



UNIVERSITY OF DEBRECEN



# **Organizational and institutional innovation and enterprise clusters as sources of competitiveness**

**Edited by:**

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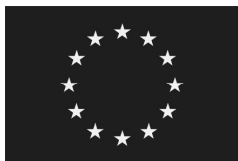
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## Preface

In our rapidly changing world, at the beginning of the 21st century, economic players have to face new challenges. Traditional tools and methods are not enough to cope with difficulties in today's fierce competitive environment. We have to find answers for continuous, and sometimes accelerated environmental and internal changes. The economic crisis of the past few years, which has shaken the entire world, focuses attention on the search for new solutions. Probably the only competitive advantage in today's world is organizational learning, faster and more effective knowledge sharing, and the search for and development of creative, innovative solutions. This process can be identified not only in manufacturing companies, but also in the service sector or in the form of innovative organizational solutions. In addition to developments in practice, academic research has developed new approaches, which seek to uncover the source of competitiveness.

In the framework of the TAMOP-4.2.2/B-10/1-2010-0024 project, won by the University of Debrecen in 2011 (the project's title is: Supporting academic training workshops at the University of Debrecen) the Doctoral School of Economics conducted original research in the field of learning organizations, organizational innovations, innovations in higher education, and innovative regional co-operation. Previous research by the professors of the doctoral school in these three topics provided a good basis to build on, and by involving students, case studies were prepared. This activity also contributed to the careers of current graduate school students. Notes were developed using these materials, to serve as basis for an independent PhD course.

The volume is divided into three parts. In the foreword of the first chapter Csaba Makó emphasises the importance of Knowledge Intensive Business Services (KIBS) and

organizational innovations. He also provides a probable solution to create a typology of organizations working in this area. After the foreword six service sector organizations' innovative activity is presented in the form of case studies.

The second chapter, together with István Polónyi's introduction, analyses the economic integration and innovation performance of higher education. Case studies from the Budapest University of Technology and the University of Debrecen, Department of Bioengineering show specific examples of this.

Finally, in the third section Miklós Szanyi writes about the connection between industrial clusters and regional development, as well as about the relationship between clusters and innovation. The case studies involving the Hungarian Pólus Program and the Pharmapolis Innovation and Food Cluster demonstrate the current situation in Hungary in this field.

We wish to thank the staff of the organizations concerned who accepted the PhD students of Graduate School of Economics students and, through their active involvement, helped them in preparing the case studies.

Mária Ujhelyi



## **Chapter 1.**

# **Organizational Innovations in the Service Sector**

# **Csaba Makó – Miklós Illéssy- Péter Csizmadia: Some Preliminary Remark on the Organizational Case Studies carried out in the Service Sector**

In the case studies to be presented later in this chapter, we analyse the implementation process of a workplace innovation in six different service firms. The aim of this introduction is to present the general context in which the importance of both KIBS and organisational innovation can be understood. Firstly, we intend to analyse the growing importance of the service economy, as measured by its share in employment, economic outputs and productivity growth. The main driver of this global phenomenon will also be presented. Then, we go further by proposing a possible typology of firms operating in this sector. The typology elaborated by Salter and Tether (2006) seems to be particularly useful for the aims of our analysis. Following a short review of the literature on KIBS, we will highlight the most important characteristics of organisational innovations by presenting the definition laid down in the Oslo Manual. Finally we will summarise the most important findings of the organizational case studies according to types of services (e.g. “systems firm”, “knowledge intensive business service (KIBS).)

## ***1. A historic shift in the economic structure: the growing importance of the service economy***

Since the last decades of the 20th Century, we have witnessed an unprecedented growth of the service sector at the expense of manufacturing and agriculture. In this context, some scholars are labelling this change a ‘service sector revolution’ (Chesbrough – Shphrer, 2006). In a rather simplistic way, the wealth of nations can be attributed to agriculture two centuries ago, to manufacturing a century ago, and now to the service sector, which produces 70-80 % of GDP in developed economies. In contrast, the service sector’s share of GDP in developing countries is 52%, and in the Central and Eastern European Post-Socialist countries it ranges from 58.4% to 62.9%. Another noticeable feature of these changes is the rather different development dynamics in the manufacturing and the service sectors. For example, in the UK, between 1998 and 2004, the KIBS sector experienced a 23.6% productivity growth accompanying a 20.2 % increase in employment. On the other hand, a

28.8% productivity growth and a 22.8 % employment decline were reported in the manufacturing sector (Sako, 2006: 500).

With regard to the unbundling of corporate functions relative to support activities in a firm's infrastructure and administration, globalization of the service sector is a rather new phenomenon driven by the following factors:

(1) *Globalization of the labour market or the Great Doubling* in the international labour market. Unlike in 1989, when the figure was 1.48 billion, now 2.93 people are competing and intensifying wage competition around the globe (Freeman, 2005).

(2) *General use* (due to radical cost reduction) of *ICT* in company practices has accelerated the delocalization (outsourcing/off shoring) not only of the 'primary activities' (e.g., production) in the global value chain (GVC) but also the 'support activities' in the administrative functions (Gospel – Sako, 2008: 2-4).

(3) In the emerging markets, the social and economic actors (governments) are looking for new development strategies (a new path of economic development) aimed at improving their position in GVC in supplying higher-value-added products and services. With the help of this new policy orientation, the CEE countries, including Hungary, intend to get rid of the situation of "locking (...) into economic activities with low-value-added/productivity growth and, thus, undermining future sustainable growth." (Kattel – Reinert – Suurnal, 2009: 2).

(4) The rapid development of 'modularization' or 'networking' via various types of organizational and managerial innovations in global corporations is continuing. This process is driven by both the cost-reduction and the restructuring of the firms (e.g., the focus on the core competences in both the 'primary' and the 'support' activities).<sup>1</sup>

Radical changes in the nature of the global labour market are regarded as a key factor for the great speed of the internationalization of services. As a result of the participation of China, India, and former Soviet-bloc countries in the global labour market, today, 2.93 billion people are in competition, while only 1.46 billion workers were active in the global labour market before these historical changes. Richard B. Freeman (2005) labelled this enormous shift in the global labour market a 'great doubling' with a far-reaching impact on labour in both the developed and developing economies. Before the collapse of the state-socialist

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<sup>1</sup> According to Sako (2009a), in the 'modular corporation,' the labor process in practically every large corporate department can be delocalized (either by outsourcing or offshoring) and driven both by cost- and knowledge efficiencies, using 'using new locations with a talent pool' (p. 4).

political-economic system and before the end of their economic isolation, the workforce in the countries noted above (e.g., India) rarely competed directly with those in the developed countries. One of the most important impacts of this historical change on the global labour market is increased wage competition, not only in the low-level blue-collar jobs in the manufacturing sector but also in the best- and worst-paid white-collar jobs, too. Contrary to widespread public belief, these developing (or emerging) economies are increasing their highly skilled labour force relatively rapidly with the future aspiration to improve their present position in the GVC of both manufacturing and services. In this regard, it is important to stress the following: even before the global financial and economic crisis of 2008, China launched various initiatives to increase the share of high-value-added products in total exports and made remarkable progress in R&D (e.g., nanotechnology; more than 750 MNCs created R&D capacity). In addition, by 2010, the number of Chinese PhD students in engineering and natural sciences will outstrip that of similar categories in the U.S.A. Finally, it is noteworthy that, besides China, Indonesia and Brazil had also doubled the number of university graduates between 1980 and 1990.

In relation to future employment trends in the European Union, employment growth will recover gradually in the foreseeable future. There is some good news concerning employment development. According to Cedefop (2011:1-2), the most comprehensive employment forecast, "... there will be job openings for all types of occupations ... most new jobs, projected to be around 8.5 million, will be in knowledge- and skill intensive occupations ... These changes signal a risk of job polarization, with increased demand at the upper and lower ends of occupations, and decreases or stagnation in the middle."

Global competition driven by such elements as the search for cost-efficiency and knowledge efficiency, and enabled by the tools of ICT and modularization (or networking) of business organizations are resulting in the acceleration of the delocalization (outsourcing/off shoring) of services. The dramatic decline in telecommunication costs, the decreasing importance of physical distance (the 'death of distance'), and the extensive use of ICT assist in the geographical redistribution of data storage and processing (e.g., outsourcing the data processing activities of accounting and wage departments, medical diagnosis, and logistical activities). ICT facilitates the standardization of services. This is the process of 'productizing services' in the service sector. However, the infiltration of servicing is also evident in the manufacturing sector. For example, among such globally well-known manufacturers as the American IBM or the German Siemens, the fastest growing share of their turnover is generated from service activities. This process is often called 'servicing products.'

In spite of the fact that the service sector covers a greater variety of activities than manufacturing, at the beginning of the 21<sup>st</sup> century only 10% of the service sector is involved in international trade, while this proportion is over 50% in the case of manufacturing (UNCTAD, 2004: 97). The smaller share of the service sector in international trade may be explained by the special characteristics of its products. In the majority of cases, it is difficult to store a significant proportion of the service sector's product(s) due to the fact that the production and consumption of services take place simultaneously. This feature of the service sector results in weak tradability; therefore, despite the heavy reliance on the use of ICT, services represented only 1.8 billion USD in traded value, in contrast to the 7.4 billion USD share of the manufacturing sector (WTO, 2005). Despite these difficulties, the share of Foreign Direct Investments (FDI) in service activities increased in the last decades of the 20th century. For example, in the 1970s, the sector represented only 25% of the total inward FDI; by 2002, this share had increased to 60% (UNCTAD, 2004). The role of FDI is especially important in the field of business services (e.g., in such sub-sectors as transportation, telecommunications, real estate, catering, and hotels).

Governments in the emerging markets are designing new development (modernization) strategies aimed at moving up on the GVC and shifting from the 'low-skill' to the 'high-skill' equilibrium growth model in the Central and Eastern European Countries (CEE) countries. The following table accurately illustrates the possible steps involved in moving up in the GVC in the field of business service activities.

**Table 1. Moving the value chain of business services**

IT Services ->	BPO->	KPO
IT infrastructure Software applications development Hosting Data entry and conversion	Call centres Horizontal back-office processes (e.g., payroll administration, accounts payable) Vertical business process (e.g., claims handling in insurance)	Research & Development Engineering design Data analytics and data mining Advanced processes in legal, medical, biotechnical, and pharmaceutical sectors

Source: Sako, 2009b: 17.

Note: BPO= Business Process Outsourcing, KPO= Knowledge Process Outsourcing

It is quite probable that in spite of the temptation to 'economic nationalism' affecting some countries, the radical changes in the global labour market and the impact of the global financial and economic crisis (2008) may result in only a temporary slowdown and stronger competition and not a reversal of the trend of delocalization of business services. In this context, the organizational innovations and the knowledge development practice in the KIBS firms are playing a key role in improving the competitiveness of the firm by moving up the GVC of business services.

## **2. *The heterogeneous character of services and innovation***

Characterizing the service activities in general, Korczynski (2002) (cited by Flecker-Holtgrewe-Schönauer-Dunkel-Meil, 2008: 103) identifies the following basic features of services:

- 'intangibility' – the product of service work is not, or is only partly, of a tangible nature,
- 'perishability' – the product is 'temporary' and, thus, cannot be stored,
- 'variability' – the product is not homogeneous, for it can vary according to the individuals involved (for instance, through the perception of the services on the part of a customer),
- 'simultaneous production and consumption' – the product is produced and consumed in one and the same situation ('uno-actu' principle),
- 'inseparability' – the product is produced by both a service provider and a receiver (co-production).

Due to the great variety in the form and content of services, it is extremely difficult to identify and assess innovations in the field of service activities. To overcome the problems related with the heterogeneity of the service sector, Salter and Tether (2006: 9-17), instead of using a universally accepted definition of a service, made a distinction among the following main clusters of services:

- Traditional services
- Systems firms
- Knowledge-intensive business service (KIBS) firms

## 2.1 Traditional services

According to Selter and Tether (2006: 9 -11), these types of services ‘... occupy the ‘top and bottom’ of the knowledge economy – the best and the worst jobs in services, and the growth of services, has been characterised by growing inequalities in advanced economies ... Because of their nature, many services ... are provided locally. This local-provisions to serve local-needs has arguably led to a form of low-quality lock-in, which Finegold-Soskice (1988: 22) identified as the ‘low-skill equilibrium’ – in which the majority of enterprises staffed by poorly trained managers and workers produce low quality goods and services.’

Small traditional service firms dominate the modern economy, and the following statement is generally accepted among experts dealing with service innovation: ‘... Few of these firms employ professional staff, and, therefore, they often lack the absorption capacity necessary for successful innovation’ (Selter-Tether, 2006: 9). However, it is not only the necessary professional-technical skills as social preconditions of innovation which are missing in small traditional service firms but also the necessary social skills (e.g., ability to perform teamwork, capacity to solve workplace conflicts, and communication skills).

To overcome the problems related to knowledge shortages in small traditional service firms, it is necessary to draw attention to the role of the franchise and company networking in speeding up knowledge transfer and development. The ‘franchise contracts’ may enlarge the available knowledge pool and speed up the diffusion of the new working practices as well as help identify the conditions of brand use, including the methods and routines of the new firm establishment. Another important facilitator of knowledge transfer is networking or company group membership. Organizations operating as a company group member (e.g., convenience store chains) may disseminate knowledge faster and improve their innovation performance better than a single firm operating alone (Nielsen – Lundvall, 2007: 74).

