point of view of the correct functioning of a modern economy.

Technical and structural changes have started in industry. At first, those companies unable to switch from the Commission of Mutual Economic Assistance market (COMECON – the socialist countries' trade organization) to the Western market were forced out of the picture. For instance, in the Czech Republic, the output of the metal industry and the traditional machine industry have shrunk by 45% and 55% respectively during recent years. In Hungary, while the total industry output dropped by 30%, the metal industry and the traditional machine industry declined by 41% and 45% respectively. There was no real government plan to restructure the economy and,

thus, few industries were created. At the macro level, conformity was mainly passive – the government wanted to lower the state deficit by paying back debts, while no incentives were given to modernize old steel companies, for instance.

Very few multinational companies were prepared to invest in Hungary and, thus, only a few new industry sectors were created. One of these is the auto industry, and today there is Opel Hungary in Szentgotthard, Audi in Győr, Magyar Suzuki in Esztergom, and Ford in Szekesfehervar.

A SHORT HISTORY OF THE MICRO-ECONOMIC CLIMATE

Hungarian economists explain Hungary's success in making structural changes through micro-economics. At the individual company level, some changes took place with a number of individual companies undergoing some modernization. However, this never a large scale process including whole sectors of industry. These structural changes involved the installation of new technology, such as computerized machine tools and assembly lines, mainly into the Greenfield investments. Hungarian labor costs are a fraction of those in Western Europe, and the skilled and motivated Hungarian work force is well known, a factor that is taken into account by foreign companies considering investing in Hungary.

In 1990, exports from Hungary to Eastern Europe declined by thirty percent. The following year witnessed a smaller decline of nineteen per cent. This shows that many firms were able to predict the decline of the Eastern markets in their previous form. In fact, just one year after the collapse of COMECON, the shrinking market hardly affected those firms which already had some kind of cooperative agreement or licensing, or both, with Western countries. These firms were able to change the scope of their own markets within a relatively short period. What validates this statement is the amount of exports destined for Western Europe. In 1995, Hungary exported 64.7% (US\$ 4.2 billion) of its entire export to Western Europe.

TRANSFORMATION OF COMPANIES' PRODUCT RESEARCH STRATEGIES

The research strategies of Hungarian firms changed after the free elections as a result of

the changes in ownership structures of the companies. Ownership restructuring was based on government initiatives, top-down strategies, and private attempts as bottom-up initiatives.

Different types of privatization programs in Hungary have resulted in the emergence of different ownership types in companies. Those companies purchased by Western multinational companies devised a research strategy that aligned with the parent company's overall research concept. Thus, there have been changes in the research strategies of those Hungarian companies purchased by Western multinational companies. The top managers of some of these Hungarian companies, together with their multinational company headquarters, started to devise long-term research strategies that were planned and carried out at the Hungarian firms. A good example of this is GE-Lighting Europe-Tungsrham.

The joining together of the operations of production and marketing with the formerly separated research activities within the framework of the long-term research strategies in GE-Lighting Europe-Tungsrham, has been a great success. Prior to 1989, the Hungarian Tungsrham was divided into functional departments only, where every department had its own well defined task in carrying out mass production. This was a suitable concept for the company before the disintegration of the COMECON market. To foster better research activities, the company reorganized its functionally isolated units and regrouped into product lines. The organizational restructuring, together with the devising of a long-term research strategy has enabled the company to introduce new products to the market within a very short time. The company's energy-saving, double tube lighting products were developed within two years (1988-1990). The four tube product was developed in less than one year (1989-1990). Variants of these with shorter and longer tube types and of various wattages were developed one after the other within six to nine months. This means that over 60 new products could be introduced to the market by the Hungarian company every year.