According to the review of the relevant Community Innovation Survey (CIS) (Makó-Illéssy-Csizmadia, 2012), the innovation performance of micro- and small firms lags behind that of medium-sized and, especially, large companies. In this sense, it is necessary to report that we have rather modest systematic knowledge on the social innovation performance of the micro- and small firms operating in the traditional service sector. An overwhelming majority of innovation research focuses on the growth potential of start-ups in the high-tech sectors (e.g., software development and bio-technology). Few scholars are interested in better understanding the innovation activities of the low-tech (‘technology users’) small firms in the traditional service sector.

To better understand the complexity of the innovation process, since 2008, the European Innovation Scoreboard (EIS) survey has focused on the particular social segment of firms labelled as '*neglected innovators.*' According to the EIS (2009) report, R&D is not the only method of innovating. Other methods include technology adaptation, incremental changes, imitation, and combining existing knowledge in new ways. With the possible exception of technology adoption, all of these methods require creative efforts on the part of a firm's employees and, consequently, lead to a better development of the firm's in-house innovative capabilities (EIS, 2009: 23). In comparison to a firm's in-house R&D, a higher proportion of non-R&D innovators use fewer than 50 employees and operate in a low-technology service sector and '*... are located in European countries with below average innovative performance*' (op. cit., p. 23).

In spite of the difficulties raised above regarding the low innovation capacity of traditional service firms, some of them are able to create a new path of development and break with the practice of low-cost and low-quality service ('low quality lock-in'). For such firms, the benefit margin of innovation activities could be quite high.

## **2.2 System firms**

Previously, we insisted that many services are dominated by micro- and small firms which satisfy the needs of the local market and belong to a class of firms called '*neglected innovators.*' However, '*system firms*' operating in the service sector are using both high-tech and advanced organizational and managerial practices. As Selter-Tether (2006: 13) reported, '*These services include banking and insurance, super market-retailing and airlines ... these industries typically involve very highly developed division of labor, sophisticated technologies including ICT and complex organizational forms.*' System firms represent two bureaucratic forms of organization. Both are characterized by varying degrees of innovation and learning capacity. Mintzberg (1979, 1983) labelled these forms of organization a '*mechanistic*' and a '*professional bureaucracy.*' According to the latest survey data comparing the models of work organization in Europe, work in a '*mechanistic*' bureaucracy is standardized through the use of formal job descriptions and rules imposed by management. The labour process is characterized by a higher degree of centralization and limited autonomy for employees to decide how to carry out their tasks and the pace of their work. On the other hand, in the case of a '*professional*' bureaucracy, centralization is lower '*... and behavior is regulated and standardized through the acquisition of standardized skills and the internalization of professional norms and standards of conduct. As a result, operating procedures are rather stable and routine, in spite of the considerable autonomy in the work*' (Valeyre et al., 2009: 9).



## 2.3 Professional service firms or knowledge-intensive business service firms (KIBS)

KIBS service firms are playing a key role in developing innovation and knowledge at the national, regional, and firm (or firm network) levels. This type of service is the core focus of our analysis and the great majority of the organizational case studies were carried out in this sector. According to Toivonen (2006: 5),<sup>2</sup> professional service firms can improve innovation activities and have a so-called “bridge function” role in developing and transferring knowledge in the following ways:

- ‘direct transfer of expert knowledge, i.e., the traditional model of consulting practice, experience sharing, and carrying experiences and ideas from one context to another,
- benchmarking, where the process of identifying and focusing on ‘good practice’ can be established through an intermediary,
- brokering, putting different sources and users in contact with each other,
- diagnosis and problem clarification, helping users articulate and define the particular needs in innovation in such a way that external resources and opportunities can be used effectively,
- change agency, where organizational development can be undertaken with help from a neutral outside perspective.’

Besides this, the key role of the rapid development of information and communication technologies (ICT) has tremendously improved knowledge management in general (e.g., the handling, storing, and transferring of information did not question the importance of the ‘proximity syndrome’). In this context, Toivonen reported the following: ‘The empirical studies made until now indicate that even though there is growing potential for the electronic delivery of graphic, numerical, and text-based information, no part of the KIBS transactions can be carried out without local presence of face-to-face contact’ (op. cit.: 9).

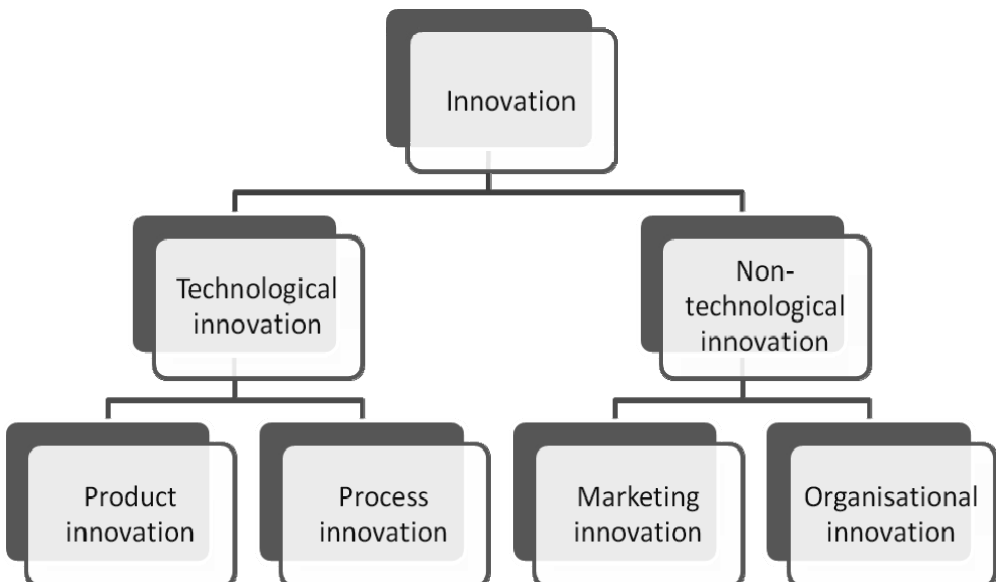
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<sup>2</sup> According to Salther and Tether (2006), the fundamental characteristics of innovation activities in the knowledge-intensive and professional service firms are as follows: ‘(1) the role of highly skilled labor in the creation and exploitation of new solutions; (2) the importance of new organizational practices, such as the use of knowledge management systems (KM) in supporting the realization of new innovative opportunities; (3) the ‘generative dance’ between clients and producers as new solutions are negotiated and co-produced between different actors; (4) the key role of social networks in generating and supporting knowledge creation and exchange through brokerage and closure; (5) the ‘*ad hoc*’ or ‘informal’ organizational form of most knowledge-intensive service firms.’ (Salther-Tether, 2006: 17)

### 3. The concept and definition of organisational innovation and its importance

In this study we use the definition of innovation developed in the Oslo Manual<sup>3</sup>. This manual, compiled jointly by the OECD and Eurostat, serves as a common reference point for all researchers investigating any forms of innovation. The manual was first published in 1992 and the third and latest edition came out in 2005. The manual defines innovation as ‘the implementation of a new or significantly improved product (good or service) or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations’ (ibid. p. 46). The manual distinguishes 4 types of innovation: product, process, marketing and organisational innovations. Product and process innovations belong to the category of technological innovation, in contrast to marketing and organisational innovations which belong to the category of non-technological innovation. The following figure presents this classification.

**Figure 1: Classification of innovations**



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<sup>3</sup> OECD – Eurostat (2005)

The Oslo Manual defines the different subcategories of innovation as follows:

1) Product innovation is 'the introduction of a good or service that is new or significantly improved with respect to its characteristics or intended issues. This includes significant improvements in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics' (ibid. p. 48).

(2) Process innovation is 'the implementation of a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software' (ibid. p. 49).

3) Marketing innovation is 'the implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing' (ibid. p. 49).

4) Organisational innovation is 'the implementation of a new organisational method in the firm's business practices, workplace organisation or external relations' (ibid. p. 50).

The Manual defines organizational innovation

4.1 in business practice as 'the implementation of new methods for organising routines and procedures for the conduct of work' (ibid. p. 51);

4.2 in workplace organisation as 'the implementation of new methods for distributing responsibilities and decision making among employees for the division of work within and between firm activities (and organisational units), as well as new concepts for the structuring of activities, such as the integration of different business activities' (ibid. p. 52);

4.3 in firms' external relations as the implementation of new ways of organising relations with other firms or public institutions, such as the establishment of new types of collaborations with research organisations or customers, new methods of integration with suppliers, and the outsourcing or subcontracting for the first time of business activities in production, procuring, distribution, recruiting and ancillary services' (ibid. p. 52).

Organisational innovations have received a great deal of attention from both academic researchers and business practitioners in recent years. Both quantitative and qualitative empirical data show that organisational innovations play a crucial role in various aspects of organisational performance. Organisational innovation can contribute to productivity growth, can improve the quality of working life at individual (employee) level, can help to use the

advantages of technological innovation and can strengthen the learning and innovation capacity at both individual and organisational level. Briefly, organisational innovation represents a key source of economic competitiveness.

As the so-called Dortmund/Brussels Position Paper rightly put it, although it is hard to find directly measurable indicators of the economic return of investments on organisational innovation, recent empirical data show that these “investments influence up to some ten percent of economic growth (Corradó et al., 2005). Consistent with earlier results of the Erasmus Competition and Innovation Monitor (2009), technological innovation, by means of R&D and ICT investments, determines 25% of innovation success, whereas social innovation (management, organisation and work aspects) determines 75% (Volberda et al., 2011)”<sup>4</sup>. The authors therefore conclude that one of the main challenges for the new European Framework programme (Horizon 2020) is to give more weight to this issue in various dimensions (fund, research, dissemination, etc.) and incorporate it in all policy programmes at European, national and regional levels.

#### ***4. Main Characteristics of the Organizational Case Studies***

In presenting the organizational case studies, the following characteristics related to the organizational changes were distinguished:

1. subject of changes,
2. target group
3. drivers of the changes
4. preconditions of the changes
5. expected outcomes

Table 2 summarises the key factors characterising the organizational changes or innovation in the organisations surveyed.

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<sup>4</sup> Dortmund/Brussels Position Paper (2012), p. 1.

**Table 2 Characteristics of Organizations Surveyed**

Company Case	Subject of changes	Target group	Drivers of the change	Preconditions of the change	Outcomes
Nexon	<p>Developer team</p> <p>Project-based approach based on internal and external knowledge sources</p> <p>Incremental</p>	The whole organisation	<p>Intensified customer orientation</p> <p>Outsourcing</p> <p>Facilitating knowledge transfer/sharing</p>	<p>Project management and marketing skills</p> <p>Training and coaching</p>	<p>Improved company performance</p> <p>Outsourcing of business functions</p>
Schönherz	<p>Supply flexible knowledge to IT-firms by developing strategic cooperation between IT-students, IT-firms and higher education institutions</p> <p>Collaborative training</p>	<p>IT-students (supply side),</p> <p>IT-firms (demand side),</p> <p>Higher education institutions</p>	Labour regulation favours flexible forms of employment allowing cost saving and better skill match	<p>Legal environment</p> <p>Firms investing in training (specific IT and social skills)</p>	Cost saving employment of IT-and electrical engineers
Magyar Posta	<p>Changing organisational culture</p> <p>Increasing sales and customer orientation</p> <p>Skill use shift, from mechanical, professional and bureaucratic skills to customer-</p>	Front office employees	<p>Liberalisation of postal services</p> <p>Maintaining competitiveness of the Hungarian Post</p>	<p>Heavy investment in formal training</p> <p>“Post-it” strategy: detailed list of competences, competence development via internal training and re-training</p>	<p>Competence development</p> <p>Strict reporting system</p> <p>Top-down approach during the implementation: less involvement</p> <p>Service</p>

	orientated social skills				diversification  Impact of the internet: mail service declining (e-mail), but packaging services rising (shopping via internet)
Avaya	Mobile and home-based telework	Support engineers and pre-sale experts	Increase competitiveness  Increase motivation and the loyalty of the employees to the firm  Flexible manpower and knowledge use	Skill base (self-organising skills)  Collaborative and cooperative relations between management and employees  Autonomy of local management	Relaxed working environment  More autonomy for employees
Klinika	Web-based communication system	Staff: nurses and physicians	More efficient technology in daily operations	Lack of satisfactory IT-infrastructure  Lack of necessary employee skills  Underdeveloped IT-solution	Lack of use  Expensive  Increased conflicts
Mortoff	Merger of two consulting firms		Increased competitiveness  Impact of the crisis	Company training practice: Informal training aimed at developing self-organising skills  Mentoring system to master tacit skills	Smooth integration of the knowledge pools of the formerly two distinct firms into one common and efficient organisational knowledge base

Comparing the various types (“traditional”, “systems firm”, “knowledge intensive business service”) and complexity of organizational innovations (e.g. “incremental”, “modular”, “architectural” and “radical”, Shcienstock, 2004:18), the main features of our company/organizational cases are presented in the Table 3.

**Table 4 Organizational Case Studies:**

Types of services	Incremental innovation	Radical Innovation
1. Traditional service	-	-
2. “Systems firm”	“Hungarian Post”	“Clinic”
3. Knowledge intensive business service (KIBS)	“Nexon Consulting Firm” “Mortoff Consulting Firm”	“International IT Service Firm” “IT Cooperative+

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# Olívér Kovács: An International IT Service Firm – A Case Study on Workplace Innovation

## ***Executive Summary***

In this case study we address the issue of telework as a specific form of organizational innovation in the case of an International IT Service Firm (hereinafter IITS) operating in Hungary. After a short introduction (*Section 1*) and an outline of the key terms used and our methodological approach (*Section 2*) we briefly present the relevant theoretical and empirical evidence regarding the topic (*Section 3*). Then we turn to the concrete company (*Section 4*) which can be seen as a prime example of the successful implementation of telework. By using the major prerequisites of an impulsive innovation process unraveled by Kornai (2010), our approach was aimed at acquiring a better understanding of how workplace innovation supported the selected firm's development and in what respects it can be justified as a good way forward (*Section 5*). The main findings of the company case study can be summarized as follows:

### **Reasons behind the introduction of telework at IITS**

- to strengthen competitiveness: IITS introduced telework imperatively for practical reasons (e.g. operating on a global scale with time differences) and to increase employees' satisfaction rather than to boost profits;
- to increase flexibility and spark loyalty to the firm were, *inter alia*, the main driving forces behind the introduction of telework.

### **The circumstances of the introduction of telework at IITS**

- management had sufficient autonomy to initiate telework;
- state-of-the-art ICT infrastructure provided a fertile ground;
- the necessary skills of the employees were available;
- the introduction of telework was gradual;
- two types of this type of new form of work were preferred: some work from home, and mobile work for teleworkers traveling regularly;

- the circle of teleworkers mainly included knowledge workers (e.g. pre-sale experts are working at home; while support engineers have the chance to work in the office as well as at home in a mixed way but under mutually agreed conditions (e.g. 1-2 days per week in the office)).

### **Assessing the effects of telework at IITS**

- The positive effects of telework (See *Box 4*), which are mostly manifested in qualitative terms, exceed the negative consequences (e.g. blackout or loss of internet connection at home, isolation, need for due self-discipline etc.).
- The importance of the human factor is increasing when it comes to telework (self-organizing skills are becoming a clear prerequisite of a well-performing telework system).
- Telework has a transformative power since it can transform and shape the habits and behavior of teleworkers in at least two respects:
  - (i) telework can lead to a significantly changed biorhythm of teleworkers due to the time zone differences; it can also lead to laziness because of the perceptibly weaker control from the management side;
  - (ii) telework may transform expectations regarding other workspaces. Having a more comfortable feeling when working from home in a quieter and friendlier environment, teleworkers' expectations regarding future workspace characteristics are revised upward as a specific form of hedonic adaptation. Hence, they can easily become sensitive to noisy environments and to physically perceivable interruptions which, otherwise, is not the case at home where they receive more and more tasks via email.

### **General implications of the company case study**

- Regarding the fundamental building blocks of a well-working telework system, it is imperative to consider the following:
  - the availability of cutting edge ICT infrastructure;
  - pursuing policies supporting a collaborative working milieu;
  - being aware of the importance of the human factor when it comes to telework.

- More research is needed in tackling the issue of the trade-off between home-life and work-life, and therefore promoting a work-life balance should be one of the most pivotal priorities of social and employment policies.

## **An international IT service firm**

### **– A Case study on ‘Workplace Innovation’**

#### **Abstract**

*This contribution addresses the issue of telework as a specific form of organizational innovation in an International IT Service Firm operating in Hungary. After a short introduction we briefly present the relevant theoretical and empirical evidence regarding the topic. Then we turn to the concrete company which can be seen as a prime example of the successful implementation of telework. It represents a case of the introduction of telework imperatively for practical reasons and to increase employees' satisfaction rather than boost profits. By using the major prerequisites of an impulsive innovation process deciphered by Kornai (2010), our approach aims at acquiring a better understanding of how workplace innovation supported the selected firm's development and in what respects it can be justified as a good way forward. The study also pinpoints a synthesis of certain drivers and bottlenecks regarding this type of organizational and employment innovation.*

#### **1. Introduction**

Economics teaches us moderation both in terms of modesty and self-confidence. However, we can claim with reasonable certainty that it is never the short term, fresh data which are crucial, but always the longer term trajectories and trends. In this regard, we cannot help but notice that the service economy is here to stay. In a rather simplistic way, the wealth of nations could be attributed to agriculture two centuries ago, to manufacturing a century ago, and to the service sector now, producing as it does 70-80 % of GDP in developed economies. Roughly 70 percent of the total employment in Europe is related to services and around 72 percent of the gross value added generated by the EU Member States stems from the service sector. Service innovation therefore plays an increasingly important role in the European economy.

The fact that the service economy has become a decisive feature of the European economy as a whole has many economic implications for both policymaking and entrepreneurial decision making alike. As far as the latter is concerned, one of the most insightful conclusions that can be drawn from the development of the service economy is not just that enterprises should implement service innovation in a more vigorous way, but also the fact

that the promotion of joint innovative interactions between manufacturing and service sectors has been receiving more and more attention in Europe.

Since service innovation often occurs as part of technological and non-technological innovation, e.g. when manufacturing firms are inclined to prefer the process of “servicizing product”, stimulating the interactions between service and manufacturing seem to be instructive. Processes such as those involving all relevant stakeholders, and the fostering of the exchange, creation and utilization of knowledge in order to become more integrated into their surrounding communities by building networks for young manufacturing and service firms are increasingly important.

Additionally, with the financial and economic crisis which erupted in 2007, and with its ensuing sovereign debt crisis, a new and very solid coercive pressure has emerged instigating and cultivating expenditure reduction throughout the European Union as a whole.

This is also relevant in the case of the public sector. Since public service provisions require a solid financial background (e.g. due to the increasing health expenditures caused by the demographic challenge etc.), one should not ignore the fact that recent trends in fiscal performance in the developed world suggest that the era of “Great Moderation” – when the cyclical fluctuations showed significant dampening – and thus the complacency regarding exposure to fiscal challenges - have ended. The “Great Recession” has been put on the policy agenda (Coibion – Gorodnichenko, 2010). Additionally, more and more European countries have faced serious liquidity problems (e.g. Hungary, Latvia and Romania in 2008) and even threats of sovereign debt crises (Italy, Spain, Ireland, Greece and Portugal in 2010). Importantly, even creditor countries (Germany, France) did not prove to be immune to the phenomenon of indebtedness, as their debt-to-GDP ratios have started to increase to record levels. It is hardly by chance that Reinhart and Rogoff (2011:4) already considers the period 2007-2018 as a decade of debt.

This can be seen as a certain harbinger of a series of fiscal consolidation episodes which will inevitably take place throughout the EU in the current decade. Consolidating public finances, i.e. maneuvering towards a sustainable path of public finance is unavoidable, simply because of the fact that there is no state with unsustainable public finances that would be able to promote collective effort in addressing great challenges.

From this perspective (i.e. when the service economy is pervaded by companies having close ties and networks with each other; and the crisis-stricken European business and public sector arenas require solutions), there is a *growing importance of innovations* that can

boost competitiveness and at the same time trigger perceptible cost-savings without endangering the product and service quality, either in the public or private sector. Without being exhaustive, one possible reason for this is the fact that there is an interesting psychological phenomenon known as “hedonic adaptation”. This means that, what was once an outstanding service merely becomes the new norm and baseline against which all other services are measured – i.e. all services must now start from this elevated level as people’s expectations are upwardly revised.

Companies therefore have to pursue new ways of *organizational learning* and change by bringing their product and service quality into line with the elevated quality level of services mentioned above. Technological (e.g. wireless infrastructure) and non-technological (e.g. organizational innovations) can be seen as an instructive way forward in this direction.

Another, perhaps equally important, force trending toward organizational innovations is provided by the *globalization of knowledge*. The term ‘globalization of the knowledge economy’ (Brown et al. 2011) often refers to the phenomenon which occurs when outsourcing the physical production functions alone has become obsolete.<sup>5</sup>

With the globalization of knowledge Far Eastern workers, for instance, are studying in Western countries and so obtaining higher skills and becoming capable of doing more sophisticated work in a cheaper way. This contributes to a large extent to the evolution of the new global division of labor (Huws, 2005: 16). For this reason, it is not only the above mentioned physical production which can be outsourced to other places but also management, R&D and innovation activities.<sup>6</sup>

This also implies that newly emerging competing workers in Far East may threaten the prospects of employees in developed countries. As a corollary, there is an increasing need on the management side to maintain and increase the loyalty of employees and their trust in the company’s leadership. In doing so, they can resort to organizational innovation by introducing telework in support of a more satisfactory working atmosphere.<sup>7</sup> Let us underline that this type of development inevitably requires the appropriate use of a more intensified ICT infrastructure (Makó, 2002:35).

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<sup>5</sup> Let us add immediately, that this does not necessarily mean that the production of goods would disappear into the background. For a more detailed study on this issue see: Tamási and Makó (2002) as well as Huws (2002).

<sup>6</sup> For a compellingly comprehensive study on R&D outsourcing, see Martínez-Noya et al. (2011).

<sup>7</sup> Pursuing telework, as a promising tool towards the modernisation of work organisations, has been an integral part of EU Policy for more than a decade. See: eEurope Action Plan 2002, Available: [http://ec.europa.eu/information\\_society/eeurope/2002/documents/archiv\\_eEurope2002/actionplan\\_en.pdf](http://ec.europa.eu/information_society/eeurope/2002/documents/archiv_eEurope2002/actionplan_en.pdf), Accessed on: 29.09.2012

In this company case study, an International IT Service Firm (hereinafter IITS) is placed at the forefront of the analysis and the reason behind this is twofold. On the one hand, this company can be portrayed as a dynamically developing one despite the economic crisis which significantly reduces firms' developing capacities; on the other hand, it can also illustrate how a company can apply non-technological innovation in order to preserve and re-invigorate its internal performance by serving as a demonstrator for its clientele. The case study briefly and succinctly presents the collected evidence on the effect of telework in the life of the company by pinpointing the drivers of and barriers to the diffusion of this kind of organizational (e.g. workplace) innovation towards clients.

## **2. Methodology**

### **2.1 Definition of key terms**

Although there is an observable tendency in the growing body of telework-related literature to use various terms and definitions (Jagger et al. 2003), this case study follows the definition expressed in the Article 2 of the European Framework Agreement on Telework of 2002.

According to the Agreement, "telework is a form of organizing and/or performing work, using information technology, in the context of an employment contract/relationship, where work, which could also be performed at the employer's premises, is carried out away from those premises on a regular basis." (The Social Dialogue Committee, 2006:32)<sup>8</sup>. Additionally, telework requires a solid IT infrastructure that enables workers to have electronic linkages to the company. As a consequence, telework is often referred to as e-working, that is to say a technology-mediated way of working that creates new working relationships.

*"In the digital economy, the firm as we know it will be transformed. Just as the organisation is changing, so are the job and the nature of work itself. As the world of work shifts from the hierarchical corporation to the new extended structures, there is a shift in the potential for work location. The office is no longer a place, it is a system. The roles of individuals within that system are no longer just jobs but fundamentally new working relationships".*

*Don Tapscott, The Digital Economy, McGraw Hill. 1995*

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<sup>8</sup> See: [http://resourcecentre.etic.org/linked\\_files/documents/Framework%20agreement%20on%20telework%20EN.pdf](http://resourcecentre.etic.org/linked_files/documents/Framework%20agreement%20on%20telework%20EN.pdf) Accessed on: 01.10.2012

In the present case study, the term teleworker embraces both the full-time and part-time employees who carry out teleworking tasks as defined above. This term is also used by the Hungarian Telework Association<sup>9</sup>, which defines 3-types of telework as follows: (i) home-based work; (ii) mobile work; and (iii) telework centers.

- **Home-based work:** in this case, the teleworker carries out the required work at home (or at least once per month from home); the worker has the ability to create, maintain and use communication contacts with the employer. Importantly, the worker has to prove to be willing and able to organize and thus to do the job at home with due diligence. Fields that most frequently make this type of work possible include: computer programmer, data recording etc.
- **Mobile work:** this represents a case when workers are best suited to customers' preferences and market needs by being on the move at different places with notebooks and other mobile communication devices that enable them to keep in contact with the employer. This type of worker establishes personal contacts with customers. Fields that are more likely to serve as a fertile ground for this type of work are for instance: sales, damage assessment in the insurance market, consulting activities etc.
- **Telework centers:** by setting up a telework center the given company brings state-of-the-art ICT solutions close to the employees' homes. In practice, a telework center means a working environment developed by the employer for its teleworkers. A center is usually located in an agglomeration or in locations far away from the employer's premises. Fields of work that seem to be efficiently carried out in telework centers are for instance: accounting, call-center, data recording etc.

## 2.2 Methodological approach

The present case study is partly based on a *literature review* relevant to the topic. In an effort to provide a comprehensive picture of the company examined, both from the management and the employee side, we conducted *six interviews* (ranging from managing director and regional labor manager to technical sales, product launch coordinator and project managers) so that we can incorporate the fundamental messages of those individuals together with the case study.

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<sup>9</sup> For the official website of the Hungarian Telework Association see: <http://www.tavmunka.org>

### ***3. Theoretical and empirical evidence on telework as a form of organizational innovation***

Although there is a growing body of theoretical and empirical evidence stating that telework can be a good option for taking firms towards a more productive mode of operation, this type of working seems to be undeservingly neglected in Hungary.