As a result of the communist research strategy system that separated research institutions from firms prior to 1989, there were cases where the industrial research institution was very weakly supervised by the companies belonging to a given industry. That was the case with the Hungarian tobacco industry, where four tobacco factories with development departments had shared one basic and applied research institution. Al-

though the tobacco factories' links with the research institution were very good and had resulted in many new and improved products, the research institution's research operations were painfully slow. This did not suit the research strategies of those companies which had purchased Hungarian tobacco factories during the privatization process. After privatization, the development departments of all Hungarian tobacco companies' were shut down, leaving the Hungarian companies to obtain the results of their parent companies' research carried out outside Hungary.

In cases where former managers became the owners of the companies, long-term research strategies were also adopted. An example of this is Graboplast. After the collapse of the COMECON market in 1990, Graboplast Ltd., a hi-tech plastics and textiles company, was privatized by its own management and sustained tremendous losses. One of the main objectives of the company was to begin selling to the Western European market. To satisfy the market, the company had to devise a research strategy that could work in a market dominated by many cultures and tremendous fashion trends. This research strategy included the restructuring of the company to carry out research faster and more within the company. Prior to 1989, although Graboplast's research division was working with government funding it was supervised by the company. Though their research activities were self-supervised, they still carried out their work separate from the company's product and marketing department. Thus, the departments were working in isolation and all conflicts had to be handled at a level high in the company hierarchy.

The reorganization of the company included many drastic steps but eventually allowed the company to carry out research projects that led to the creation of a wide variety of products within a very short time. Product departments were either replaced by 'core business profit centers' or dispersed and turned into independent legal entities. Head offices changed their role from 'command centers' to 'service providers' for the operating companies and as 'auditors' for the shareholders. The development department and the product preparation department whose efforts were vital for the quality of the final products, were also transformed into 'service providers'.

The development department employed a two-stage policy. First came the establishment of 'core service providers' whose task was to maintain the company's level of expertise. This core unit contained the people who carry out basic and ap-

plied research suited to the company's core technology. Then the company decided on several product families, and their development was put into the hands of teams. Team coordinators exchanged information in frequent formal meetings to avoid overlapping in research effort. In the restructured organization, the contact between the earlier separated entities became much closer.

In state-owned or partly state-owned companies, research strategies were rather short-sighted because of the owners' uncertainty whether to keep the company or not. A state-owned company, prior to 1989, was in a good market position if it had well developed connections with banks and the authorities. If an organization remained partly state-owned after 1989, it could still play according to the old rules to a certain degree and, thereby, assure itself more economic advantages than privately owned organizations. However, because of the limited resources in Hungary, some constraints were placed on the partly state-owned companies as well.

Ikarus, Hungary's leading bus manufacturing company, has remained state-owned. Very few models were produced by this company prior to 1989, and most of them were intended for the Soviet market. Ikarus had been primarily focusing on design, assembly and marketing functions. All other needs were subcontracted out. Ikarus' main strength had been its design capacity, enabling it to design a bus using whatever items were available on the market. The benefit of this approach was that the company did not have to use a purpose-built 'Ikarus' engine. With little adaptation work, the company could use the engine of any manufacturer in its buses. Thus, buses could be designed with interchangeable components allowing competitive pricing. Over the years, modern assembly line technologies were developed in cooperation with West German tooling companies. Western technology was incorporated into the engine, as well as many other components produced by Raba, one of Ikarus' Hungarian subcontractors, under license from West German MAN. Some parts (such as front axles) were imported from the former Soviet Union. As a result, buses became the leading item by value in Hungary's exports to the former Soviet Union, the former DDR, Poland and the Czech Republic.

However, because of its price structure, Ikarus could only assemble a narrow range of models which was quite inadequate for the fragmented and highly differentiated Western require-

ments. After the collapse of the COMECON market, the company needed to penetrate the Western market. To make this shift, the company had to restructure and modernize its development department. The restructuring process was unsuccessful; some changes were made, but all of them were in the sphere of short-term problem solving.

Even after restructuring, the company is still designing its products manually. Blueprints are drafted on heavy drawing paper instead of formulating the design on computer. An other serious problem in the development department was weak control of the design process. The company had no knowledge whether those parts incorporated into its design actually were available. The source of this problem was that with the collapse of the COMECON market, many of the old suppliers ceased to exist. The company did not have on-line access to a components pool or to parts in the world market. What little information was available was not disseminated throughout the design department.