In his pioneering work, Ellison (1999) comprehensively analyzed the telework-related research in the interest of a better understanding of telework (i.e. out-of-office work mediated by information and communication technology, ICT) and its practical implications for management. The author's conclusion was clearly in accordance with others who are calling for further research on the causes and consequences of telework, given the still undiscovered correlations that exist (Garrett – Danziger, 2007). There are clear shortcomings in our understanding, even though 35 years have passed since Nilles (1975) first articulated the concept. Importantly, there is a widespread view emphasizing that telework is applied to gain flexibility, escape managerial monitoring, and leave behind the old forms of office working to which both managers and employees can be very much wedded, in other words to “[...] break the routine of work, getting more time for private circumstances, and organize the work tasks to be done at a geographical distance from the main work place office” (Aldhmour – Al-Jaafreh, 2011:602).

If we follow the line of thinking of Armbruster et al. (2006) who considered organizational innovation as a structural (hierarchical) or procedural (process-based) innovation, we can come to the conclusion that telework can be regarded as a procedural organizational innovation, which by its nature affects routines, processes (e.g. knowledge management) and operations.



### **Box 1. Procedural organisational innovation (telework) and knowledge management**

Adequate knowledge management is the first step towards bridging the knowing-doing gap (Pfeffer – Sutton, 1999), namely to turn knowledge into action. Although knowledge management is a multifaceted field because it encapsulates at least the following areas: HR, informatics, accounting, and legal issues, the human factor, as the source of all knowledge, is at its centre.

Knowledge management is not only about the establishment of a wide range of ICT solutions employed to collect, assess and store knowledge, but adequate knowledge management is expected to reach the emotions of employees to motivate them to share knowledge (especially, non-codifiable tacit knowledge), vital disputes and dialogue with all relevant stakeholders. From this perspective, technology is “just the maid servant”, while human factor is the key in putting ideas based on collected and assessed data into practice.

According to comprehensive studies on knowledge management in developed (OECD, 2003) and developing countries (Yuen, 2007), the human factor might not have been so accurately evaluated when examining the majority of countries, i.e. it was underestimated in the efforts to build up knowledge management. It requires a willingness on the part of employees to be under control and to provide all necessary information. It demonstrates *per se* the necessity for non-technological innovations tailored towards the human factor (e.g. organisational innovation, new management practices through coaching, interim management to create better organisational resilience etc.) to promote cultural “innovation” moving towards an advanced collective intelligence required by complex challenges.

In this respect, options such as telework can serve as a helping hand since telework has some attractive benefits (e.g. greater flexibility, reduced stress, elimination of long journeys and commuting etc.) which can increase the willingness of employees to be part and parcel of integrated knowledge management.

Advocates of telework often argue that the landscape of modern employment has changed (Felstead et al. 2005). According to a global study, which was conducted by Reuters/IPSOS covering 24 countries selected worldwide and surveying more than 11 thousand employees, one in five (17%) employees who can be connected online to their workplace report they ‘telecommute’ on a ‘frequent basis’: 7% say they “work every day from home which is remote or separate from their employer’s real office elsewhere’ while another 10% say they do so ‘on a very consistent and constant basis like evenings and weekends’<sup>10</sup> (Reuters/IPSOS, 2012).

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<sup>10</sup> See: Reuters/Ipsos (2012): The World of Work: Global Study of Online Employees Shows One in Five (17%) Work from Elsewhere. Available: <http://www.ipsos-na.com/news-polls/pressrelease.aspx?id=5486> Accessed on: 24.08.2012. Additionally, an interesting insight emerged in a study on home working conducted by Bloom et al. (2012) in case of a 13,000 employee NASDAQ listed Chinese multinational. Besides the finding that home-working (in the case of call center employees) contributed to a 13% increase in performance, it also emphasised that half of the volunteer group preferred office working. This phenomenon implies that there are employees placing a higher value on social interactions at work.

As far as the impact of telework on firm level productivity is concerned, the above mentioned study also tried to gather some opinions in this regard.<sup>11</sup> The survey conveys the message that two thirds of total respondents took the view that telework contributed significantly to the improvement of productivity, while 35% of the respondents stressed the opposite because of the belief that teleworkers do not work as hard as colleagues working exclusively in the office, primarily due to the lack of manager supervision and/or because of family and social distractions arising at home.

Concerning the main industries where telework is becoming a non-negligible feature, one may conclude that the intensity of telework differs across the spectrum of industries. One of the most spectacular presences of telework can be found in the business services industry (Shaw, 1996; Welz – Wolf, 2010). What is more, as Makó et al. (2011) rightly pointed out, telework has a more fertile ground in the case of knowledge-intensive business services simply because ‘knowledge-workers’ are more likely to work efficiently in this way. Additionally, telework is often seen as dominant in the non-profit and civil sectors (Makó et al. 2008). The usage of partial or full telework is also substantial in the technology and telecommunication sector, simply because this sector can be seen as a cradle of technologies that *per se* enable and initiate telework (See *Annex I*).

Another, perhaps equally important, fact is that telework, as a manifestation of organizational innovation, is also growing in the public sector. Today, more and more government activity promotes telework (e.g. remote working) in public sector organizations and governmental officers alike.<sup>12</sup>

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<sup>11</sup> Tidd (2004) also analysed the impact of teleworking on productivity.

<sup>12</sup> The issue of public sector innovation (including workplace innovation) is also tackled by Kovács (2012).

### **Box 2. Governments are to unfold the potential of teleworking**

**UK:** *The era of fiscal anomalies pushes governments to reduce expenditures and achieve significant savings. The UK government is to unleash the potential of workplace innovation (incl. the introduction of teleworking in various departments) which is expected to lead to savings amounting to approx. €1.2-1.9 billion by 2013. In doing so, government is making strategic investments in much smaller and more flexible workspaces that are fully equipped with the necessary ICT solutions.*

**Canada:** *Health Canada also carried out a workplace rationalization by moving 500 employees into a more flexible, space efficient facility that offers a better working atmosphere as well. As a result, real estate costs could be reduced by more than 50 per cent. In the case of other departments, the relative proportion of teleworking has been increased significantly.*

**Korea:** *Within the Korean government, there was a general demand for teleworking at public administration level in a more dedicated way. To this end, the Ministry of Public Administration and Security for the South Korean Government initiated the so-called 'SmartWork Center Building Project'. The project is designed to promote flexible working practices in organizations across Korea, and encourage government officers to telework from anywhere, at any time (it is expected that the project will allow 30% of public workers to work remotely). The Ministry of Public Administration and Security considered this option because by reducing the travelling intensity of public workers between their homes and central government facilities, Korea will be able to curb emission trading and transportation costs. It is expected that if each remote worker utilizes their local SmartWork center as opposed to travelling to the central government facilities in Seoul for between 1 and 2 days per week, this will reduce emission trading and transportation costs by approximately €250 per remote worker annually, and commuter time by up to 90 minutes per day.*

Concerning the usage and the diffusion of telework in the European panorama, one may conclude that there are huge discrepancies across European countries in terms of telework-intensity and its specific features. For instance, the EMERGENCE project<sup>13</sup> revealed that the use of telework in Central European countries like Hungary, Slovakia and Poland is more skewed, irrespective of whether we consider the sectors or company size. In this region, telework dominates in the case of large firms (some of which are foreign-owned), which is diametrically opposed to the EU average where medium-sized firms are more likely to use this type of organizational and employment innovation. As regards sectors, the main finding of the project, among other things, was that traditional industrial sectors and medium-sized establishments are lagging behind in the telework development process.

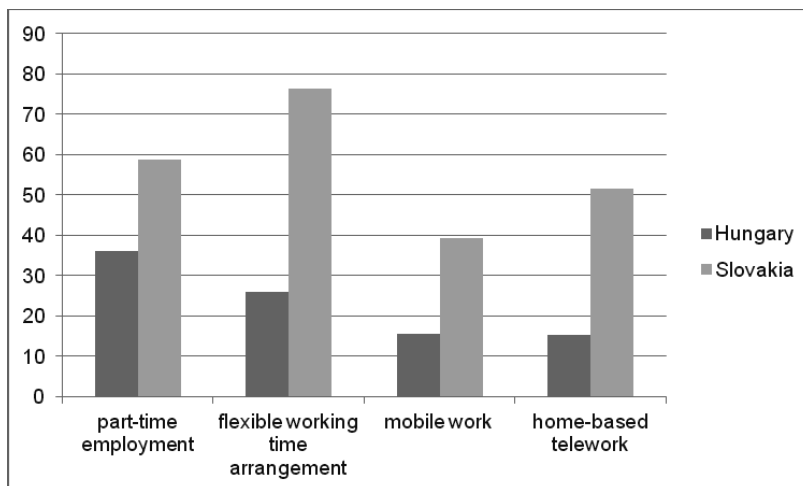
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<sup>13</sup> Funded by the European Commission's Information Society Technologies (IST) Programme, the EMERGENCE project has carried out pioneering research in 22 countries. See: <http://www.emergence.nu/> Accessed on: 30.09.2012

Beyond these findings, the level of telework-intensity also differs across European countries. This was clearly shown by the latest European Establishment Working Time Survey (ESWT – 2005). The survey showed clusters of countries on the basis of their level of working time flexibility (Vinken – Ester, 2006): (i) most flexible countries (Denmark, Finland, Latvia, The Netherlands, Sweden and Slovenia); (ii) flexible countries (Austria, Belgium, Estonia, Ireland and Luxembourg); (iii) less flexible countries (Lithuania, Bulgaria, Romania and Spain); (iv) least flexible countries (Cyprus, Greece, Hungary, Portugal and Italy).

In the case of the post-socialist countries, the Czech Republic (16.1%) had the highest share of teleworkers within total employment, while Hungary proved to be the laggard in this respect even if we compare its rate to the Slovakian one (11.7%) which is three times higher (Makó et al. 2011:59). This can be justified if we consider briefly the state of this kind of organizational innovation in the case of knowledge-intensive business services (KIBS) that have an unarguable preponderance of ‘knowledge-workers’ (Chart 1).

**Chart 1. Forms of organizational innovation (in %)**



Note: both organizational and contractual innovations are considered here.

Source: Makó et al. (2011:60), Table 23

Despite the perceptible benefits of teleworking, Hungary does not show a salient performance in this regard. According to the Reuters/IPSOS 2012 survey, cited earlier, while the international average is 17 percent, this figure in Hungary was only 3 percent in 2011 (approx. 114 thousand employees).<sup>14</sup>

Although Hungarian firms are less likely to commit themselves to transform their employment landscape into a more telework-friendly environment, there is an International IT Service Firm that exemplifies the promising opportunities of telework by playing a demonstrator role at the same time.

#### **4. Short profile of the company**

The International IT Service Firm (hereinafter IITS), which is under the magnifying glass, is specialized in providing business collaboration and communications solutions, offering unified communications, contact centers, networking and related services to companies of all sizes around the world (especially in Europe, North-America, the Middle-East and Africa).<sup>15</sup> The U.S. based firm has been present in Hungary since the country's regime change, and since 1998, it has complemented its product portfolio by offering customer supporting services, as well.

The company has repeatedly shown itself to be a well-performing and prosperous one in the so-called 'Magic Quadrant for Wired and Wireless LAN Access Infrastructure' report prepared by Gartner. In 2012, this report reflected that IITS, as a Visionary<sup>16</sup>, faces increasing demand for its services and products despite the still observable negative repercussions of the financial crisis and its ensuing sovereign debt crisis which brings with it more caution into the investment and development decisions of European firms.

Importantly, both SMEs and larger companies have been forced to resort to innovations which can entail savings in terms of expenditures by bringing a new élan into their day-to-day operation. For instance, the market demand for unified wired and wireless access solutions is

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<sup>14</sup> Let us not forget that the definition of telework also embraces the fact that more and more people are checking and answering email in the mornings and evenings, and what is more, people often work at the weekend with their notebooks as well. As a consequence, the share of the teleworkers in Hungary should be interpreted with care.

<sup>15</sup> Furthermore, IITS has undoubtedly gained dominance in China as well, where its market share increased from 28.9 to 32.1 percent in the telephony market. See: Soni (2012)

<sup>16</sup> This means that a vendor in the Visionaries quadrant has demonstrated the ability to increase the features in its offering to provide a unique and differentiated approach to the market. A visionary will have innovated in one or more key areas of access layer technologies (e.g., convergence, security, management or operational efficiency).

growing, and the examined firm could therefore make great strides in favor of a dynamic diffusion of its cutting-edge VENA (Enterprise Network Architecture) virtualization solution.<sup>17</sup>

The company will embrace a complex array of fields that can be fully covered by the use of IT-based unified communicational solutions. These fields are as follows: (i) education; (ii) financial services; (iii) health care; and (iv) hospitality.

(i) According to the underlying conception of the company, a holistic and dynamic view can be seen as a necessary constituent factor in longer term competitiveness. It stands to reason that the current economic crisis with its tightening budgets forms a non-negligible challenge for education providers as well. This can be manifested in adopting more innovative ways to raise educational standards while reducing the cost of providing these services. This is where communications technologies can play a pivotal role in enhancing teaching and learning, as well as streamlining back-office processes. Technologies such as unified communications integrating telephony, email, instant messaging and other conferencing solutions support more cost-effective school administration communications applications and devices.

(ii) As regards the clients operating in the financial services sector, improving the general level of productivity by reaching still perceivable cost-savings has become the beacon to be followed by these firms. The International IT Service Firm has solutions and services to specifically address these challenges.<sup>18</sup>

(iii) Concerning the third area, the company also offers solutions for those in the healthcare sector by initiating mobility, and ultimately increasing the productivity of nurses. Health insurance payers and providers – both private for-profit companies and publicly funded government entities – are under pressure to control costs, improve medical expense ratios, and slow the growth of insurance premiums so consumers and employers can afford care. To transform how care is delivered, physicians, hospitals, and health systems are increasingly measured, and rewarded for quality outcomes. They must have processes and technologies in place to devote more attention to patients and be more efficient with resources. Healthcare companies must supply innovative, high-quality medicines, devices, and diagnostic capabilities that improve health at a reasonable cost. To this end, the firm

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<sup>17</sup> The company helps organizations simplify the design and management of their networks while streamlining cloud-based service deployments and improvement of always-on content and applications.

<sup>18</sup> Using the firm's cost-effective and reliable communications infrastructure, a regional bank with 950 branches and 6 call centers saved \$28 million over 5 years. With the communications solutions and services, a U.S. \$5 billion Credit Union was able to communicate better with customers, resulting in a \$35.5 million reduction in delinquencies in 8 months.

integrates communications technology into existing clinical systems. In building solutions for healthcare and life sciences, the firm leverages its complete communications portfolio as well as best-of-breed third party solutions.

(iv) Last but in no way least, the firm also devotes attention to the hospitality industry. Its main goal is to propose thoroughly contextualized recommendations for improving business operation, design and communication to meet business requirements. Furthermore, IITS delivers testing, deployment, and support for implemented solutions, as well.

From our perspective, telework can be treated as a specific form of organizational innovation and its role within the company is of particular importance, given that the firm has been focusing on teleworking for years, exemplified by the fact that the predominant proportion of the company's employees (approx. 75%) are working in this way. This is mainly the result of an organic development as well as strategic managerial thinking. In addition, the firm also plays an important role in the dissemination of telework – including mobile working (i.e. “work on the move”) and remote working (i.e. “work at home”) – related knowledge.

For instance, the Unified Communications for Remote Workers is a complex package that combines the necessary technologies and services with the aim of addressing the communications needs of full- and part-time teleworkers.

IITS gives teleworkers a set of tools that reflect the office work environment, with all of the features they need to communicate with colleagues and customers, quickly, reliably, and accurately. It keeps teleworkers well informed and highly productive. This teleworking solution offers a wide range of endpoints, including thick, thin, and mobility clients that integrate with leading productivity suites like IBM® Lotus® Sametime® and Microsoft® Office Communications Server.

The firm pursues open-minded service offerings. To this end, clients have the opportunity to complement the spectrum of services. In this way, the teleworking system is continuously customized and clients have a system that best suits their requirements and specificities.

Regarding telework, the firm's product portfolio ranges from Mobile Workers through Office Roamers and Office Workers to Remote Workers as well as Video Communications. For instance, the aim of the so-called Mobile Workers solution is to substantially increase and maintain the capability of highly mobile staff to communicate with colleagues as quickly, reliably, and cost-effectively as possible.

It seems that the firm can utilize its market potential through telework by reaching higher and higher revenues either in terms of internal sales or exports. Despite the financial crisis and economic slowdown, the company has been able to increase its revenues between 2009 and 2011. As regards the trends of employment, the firm was not forced to resort to substantial layoffs (the number of employees was 112 in 2010, and it dropped slightly to 106 in 2011).

## ***5. Source of growth and development – The prerequisites of an impulsive innovation process***

According to Komai (2010), the major prerequisites of an impulsive innovation process in capitalism are the following: (i) decentralized initiation; (ii) high rewards; (iii) competition; (iv) flexibility of financing; and (v) opportunity for wide experiments.

Decentralized initiation means that every business actor (e.g. SMEs) can decide themselves what they want to invest in. It also implies that subsidiaries have the necessary autonomy to prepare strategic roadmaps with responses to local challenges by fully incorporating the local specificities and changing circumstances. Ultimately, the most successful innovations are accompanied by an enormous amount of financial reward including long-lasting reputation. Financial reward and achievable fame are fundamental incentives for service innovators, as well; however, the success of the innovation relies to a large extent on the available financial resources and the service “culture” of the society. In addition to the latter, in the case of our selected company, the maturity of a telework-friendly managerial attitude is of key importance in terms of spreading telework-promoting solutions. The latter may offer a wide arena for extensive experimenting<sup>19</sup>, which is always an ancillary and inevitable phenomenon during the series of attempts to create real innovation.

From this point of analysis our approach becomes pervaded by this narrative in the interest of acquiring a better understanding of how workplace innovation (e.g. telework) supported the selected firm’s development and in what respects it can be justified as a good way forward. In doing so we are also able to pinpoint a synthesis of certain drivers and bottlenecks regarding telework.

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<sup>19</sup> Concerning the opportunity for wide experiments, too strict employment protection would be problematic, if for no other reason than because the employer planning to innovate is to a large extent relying on its opportunity to rapidly hire or fire employees before and after innovation. If the innovation proved to be profitable, the outcome would be beneficial both for the employer and the employees. But, if the innovation proved to be futile, the employer would have to reduce costs by layoffs. Firing employees is much more difficult in Europe – where the flexibility of labour markets differs significantly across countries – than for example in the US; accordingly, the opportunity of a European company for experiments cannot be considered as wide as it is in the US.



## **5.1 Decentralized initiation – Autonomy to introduce the inevitable telework**

There is a non-negligible fact behind the scenes of the development of the Hungarian subsidiary of the U.S based company. Namely, the mother company's powerful influence can be observed in its development trajectory; however the subsidiary has the essential autonomy to pose new solutions tailored towards local needs and specificities (e.g. introducing telework).

According to the management of the Hungarian subsidiary, autonomy can be seen as a dynamic balance which is a result of continuous attempts to establish independence. There is an avowedly decisive impact of the mother company which stems from the firm's global structure. Nonetheless, there are always opportunities for local initiatives.

Basically, there are two types of initiatives which develop within the authority of the management at the subsidiary located in Hungary. First and foremost, there are initiatives that do not require any approval from the mother company; these are not within the 'radar check' of the upper level managerial hierarchy in the mother company. Another group of initiatives includes those requiring unanimous approval from the upper level of management and which have to go through the corresponding thematic approval procedure. The latter often entails a longer confirmation cycle; however, local management do not deliberately avoid these types of initiatives simply because this procedure is more likely to be successful than an external observer would expect.

One of the most important tasks of corporate local governance is to explore this autonomy as well as to seize the opportunities to create an attractive working milieu within the company and to offer people-centric innovation and fit-for purpose solutions in a more vigorous way. In unraveling the potential of telework, the management decided to introduce it in a partial way (i.e. nobody is allowed to work from home exclusively, some regular appearance in the office is required by the management; and of course telework often refers to mobile work when technical sales staff travel a lot). IITS introduced telework gradually on a case-by-case basis during the 2000s; therefore there is no concrete date for the full implementation of telework.

Although the firm has numerous orders from the private sector (especially from the telecommunications and financial sectors), it searches out opportunities from the public sector as well. In doing so, the management has to be aware of the local circumstances and

the maturity of the ICT infrastructure, which also requires the proper autonomy to exploit the opportunities which arise.

Importantly, the company has dedicated itself to disseminating the benefits of telework, including resorting to these types of employment itself. Employees have the opportunity to work from home or in a mixed style of working, both in the office and at home. Mobile work also occurs as indicated above. The local management is entitled to define what types of workers seem to be able to work reliably in this way, and it also can determine the proportion of teleworkers within the total number of staff.

As a consequence, there are two basic sources of company development, which can be characterized as (i) external and (ii) internal factors. With external factors, the mother company decides whether to increase or decrease the size of the local staff/groups; or it can also establish whether it needs to bring in new activities and functions or relocate already existing ones to another location. According to the view of the local management, this source of development has proved to be worthwhile. Let us underline that the external source of development does not necessarily lead towards an organic development path because it often requires action by the local management to accustom itself to the changed and maybe 'bureaucratically' delegated new functions and activities.

As far as the internal source of development is concerned, this is linked to the issue of decentralized initiation. There is no autonomy to change anything except for the organizational structure and its operation (i.e. there is no authority to diverge from the defined size of the organization). For instance, the company's mentor system is one of those local initiatives: the colleagues who are far away from their direct superiors are "adopted" by someone from the local management. This individual informs them of local decisions, monitors the compliance of local policies and guides the adopted colleague in local affairs.

All in all, the local corporate management has the authority to make innovative decisions which are in accordance with local needs. In this way, there are initiatives whose mastermind is the local management itself.

It is important to note that offering workers the opportunity to work from home (telework) as an option, by building on the autonomy described above, was unavoidable due to the company's global presence.

Interviews with teleworkers, who have been working in this way for 6 years on average, confirmed this view by drawing attention to:

- (i) the fact that the numerous journeys affect the distribution of the type of work;
- (ii) the importance of working with colleagues in other continents with +/- 6-8 hours time differences (e.g. North and South America, India, China etc.).

In terms of the distribution of working types, workers in sales estimated their work distribution as follows: travel (40%); home work (55%); office work (5%), other teleworkers reported that home work often reaches 80-85%, while the share of office work is about 15-20%. The number of working days at home depends heavily on the type of work and the intensity of the workload. Moreover, the number of days spent in the office also varies according to how employees feel (i.e. sometime they feel more need to have personal/physical contacts with colleagues than at other times).

Additionally, the introduction of an optional telework opportunity was also determined by the fact that knowledge workers, who are also offering ancillary services such as education, documentation, process management (e.g. who can be consulted in the case of product failures and who have various kinds of responsibility policies), often proved to be good caretakers of their colleagues in foreign countries like Argentina. They manage and support these colleagues in telework as a consequence of the different time zones.

**Box 3. The motivation behind the introduction of workplace innovation and its main circumstances**

*IITS represents a case of the introduction of telework imperatively for practical reasons (e.g. operating on a global scale with time differences) and to increase employees' satisfaction rather than to boost profits.*

*The circumstances of the introduction of telework:*

*management had enough autonomy to initiate telework;*

*state-of-the-art ICT infrastructure provided a fertile ground;*

*the necessary skills of the employees were at hand;*

*the introduction of telework was gradual;*

*two types of such new forms of work were preferred: some work from home, and mobile work for teleworkers traveling regularly;*

*the circle of teleworkers included mainly knowledge workers (e.g. pre-sales experts work at home; while support engineers have the chance to work in the office as well as at home in a mixed way but under mutually agreed conditions (e.g. 1-2 days per week in the office).*

## 5.2 High rewards – More beneficial than the detrimental effects of telework

With innovators, one of the most fundamental driving forces is the possibility of obtaining high rewards (e.g. greater market share, increasing profits, long-lasting reputation and fame etc.). If we take a look at the internal, and particularly the employment-related rewards, one can conclude that the introduction of telework *per se* carries some attractive benefits for both employees and employers. These can be illustrated as main drivers of the introduction and application of telework.

In IITS's case, introducing telework was not from the onset expected to increase the productivity and the overall profit level of the company. The firm's telework practice cannot be regarded as pure (100%) telework; therefore some of its merits (e.g. those associated with smaller office space and real-estate) are not realized. The management links a more qualitative outcome to such workplace innovation. By offering an option for work from home, this can trigger emotional effects, and this can lead to increasing loyalty and more commitment from employees to the company through greater job-satisfaction rather than a spectacular improvement in the annual turnover.

*„What are the advantages and disadvantages? Get more done in a given period. Ability to concentrate. Address what is important to my job role, without 'trivial interruptions'. Flexibility is a very valuable aspect, a huge benefit to family life. Do not waste hours travelling to local office. On the negative side, it is too easy to go into the home office and sit down in the evening or weekend. Just answering a couple of emails can easily turn into a few hours work. Self discipline is required, to not do too much (because it's easy to!). Also working in a small office at home for too long (a long stretch of days) is not good, (I) need to get out, meet people, experience things. Not so much of an issue for me due to travel.“*

*Technical Sales at the IITS firm*

There is a shared view among local management which stresses that allowing employees to be teleworkers as well as creating its preconditions can be seen as an integral part of an overarching programmed which aims at enhancing the loyalty-base of employees: the employee who deserves it, and who feels like trying it and for whom there is no any particular obstacle, can work at home. In doing so, the company offers trust and flexibility in exchange for loyalty. The economic aspects of telework are not considered as priorities. The main argument behind this type of work in the case of the company analyzed is those employees – who are particularly important to the firm, who are reliable and have proved to be permanently useful –feel comfortable within stipulated and mutually accepted limits.

Moreover, telework can result in cost-savings as well as enhanced efficiency. The company's management is rooted in the belief that this effect potentially holds especially in the case of 'knowledge workers' who are working in easily algorithmic fields that do not necessarily require permanent face-to-face meetings and that can be seamlessly monitored and controlled.

The management-attitude in this company transmits the message that the fundamental building blocks of a well-working telework system are as follows:

- availability of cutting edge ICT infrastructure;
- policies supporting a collaborative working milieu ;
- awareness of the importance of the human factor.

Cutting edge ICT infrastructure has a transformative power; in other words, having this type of state-of-the-art technology (based upon wireless applications) from the onset (as in this case) makes the introduction of telework straightforward (much more dynamic workspaces) without generating any unsolvable problem(s). In the case of the company investigated, the technological-aspect was well-prepared to take big leap towards telework. As for the skills of employees, they were also available.