Thus, at the beginning of the 1990s, the component database had to be revised. This problem was solved by designing a more comprehensive and easily revisable components catalog which was partly computerized to allow short search times. This reduced the large amount of time that had hitherto been wasted. The company also improved other functions by developing rudimentary control manuals, supplier quality controls, and design delivery time controls. The new design control procedures allowed faster selection of new suppliers. Furthermore, they increased the responsibility of new suppliers to meet the higher standards on product consistency. Once this was achieved, the company lost interest in long-term design control procedures.

Researchers in industrial research institutions after 1989 took advantage of the new opportunity to set up firms. This was a kind of bottom-up activity of utilizing tacit and non-tacit personal knowledge on the part of the employees. The main motivation to launch a spin-off firm were low salary and the industrial research firm restructuring process whereby employees were made redundant. An example of this is Graphisof that was founded by two software engineers previously working at one of the government research institutes. The company develops and markets advanced architectural Computer Aided Design (CAD) software for use on personal computers under both Apple-Macintosh and Microsoft Windows operating systems. The CAD program is

based on sophisticated knowledge of mathematics.

TRANSFORMATION OF COMPANIES' PRODUCTION RESEARCH STRATEGIES

Most of the literature in economics deals with the transition of the research system and focuses on product research. I started this paper with the transformation of product research strategies as the main element of the transition of the Hungarian research system. However, in the course of the work I could see that those firms that survived the transition period, even if not involved in product research, were to some degree involved in production research or in an other company's production research adaptation.

In the process of devising a science and technology policy, the Hungarian government directed most of its energies to R&D efforts. But it is evident that by failing to modernize production processes, Hungarian firms have become increasingly unable to match the cost and quality level of Western-made products. One of the Technology Audits invited by the Hungarians in 1995 found that in a given technology, the processing and finishing of surfaces is of particular interest to many Hungarian companies. The Audit recommended that the Hungarian Science and Technology policy makers should focus on these process technologies helping the equipment industry to improve quality.

After having been purchased by GE, one of the main concerns of Tungshram, the Hungarian light bulb manufacturer, in devising long-term research strategies was to change the production system to facilitate the production of a wide variety of low cost products. This aim was achieved by developing a flexible manufacturing machine that was embedded in a flexible manufacturing method.

The new flexible production tool and the flexible production process were developed by an integrated development method that allowed production engineers to work together with product development engineers. This was no easy task, because previously the two departments were officially separated. During the development process, great emphasis was placed on coordinating the activities of the two departments. Another problem stemmed from that fact that at the time the company started to develop its flexible manufacturing systems, communications in Hungary were very bad.

Billing Peter, GE-Lighting-Europe-Tungshram development manager, described his experience in that environment: "When we started this project we chose 10–15 people among the machine developers and the product developers. These people spent a great deal of time together every week. Together they developed the pilot product, and learned together which type of production technology was necessary for producing the new product. This was a very interactive process. In no way was it similar to the classical process where one unit developed a product, then another would develop a suitable production method for the product developed, then the machinery and only then finally was the whole process run together. The Americans were also members of the development team. Sometimes they lived in Budapest, but most of the time communications were by fax, video-conferencing and E-mail. This type of communication was unimaginable some years ago. In 1989, when we wanted to talk to Nagykanizsa (city in Hungary), we had to place our order early in the morning for an 'intercity' call from the Hungarian Post Office. We paid ten times the regular price because of our desire for an express service. We were finally connected at 14:00 that day. With this kind of communications it is impossible to conduct the type of development that is being undertaken now. Today, I just push a button on my phone and the next moment I can talk to anybody, anywhere I want to."