At this point, a new leitmotif can be identified behind the motivation of IITS for the implementation of telework. This company operates on global scale; consequently, the traditional Hungarian allocated cumulative working hours do not necessarily equal those of partners who are often located in another continent. If someone has to hold a telephone conference with another continent, or to work in clients' out-of-service time (weekend, nights), this in itself suggests the idea of doing this job at home where this unusual timing can be solved in a more flexible way (i.e. the employee does not need to go to the central office at night or the weekend). This explains why the company does not make particular efforts to quantify the effects of telework, because there is a clearly visible impact, namely the increased loyalty to the firm due to the advantage of improved flexibility that creates a greater latitude for the employees in harmonizing their work and personal life (i.e. their work-life balance).

Against this background it was expected that employees will take advantage of this opportunity by being collaborative at the same time. There is a widespread view among economists that the above mentioned state-of-the-art technologies that make the introduction

of new forms of work possible is itself sufficient. The company reported that this is not always the case, especially if we take a longer perspective after introducing telework. *ICT infrastructure is not a panacea in itself if the working culture does not provide a fertile environment for collaboration.*

For instance, when the instant messaging was launched within the company, employees' availability and responsiveness – at least of those whose responding time to emails or voice mails was much slower than the average before the introduction – became much better for a while. This was because the new device caught their attention, and so they responded earlier. Nonetheless, this positive effect of instant messaging dissolved within 6 months of its introduction. This points, *inter alia*, to the fact that *the willingness of people to be communicative and rapidly responsive differs widely and seems to be partly influenced by the attitude to new tools and devices in the longer term.*

The real challenge therefore was how to make the rules, policies and requirements for performance and availability regarding telework (i.e. work at home) clear.<sup>20</sup> Additionally, even if the company had developed guidelines for teleworking, the human factor is here to stay. The role of the human factor in the longer term success of this kind of workplace innovation cannot be shrugged off by a general reference to the old saying “knowing is not enough; we must apply” coined by Leonardo Da Vinci in the 15<sup>th</sup> century.

Without having the necessary self-management and self-organization skills (e.g. tackling the unusual schedules and timing and the accompanying tasks appropriately without causing any emotional frustration or stress in efforts to harmonize work and family obligations), simply knowing the mutually agreed rules and policies will not lead to the desired results, neither for the employer nor for the employee. It is crucial because emotional/psychological status is easily perceptible in day to day working especially through wireless connections (i.e. in case of problems, the tone changes, the speed of responsiveness slows down, or teleworkers are likely to avoid strict control).

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<sup>20</sup> This was also emphasised by Vartiainen et al. (2007:10). The authors called attention to the fact that an integration of space, ICT and human resource management is a must in order to have a good basis for policymaking.

It is also worth mentioning that high rewards can only be achievable if conflicts and tensions arising are taken into account as well as solved as soon as possible via mutually beneficial consultations between managers and employees.<sup>21</sup>

What is more, colleagues are often invited to have joint programs in order to enhance collegiality (i.e. team spirit) and management regularly requires feedbacks from employees to have a chance to continuously monitor their working conditions and personal status (i.e. how they feel) in order to dampen this 'insidious' character of telework. According to the management, the employer must always care about their employees' personal life if they are working at home, because in this case what is "personal life" is no longer "clear". Moreover, job-related problems might infiltrate into their personal life and can affect their performance.

Due to the aspiration of this type of firm to help teleworkers to have a work-life balance, the degree of overworking and withdrawal seems to be quite low; however, interviews pointed out the threat it poses (or more generally insidious character).

Let us notice that this type of approach is broader than the traditional ones in the knowledge management literature. What is more, this is not just a much wider consideration which alludes to a certain extent to the so-called 'collective intelligence' related research, but an approach which largely represents the presence of a value-based management (i.e. the permanently learning knowledge worker can now be seen as capital in him/herself, and his/her conditions have to be addressed and incorporated by the management).

For instance, interviews implicitly draw our attention to the 'transformative' power of telework. This means that telework can transform and shape the customs and behavior of teleworkers. First, telework can lead to a significantly changed biorhythm of teleworkers due to the time zone differences. Moreover, it can also lead to laziness because of the perceived lower level of control from management. Second, telework may transform expectations in other workspaces.

By offering workers the opportunity to work at home, i.e. to have a more comfortable feeling of working in a quieter and more friendly environment, their expectations as regards future workspace characteristics are revised upward as a specific form of hedonic adaptation:

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<sup>21</sup> Despite the growing importance of telework, studies also emphasise the role of face-to-face conversations and meetings by implying that telework cannot be used without restraint. Boggs (2012) emphasized that the share of full-time teleworkers started on a downward trend between 2007 and 2011. It fell from 31% to 22% which may to a some extent send the message that the managements of companies using telework in the United States are establishing a limit to telework (e.g. because face-to-face meetings are needed to deal with problems etc.).

hence they can easily become sensitive to noisy environments and to physically perceivable interruptions which, otherwise, is not the case at home where they are receiving more and more tasks via email; and the precise point they react to them can be more freely chosen.

Ultimately, telework requires a worker to be able to carry out changes at the personality level. This implies that organizational and employment innovations like telework, which is heavily based on technological innovations, cannot be fully unfolded unless they are accompanied with societal innovations that shape formal and informal communications as well. Future research is needed to address such repercussions of telework.

**Box 4. Assessing telework at IITS – deciphering the main advantages and disadvantages of telework and the importance of making a personal appearance at IITS**

**Advantages (emphasised by the employer and employees of IITS):** flexible schedule, more efficient work, better concentration due to the much quieter and healthier environment (no external noise, no smoking colleagues, the chance to cook etc.), nourished proactive behaviour, conscious life creation, a wider portfolio of talents (i.e. talented people with disabilities or pregnant workers are also available), expressed confidence and trust, enhanced ability to keep employees, arena for testing own products. And last but not at all least, telework fosters the learning process while the employee will become able to work at other places offering similar conditions to home work (e.g. hotel rooms, quiet coffee houses etc.).<sup>22</sup>

**Disadvantages (emphasised by the employer and employees of IITS):** loneliness, isolation, problems with 'quietness', overworking in the absence of the self-discipline which is more likely to develop in the office.

**Reasons behind making a personal appearance in the office (emphasised by the employer and employees of IITS):** management is aware of the specific time requirements of various tasks delivered by teleworkers, therefore the management did not prescribe a mandatory presence of teleworkers at the office. Although personal appearance is not obligatory, it is mainly a need felt by employees. Interviews corroborated this since employees believe that it is important to meet local colleagues from time to time, and of course there are local partner/customer meetings or events, as well. In addition, employees insist on being personally known in the company – so visibility is of key importance with respect to internal promotion. Normally, teleworkers appear in the office 2-3 times per month particularly to have discussions about important issues, arranging paper work or submitting important documents etc. Apart from this, teleworkers necessarily appear in the office at times of 'crisis' (e.g. loss of home Internet connection, blackout). Nonetheless, the development and the use of smart phones with internet connections bridged this problem.

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<sup>22</sup> Interviews also uncovered that smoking teleworkers considers this type of work as a positive development because they can smoke during their work at home. In this way they no longer adopt such an intermittent working style in the office.



### 5.3 Competition and flexibility of financing – Telework strengthens competitiveness

Since the company surveyed is a global leader in its market, operating at numerous locations around the world (Asia Pacific, Caribbean, Latin America, Europe, Middle East & Africa, United States, and Canada), and since international competition forces the company to conduct permanent renewal and development, it is more than evident that the global-scale operation required a changing use of manpower and knowledge. As a corollary, the globalize company had an inherent incentive to take steps toward new forms of work and employment such as telework, since this is best suited to certain purposes which we described earlier (e.g. to overcome the differences in working arrangements among continents). Telework drove the firm's competitiveness in the era of the new global division of labor.

Apart from the competition in the private sector which triggered the internal workplace innovation in the company, there are other opportunities that pull the growth and development of the firm. It is worth recalling the fact that such workplace innovation does not appear only in the private, but also in the public, sector. In this process, the firm's demonstrator role was a key driving force in case of the United States. Additionally, the Ministry of Education and Science of the Russian Federation has also streamlined its education hotline with the solutions provided by the company.<sup>23</sup> Consequently, IITS's role in the public sector cannot be regarded as a highly accidental one, but is rather systemic and purposeful.

It is worth mentioning that in this way, the company investigated significantly contributes to making the public sector more innovative as a whole, which is nowadays of paramount importance due to the need for "more for less", i.e. improved service quality/accessibility and cost efficiency.<sup>24</sup>

As far as the flexibility of financing is concerned, we can claim with reasonable certainty that the availability of the necessary financial resources for innovation – which is often time-consuming and requires additional investments – is a basic prerequisite of a healthy

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<sup>23</sup> The company, as a global provider of business collaboration and communications solutions and services, together with its Gold Partner, Step Logic, have opened a contact centre for 18 operators in the Russian Federation Ministry of Education and Science. See: <http://www.avaya.com/emea/about-avaya/newsroom/news-releases/2012/pr-170812> Accessed on: 20 August 2012

<sup>24</sup> According to an INNO-Grips Policy Brief, mechanisms are needed that promote innovation across sectors, within the public sector and between different services by incorporating the appetite for innovation. To this end, improving communication is of key importance. One potential way to achieve this is a sort of "awareness raising" by promoting workshops and direct knowledge transfer for municipalities and local institutions of different member states. See: Kovács (2012:67)

innovative capacity. From the point of view of the introduction of telework, the company did not have to make enormous up-front investments when it decided to implement a new, IT-based form of work.

#### **5.4 Opportunity for wide experiments**

Innovation is always a risky undertaking. Beyond the fact that the company has to bear the cost of an innovation that might finally prove to be futile; the market actors also have to seek methods and ways to expand the scope of experimenting. In this respect, there are at least two aspects to be addressed in the case of IITS: (i) the opportunity for experiment within the firm to become a demonstrator of the solutions offered for clients from the private and public sector; and (ii) the extent of experimentation in the Hungarian market.

Internally, the introduction of telework did not cause any particular challenges in terms of technological maturity. All the necessary ICT infrastructure and IT skills were in place at that time of introduction. Consequently the company can be viewed as a wide arena for experimenting with telework. In addition, since telework requires trust and confidence, which is built upon a relatively long standing cooperation between employees and employers prior to the introduction of telework, the company was in a good position to implement this kind of workplace innovation.

Nevertheless, defining telework policies and learning how to work in this way were, on the other hand, of paramount importance. One of the most insightful lessons that can be drawn from the experience of the company is that employees have to learn how to tackle the isolation, and how to step out of it. If someone faces a serious task and another colleague is also available at the next desk, the problem will be solved more smoothly. With working at home, utilizing every opportunity to eliminate the problem becomes one of the most crucial preconditions of a successful work performance.

The analyzed company can be ranked with the circle of firms applying teleworking if we look at the types of functions and tasks that are allowed to be delivered at home. Most teleworkers are knowledge workers. For instance, pre-sales experts work at home; while support engineers have the chance to work in the office as well as at home in a mixed way but under mutually agreed conditions (e.g. 1-2 days per week in the office). Managers and various staff members mainly work in the office (e.g. management, HR-staff, employees in the financial department etc.).

It is also essential to emphasize that telework *per se* provides an arena for testing the company's own products (e.g. VPN phone, SIP Phone, 1XMobile). Teleworkers are using these devices and inevitably assessing their operations and when it comes to product failures, the company can learn more rapidly from those situations.

A more productive line of inquiry is to ask whether the company is planning to increase the share of teleworkers on the basis of its experience in the near future. Concerning the future, the management is inclined to think that the share of teleworkers will never reach 100% because of the fact that problem and conflict solving requires face-to-face contacts and discussions. However, the management considers that a significant part of the whole range of activities can be delivered at home, including technical support, project management, technical design etc. A potential lesson can be identified here, namely, that formal and informal face-to-face discussions and meetings will inevitably remain as a main constituent of future work at the company. This calls on the human factor again by justifying the multifaceted and multi-layered character of telework.

Externally, far from fading into irrelevance, interviews leave us with the impression that changes are needed but mainly at national policymaking level rather than at the IITS level. To name some practical aspects, interviewees unequivocally stressed that the Hungarian labor law or Expense Regulations could be dragged into the modern world by making better conditions for telework (e.g. making it easier to address paperwork issues, promoting the use of internet invoices, allowing companies to support teleworkers with printer cartridges etc., which are prevalent practices in the United States).

Hungarian companies show a relatively wide-scale reluctance to use telework (work at home, mobile working, working in telework centers) as was indicated earlier. The spread of this type of employment is hindered by various factors. To name just a few, many companies still have a backlog in establishing the necessary technological infrastructure, there are shortcomings in the employment protection regulation that does not elaborate carefully all the necessary details regarding teleworking.

Additionally, managers and executives of companies still show great resistance to telework (e.g. company leaders fear that they will lose control over their employees after introducing telework). This reflects the fact that one of the most pertinent challenges is to raise awareness of the fact that telework is not an opportunity for idleness; on the contrary, it offers a more flexible and alternative way of working.

Even though the company is a valuable member of the Telework Association which is the major proponent of that form of employment, it could not benefit greatly from this activity because of the circumstances mentioned above.

## **6. Conclusion**

In this case study we addressed the issue of telework as a specific form of organizational innovation in the case of an International IT Service Firm operating in Hungary. After a short introduction we briefly presented the relevant theoretical and empirical evidence regarding the topic. Then we turned to the concrete company which can be seen as a prime example of a successful implementation of telework. The company represents a case of telework being introduced imperatively for practical reasons (e.g. operating on global scale with time differences) and to increase employees' satisfaction rather than to boost profits. By using the major prerequisites of an impulsive innovation process unraveled by Kornai (2010), our approach aimed at acquiring a better understanding of how workplace innovation supported the selected firm's development and in what respects it can be justified as a good way forward.

In the case of our particular example, increasing flexibility and strengthening loyalty to the firm were, *inter alia*, the main driving forces behind the introduction of telework. This draws our attention to the fact that achieving cost-savings is not necessarily a priority in the mindset of the management if the company can be regarded as a well-performing global leader. In the case we have presented, the positive effects of telework, which are mostly evident in qualitative terms, exceed the negative consequences (e.g. blackout or loss of internet connection at home, isolation, the need for due self-discipline etc.). Related to this, *the case study also points to the importance of the human factor whose self-organizing skill is greatly increasing when it comes to telework.*

*The case study justifies the multi-faceted and multi-layered character of teleworking by drawing attention to its negative characteristics, which can be accommodated by a value-based management.* The company might also be a prime example of the fact that the telework-related economic literature requires further work by devoting special attention to the human factor which makes telework a more complex set of issues.

*For instance, interviews implicitly drew our attention to the 'transformative' power of telework.* This means that telework can transform and shape the customs and behavior of teleworkers.

First, telework can lead to a significantly change in the biorhythm of teleworkers due to the time zone differences. Moreover, it can also lead to laziness because of the perceptibly lower level of control from the management side. Second, telework may transform expectations regarding other workspaces. Having a more comfortable feeling when working from home in a quieter and friendlier environment, teleworkers' expectations regarding future workspace characteristics are revised upwards as a specific form of hedonic adaptation. Hence, they can easily become sensitive to noisy environments and to physically perceivable interruptions which is not the case at home where they receive more and more tasks via email.

*Another equally important aspect is that more research is needed in tackling the issue of the trade-off between home-life and work-life, and therefore promoting a work-life balance should be one of the most pivotal priorities of social and employment policies. As a report prepared by the Executive Office of the President Council of Economic Advisers stated: "A factor hindering a deeper understanding of the benefits and costs of flexibility is a lack of data on the prevalence of workplace flexibility and arrangements, and more research is needed on the mechanisms through which flexibility influences workers' job satisfaction and firms' profits to help policy makers and managers alike" (Council of Economic Advisers, 2010).*

Although telework proved to be worthwhile in the lifetime of the IT service firm investigated, we can, however, come to the conclusion that after contemplating and analyzing a myriad of telework related research one can become an expert who knows more and more about less and less because of the prevalent negligence of the human factor.

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**Annex I.**

**Best companies for teleworking**

Company	Industry
Accenture	Business Services
Dun & Bradstreet	
Federal Express	
Link Resources Corp	
RAND Corporation	
S. C. Johnson & Son	Consumer Products, Retail, Manufacturing
Sears	
Wendy's	
Weyerhaeuser	
American Express	Financial Services
Citibank	
Deloitte	
New York Life Insurance Company	
PricewaterhouseCoopers	
Detroit Free Press	Media and Publishing
Gannett	
Time, Inc.	
3Com	Technology and Telecommunications
Apple	
AT&T	
Brocade Communications Systems	
Cisco	
Compaq	
Intel	
Shared Technologies	
Xerox	
JetBlue	

Source: Fortune Magazines (2011)



## ***Annex II***

### **Fields of interviewees**

1	Managing director
2	Product launches coordinator
3	Project manager
4	Regional labor manager
5	Technical Sales
6	Technical Sales

# **Olivér Kovács – Ágnes Orosz: An Innovative High Growth SME. Case Study of NEXON - The role of non-technological innovation in a payroll, labour and HR management firm in Hungary**

## ***1. Introduction – Background and scope***

### **1.1 The rise of learning and service economies**

Economics teaches us moderation both in terms of modesty and self-confidence; however, we can claim with reasonable certainty that it is never the short term, fresh data which are crucial, but always the longer term trajectories and trends. In this regard, it is not surprising that there is a broadly accepted consensus in recent economic literature emphasising the dominance of service economies. The service sector's contribution to GDP has been growing continuously, reaching 70-80 per cent in developed countries, while the share of the service sector within total GDP has also shown a significant increase in developing countries, representing approximately 40-50 per cent (Glushko, 2008).<sup>25</sup> As far as the European employment-dimension is concerned, approximately 70 per cent of total employment occurs in the service sector and, what is perhaps even more important, more than 70 per cent of the gross value added is determined by the service sector.

Today, living in a "learning economy" (Lundvall, 2002) means on the one hand that knowledge and societies' capability to pursue the acquisition of relevant knowledge have been growing significantly and, on the other hand, the importance of knowledge has become even more emphatic in the case of the service sector. Additionally, since the consumption of services has been growing for decades (Buera – Kaboski, 2009), the rise of the service sector – including the knowledge-intensive service sectors – in terms of employment is a logical consequence of this.<sup>26</sup>

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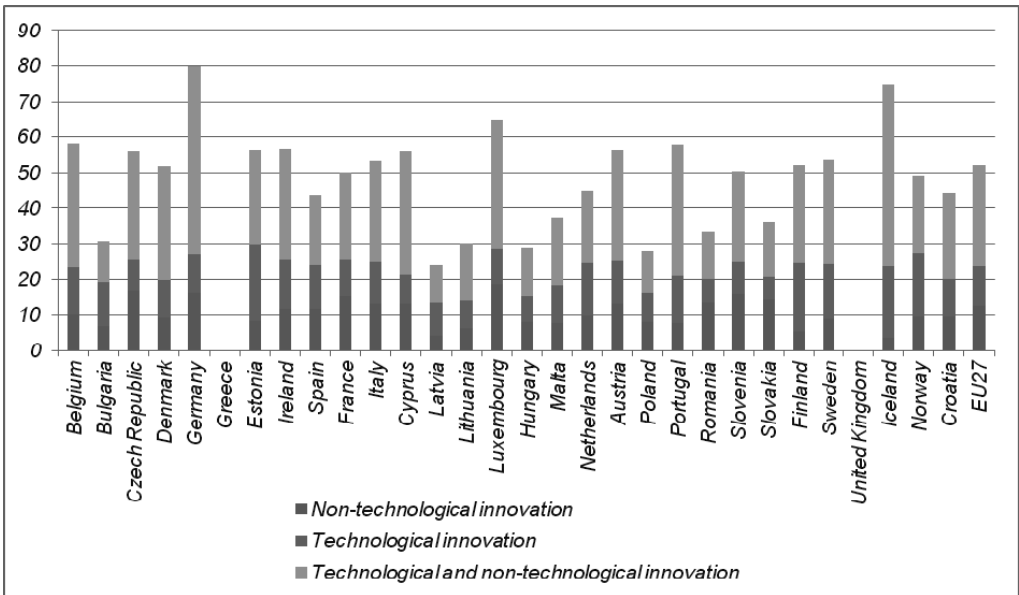
<sup>25</sup> The rise of the service sector is very noticeable in India where economic development seems to be contradicting the conventional wisdom that the sequence of economic development occurs in the following phases: agriculture-driven wealth; an economy based on manufacturing; and then the dominance of the service economy. India's big leap was the omission of the manufacturing phase by transforming itself into a service economy directly after an agricultural economy. See more: Ghani (2011).

<sup>26</sup> Based on the NACE rev. 2, the knowledge-intensive service sectors are as follows: transportation and storage; information and communication; financial and insurance activities; professional, scientific and technical activities; public administration and defence, compulsory social security; education; human health and social work activities; arts, entertainment and recreation (Eurostat, 2008).

## 1.2 The growing role of non-technological innovation in the era of the service economy

In the era of the “learning economy” with its dominant service sector, the entrepreneur - and thus the company itself – both of whom aim at being competitive can be portrayed as manifestations of the ability to discover and harness opportunities by embracing the appropriate smart combination of available technology, knowledge and highly skilled employees. This objective has led to a situation in which firms have become more likely – even in the manufacturing sector – to offer and add complementary services to the existing products-portfolio with the aim of building and maintaining customers’ loyalty in the longer run. In this sense, an intensified awareness has developed related to the need for non-technological innovations in creating added value for businesses. Since manufacturing is tending to be more service-oriented (Gallouj, 2002), the border between the manufacturing and service sectors has become blurred. In an effort to underpin our argument we turn to the statistics reflecting the fact that the combination of technological and non-technological innovation – especially product and organisational innovation – is quite a frequent phenomenon (*Chart 1*).

**Chart 1. Innovative enterprises by type of innovation activity, as a percentage of all enterprises, EU-27 and selected countries, 2008**



Note: EU27 excluding Greece and the United Kingdom. Non-technological innovation includes services, marketing and organisational innovations.

Source: Eurostat (inn\_cis6\_type)

As the Oslo Manual<sup>27</sup> rightly pointed out, differentiating between product and service innovation is starting to become an almost futile enterprise. Non-technological innovation is of paramount importance in the era of service economies (e.g. service, marketing and organisational innovation), because, as studies have shown, it can serve as an outstanding catalyst of better knowledge-management and ultimately of the company's development.<sup>28</sup> Nonetheless, distinguishing – on the basis of specific features – among innovations taking place either in the manufacturing or in the service sector is more or less feasible. In short, some pivotal differences can be identified along at least the following four dimensions in explaining how non-technological innovation (mainly service innovation) differs from the technological innovation taking place predominantly in the manufacturing sector:

*(i) Outcome:* With service innovation, there is a more qualitative outcome. Many studies have emphasised that services innovation has a significant emotional effect, as well, i.e. it generates changes in consumer perceptions of the services offered by the given firm.

*(ii) Profitability:* Numerous empirical studies have argued that most leading manufacturing firms have implemented service innovation by adding it to their existing product offerings. Recent studies have also pointed out that service innovation increases sales revenues in service firms; however, these additional revenues seem to be neutralised by increased costs, i.e. the financial resources available for service innovation cannot overcompensate the service innovation related costs (Schmidt – Rammer, 2007).

*(iii) Diffusion:* as far as the diffusion of services innovation is concerned, it is quite often hampered. At this point we should recall the issue of the firm's future expectations (European Commission, 2011). Firms are often able to predict when a given and easily adoptable service innovation will presumably be outdated. Accordingly, if the life-cycle of the given service innovation is relatively short, and it is predictable, there is no incentive to adopt that service innovation.

*(iv) Protection:* the issue of diffusion leads us inevitably to the important question of protection in the case of non-technological innovations. Patents are by no means applicable for all new services, or for all tacit or even codifiable knowledge; therefore we often see informal or, to a certain extent, strategic methods in support of protection (e.g. secrecy, confidentiality agreements etc). The significance of traditional methods of protection seems even less important if we consider the open service innovation when the outcome is not possessed exclusively by one entity, i.e. there is free access to services.

The intertwined relationship among the specific features mentioned above leads us towards the assumption that continuous service innovation is a must in the era of the service economy for firms aiming at growing in a sustainable way without damaging their competitiveness. This need may also create a continuous incentive to consider other non-technological changes, innovations (e.g. organisational innovation) or even imitations.

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<sup>27</sup> OECD/Eurostat (2005)

<sup>28</sup> See: Commission Staff Working Document (2009): Challenges for EU support to innovation in services – Fostering new markets and jobs through innovation. SEC (2009) 1195 of 09.09.2009

At this point, firms have to face a choice as to whether they will adopt an incremental or disruptive approach to innovations (Christensen, 1997). While the term “incremental” means that the basic structure and relations of the company will not change as a result of the innovation, the term “disruptive” refers to a situation in which the firm can also take a leap forward and apply innovations that are more likely to lend support to a successful adaptation to significantly changed market conditions by leaving behind the former structure and processes of the firm. Among incremental non-technological innovations we can find, for example, the introduction of project-based management practice, outsourcing, or training and coaching initiatives in fostering the firm’s performance. Disruptive innovation, for example, includes the issue of new cell phones versus old models.

Let us add immediately that this continuously innovative approach relies heavily on firms’ ability to learn continuously from internal and external experiences. To this end, the organisational setting of a firm (i.e. the evolved managerial and working concepts as well as practices that shape the structure and processes of a firm)<sup>29</sup> has to be able to reinvigorate management and employees to be engaged in expressing, discussing and eventually strategically targeting the available opportunities. This also implies the existence of a systematic effort to collect good and bad experiences and make them available in the open knowledge-base of a firm. Recent studies have also shed light on the importance of open-mindedness (Egersberg et al. 2011), i.e. the key role of “open” innovation (Chesbrough, 2006) when a company aims not only at utilising internal knowledge sources, but also aspires to gain external knowledge by receiving feedback which is indispensable if the company wants to grow further and enhance its products and services. This type of knowledge-management approach could boost the company’s competitiveness (Johannessen, 2008).