Several companies that were purchased by multinationals did not have the ability to invest in the modernization of their production facilities or to take an active part in developing new production systems. They needed the parent company's capital to invest, and others to develop the new production facilities. But although the parent company invested in new production facilities, the Hungarian company had to introduce the new facilities and integrate them into their existing production system. Hungarian tobacco factories were suffering from severe deterioration of production plants due to the lack of long-term investment. To modernize production facilities, heavy investment was required. All of the multinational companies, British-American-Tobacco (B.A.T.), Reemtsma, Philip Morris and R.J. Reynolds, who purchased Hungarian tobacco factories, invested large amounts into the modernization of the Hungarian tobacco companies. This investment was integrated into their production systems by the Hungarian factories and allowed the Hungarian companies stay in the market.

The modernization process in the Pecs tobacco factory (purchased by B.A.T.) exemplifies how much Western multinationals had to invest into the Hungarian companies' production facilities. To stay in the Hungarian market, B.A.T. had to invest more than 25 million forints to cover the purchasing of tobacco leaf processing machines, a new line of cigarette manufacturing, and a new packaging machine.

Where former managers became owners of companies, the companies had no resources to invest in new modern production technology. Graboplast had to build up a new flexible manufacturing unit by itself with the help of its own production managers and engineers. The flexible manufacturing unit allowed more efficient production of the smaller quantities that Graboplast needed to get a foothold in the Western market.

Ikarus, the partly state-owned bus manufacturing company, also built up a flexible assembly unit in order to produce custom-made buses. When the flexible assembly unit was first operated, the company used a cross-functional team to coordinate the tasks of the flexible assembly unit, design, and marketing. However, Ikarus could not integrate the new flexible assembly unit into its own production system, because there were many problems with coordination, and eventually Ikarus moved the flexible assembly unit out of Ikarus' original production site. A dedicated team separated from Ikarus' main operation, became responsible of the flexible assembly unit in the new site.

CONCLUSION

Until the late 1980s, the Hungarian shortage economy had an aversion to rapid technological innovation. This policy was supported by long production runs that led to highly hierarchic enterprises, where R&D functions were specialized and organizationally separated.

In Hungary, education belonged to the universities and basic research to the Hungarian Academy of Science. Industrial research was the task of sectoral institutes. Their research was conducted on a contract basis, where the State was an important contractor. The founders and supervisors of these institutes were usually the relevant ministries. Some institutes were, however, supervised by firms, but still run separately from the relevant firms. This separation started to change prior to 1989, and gained speed after the free

elections. Both the basic and the industrial research systems underwent structural and functional revision.

On the industry side, due to different types of privatization programs, different ownership types of companies emerged in the first half of the 1990s in Hungary. Different ownerships devised different research strategies according to the owner's vision. In the companies purchased by Western multinationals, research uses long-term strategies. A good example of this is GE-Lighting Europe-Tungstam. In cases where former managers became owners of companies, research also employs long-term strategies. An example of this is Graboplast. Spin-off companies' research strategies range from short to medium. In this paper, we discussed Graphisoft as an example of a company of this type.

The other forms of ownership in our study are state-owned and partly state-owned companies. Here, because of the owners' uncertainty whether to keep the company or not, the companies' research strategies have been rather short-sighted.

The strategy devised for organizational restructuring to promote faster research and development was found different in different Hungarian companies, and it depended on the type of ownership. Those companies purchased by Western multinationals were restructured to the point where they eventually could adopt the parent company's research strategy. The state-owned or partly state-owned companies' restructuring remained on a small scale, just to allow the companies to implement short term research strategies.

By introducing new production technologies, Hungarian companies have been able to launch highly customized products, necessary to get their foot in the Western market. The research showed that flexible production methods are a very important factor in a company's successful transition.

REFERENCES

- Unless otherwise attributed, all material in direct quotations in the paper is from interviews conducted by the author.
- Lapid, K., (1996) 'The Tobacco Industry During The Transition Period'. *Ipari Szemle*, 96/3., pp. 16-17.
- Mosonyine, Fried Judit., (1993) 'The role of Hungarian scientist and foreign experts in evaluation of institutes', In: OMFb conference on evaluation the research.