### **1.3 The issue of high-growth innovative SMEs**

In the sections above, we have briefly outlined the importance of dealing with service economies in the context of innovation, especially with non-technological innovation. Now we will attempt to further elaborate our thinking by concentrating on the issue of high-growth innovative SMEs<sup>30</sup> which are of particular importance in each economy. The reason we briefly devote attention to this topic is the fact that a plethora of authoritative studies have

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<sup>29</sup> European Commission (2010): Organisational Innovation in Services. Available: [http://www.europe-innova.eu/c/document\\_library/get\\_file?folderId=386038&name=DLFE-11417.pdf](http://www.europe-innova.eu/c/document_library/get_file?folderId=386038&name=DLFE-11417.pdf) Accessed on: 16.01.2012

<sup>30</sup> According to the OECD’s definition: “High-growth enterprises, as measured by employment (or by turnover), are enterprises with average annualised growth in employees (or in turnover) greater than 20% a year, over a three-year period, and with ten or more employees at the beginning of the observation period.” (OECD, 2009:28).

indicated that analysing the nature and evolution of this type of company could lead to a better understanding of what kind of obstacles and bottlenecks have to be addressed in a more vigorous way by economic policy engineering.<sup>31</sup>

One should not neglect the fact that growth *per se* – whether it is measured in terms of employees or turnover – is not a panacea, nor is it a strict indicator of company development. However, high-growth SMEs are more likely to help foster the job-creation which is permanently on the agenda of the European Union, as well. Still, companies are going through growth phases that are accompanied by periods of crisis which have to be addressed through - for example - innovation. This can happen through a variety of initiatives within the organisation, exploiting, for instance, the non-technological innovations indicated earlier.<sup>32</sup> As Lilischkis (2011:10) emphasises: “[...] while high growth may often stem from innovation, this innovation does not necessarily need to be technology-related”. Innovative approaches (e.g. incremental/disruptive, open innovation etc.) may fuel an increase in growth potential and also gear it towards sustainability.

Contemplating the nature of companies – including their growth phases (Greiner, 1972) – that have achieved rapid growth and can be portrayed as innovative has revealed some important issues that are also of key importance from the perspective of policymaking.

There are certain lessons to be drawn from the empirical findings on innovative high-growth SMEs in this regard. These lessons take into account the fact that growth phases are beset with difficulties which require significant responses from the firm in terms of how they learn by doing (Littunen – Niittykangas, 2010). It also implies that the general economic framework provides a fertile ground for such changes and innovations. This is crucial, if for no other reason than because the firm also has to be able withstand the consequences of a failed innovation. Furthermore, fertile ground means, *inter alia*, that the regulatory barriers as well as obstacles to access to finance are minimised in parallel with the bureaucratic and administrative burden on SMEs, and that knowledge creation and utilisation opportunities are provided either by the company or other organisations (e.g. certified coaching programmes).

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<sup>31</sup> See for example: European Commission (2011b): Policies in support of high-growth innovative SMEs. An INNO-Grips Policy Brief by empirica Communication and Technology Research. Principal author: Stefan Lilischkis. Bonn.

<sup>32</sup> See: Greiner and Schein (1988); the authors consider which mix of managerial power and organisational development can best improve efficiency and growth potential.

## **2. Company case study – the NEXON payroll and HR management firm**

The company NEXON – owned exclusively by Hungarians and specialising in the development and sale of HR management software, consultancy, payroll and HR-outsourcing as well as adult training – can be seen as a prime example of a high-growth innovative SME. In the following sections we emphasise that the case of NEXON is best understood as a continuous user-centred non-technological innovation that has been driving its high-growth. Its example is also able to focus attention on the importance of business sector specifications that might negatively influence the company's growth outlook.

### **2.1 How to become a high-growth innovative company**

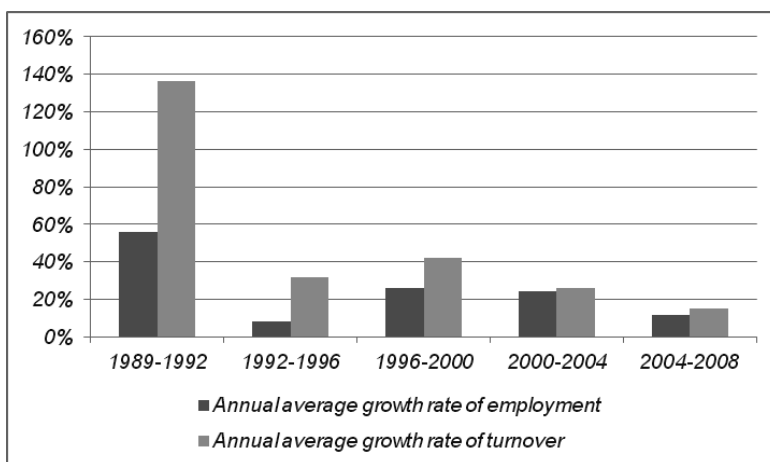
As the leading Hungarian company, NEXON is specialised in computer programming with the aim of offering a unique portfolio of complex solutions for payroll, labour and human resource (HR) management for companies operating in Hungary. The firm's services have undergone developments generated from within the company which are geared more and more to the needs of clients. This user-centred focus was already present at the outset, when only five people came together with the idea of creating a software program that was more likely to outstrip all competitors in the computer-based payroll system market.

Nowadays, NEXON offers comprehensive software applications and services. Behind the company's success was, to a large extent, its unique history which goes back to the mid 1980s. The idea of placing payroll applications onto a strong IT platform used to facilitate game programmes was an internationally innovative one. With this extraordinarily strong IT backing, the payroll application was guaranteed to make a significant step forward since it substantially outshone the performance of payroll solutions provided by competitors. This innovative idea born in a "garage" sparked the interest of larger companies, and thus offered a chance to be a first mover and to sell a great number of applications. Eventually, the firm was founded in July 1989 and 70 large companies were already among its clientele.

Beyond the fact that the payroll application was by far the best performing one in Hungary, the firm aspired to seize every opportunity to enhance the quality of the already existing application to extend the range of services provided, by incorporating labour and HR management support solutions. As the number of clients grew, the average annual turnover showed a noticeable growth as well. NEXON proved to be a high-growth innovative SME.

In the first three years, NEXON enjoyed the trust of clients, as was clearly illustrated by the fact that the company increased the number of contracts from 60 to 230 between 1989 and 1992. The growing trend continued as well, reaching 1200 clients by 1998. Up until 1998, the number of employees was still below 50; however, a turning point arrived in 2000 and the number increased to 65, while the circle of clients also expanded to 1700. By 2004, the number of clients was approximately 2400; the organisation required additional skilled workers and thus the number of employees rose to 155. Today, NEXON provides services for 3000 clients and therefore supports smooth payroll management for approx. 1 million employees in Hungary.

**Chart 2. NEXON as a high-growth innovative SME**



*Source:* data are calculated on the basis of NEXON's official documents.

As regards the annual turnover in absolute terms, NEXON has performed outstandingly since its foundation. In 1989, the firm earned HUF 4 million, increasing to HUF 650 million seven years later, and HUF 2.9 billion in 2010 (approx. EUR 10.5 million)<sup>33</sup>.

Still, as *Chart 2* shows, from 2004 onwards, NEXON's growth potential in terms of annual average turnover seems to be lower than it has ever been. There are at least three reasons behind the slowing growth performance. Firstly, the once unique advantage of NEXON – i.e. the high performance gap regarding the performance of programs and services offered relative to competitors' solutions – had largely evaporated by the mid 2000s. Secondly, the specific features of this business sector in Hungary do not provide much room for manoeuvre with respect to growth. And last but not all least, the recent financial and economic crisis has

<sup>33</sup> The exchange rate used is the ECB rate of December 31, 2010: EUR 1 = Hungarian Forint 277.95.



put repeated obstacles in the path of potential new Hungarian clients - ranging from SMEs to multinational enterprises - by forcing them not to invest in training or in new software installation so confidently. As Hungarian SMEs and multinationals have proved not to be immune to the impact of the crisis, one of the logical repercussions was the fact that NEXON was also affected negatively, although it seems that this effect was only temporary. In 2009 the number of employees was 5.8% lower than in 2008 (in 2010, it stagnated). As far as the turnover is concerned, it fell by 1.12% from 2008 to 2009; however, it started to regenerate in 2010, growing by 3.7%.

### **2.1.1 Specific features of the given business sector**

Without doubt, the payroll, labour and HR management system market has gone through an epochal transformation since the mid 1980s. After the introduction of a western-type tax system, the demand for payroll and tax-related knowledge suddenly increased. It was primarily re-intensified after the regime change by which time NEXON was already present on the market.

On the one hand, there are certain important characteristics of this business sector that are easily interrelated. As firms grow they are more likely to invest in payroll, labour and complex HR support solutions. Furthermore, since by now the use of ICT has become a ubiquitous phenomenon, there is an inevitable bias towards computer- and Internet based applications and services.

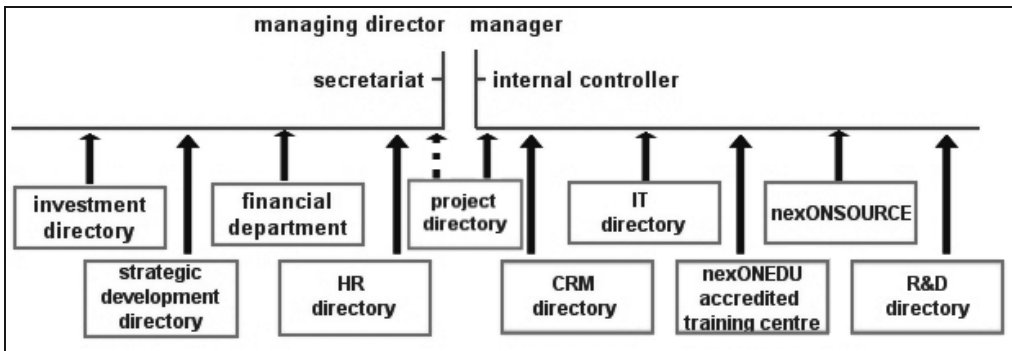
On the other hand, ignoring the fact that the exposure of this business sector to tax-, wage- and labour policy developments is extremely high and that these small and often fundamental changes have been occurring in a rather hectic way in Hungary since regime change, would lead to a misunderstanding of the conditions of this market. This fact *per se* creates a coercive power directing firms towards an approach whose purpose is to reduce costs (related to obtaining information regarding the legislative changes in tax, wage and labour policy) and the time spent on these types of activities by, for example, using the services of a payroll company.

This also implies to a certain extent that the major problems arise from newly installed programs and services provided. In an effort to meet the requirements of clients, application service providers like NEXON have to be able to tackle not only standard tasks and routine, but also specific and often unique problems. Granted that this is a driving force for innovation, it does, however, require the kind of a country-specific specialisation that presumably undermines the opportunity to make significant steps towards international markets.

### 2.1.2 Organisational background, products and services

NEXON's organisational structure reflects the importance of permanent learning through experience in the interest of an improved user-centred service development. If a firm intends to create and maintain an innovative milieu, its functional units have to be part and parcel of each other. NEXON has therefore been pursuing a day-to-day operation which enhances the transfer of ideas and knowledge among the various parts of the firm with a view to preferring a flat organisation rather than pushing a strict hierarchical structure (*Chart 3*).

**Chart 3. Organisational structure at NEXON**



Source: NEXON

At the beginning, a holistic approach dominated the business, meaning that one person had to acquire many skills. As time passed and the processes and business operation became more sophisticated (e.g. mainly due to the widening product and service portfolio), more and more functionally separated fields evolved with specialised skills and competences. This is, on the one hand, instructive, if for no other reason than that in this way the organisation is ready to open channels of communication among highly specialised workers; on the other hand, recruiting new employees with the necessary competences has become more and more difficult.

As far as the distribution of 226 employees (in 2010) is concerned, the largest proportion work in the field of outsourcing (approx. 50%), while 10 per cent are mainly in IT related fields such as programming, system organisation and software development. Additionally, NEXON's training activity has also become more and more emphatic over time; the number of employees involved in training has consequently shown a significant growth reaching 2-3% of total employees. As regards the necessary expertise, employees dealing with payroll

issues (and sick benefit payments, maternity leave and tax return issues etc.) need to be experienced professionals with highly qualified knowledge. This also holds for NEXON's training activity where highly qualified expertise is a must. With outsourcing, NEXON does not expect the employees to have a higher education degree in any case.

Thanks to continuous development and innovation, NEXON has been able to offer a "flotilla" of state-of-the-art applications and services for its clients:

**The nexONBÉR** payroll management system is completely geared towards the needs of companies coping with payroll management issues such as payroll, labour, OEP (Hungarian Health Insurance Fund) benefits, monthly e-returns, management information systems and benefits (cafeteria). nexONBÉR can be seen as the latest generation of NEXON's payroll management system, and it embraces a minimum of 20 years experience in this field by guaranteeing updating in response to regulatory changes for the convenience of clients (irrespective of the fact that they are operating in different sectors with different company sizes).

**nexONHRM** is a complex HR system which improves company operation in the fields of recruitment-selection and training-development as well as performance management; and it therefore helps companies gain the highest return for their investment in human capital. This highly flexible software can be adapted to the variable needs of different companies. A genuinely important advantage of using this software stems from the easy and user-friendly operation of the web-based user interfaces. With this software paper-based administration can be reduced owing to the application of cutting-edge communication channels, and it also eliminates organisational problems.

**nexONTIME** aims to combine various indispensable applications and services with special attention to the following areas: entry, planning, registering and accounting for working time. Ameliorating these tasks is a key issue of efficient management in the life of SMEs and of multinationals, as well. By using this entry, and time, and attendance accounting software the management has the opportunity to monitor and analyse the performance of employees; not to mention that anomalies in payment and resource management related issues can be much more easily identified.

**nexCAFÉ** as a hands-on tool supports companies in planning and running a 'cafeteria' system (i.e. a mixed package of benefits) comprehensively. By using the help of NEXON consultants proper cafeteria rules can be established in favour not only of the management, but also of the employees.

**nexONSOURCE** allows client companies to establish a state-of-the-art and cost-effective operational background. Outsourcing the payroll management to the expert area allows the company's management to focus on the core business activities. Beside this positive impetus, professional payroll management clients will also be able to reduce their equipment and labour costs by using nexONSOURCE.

**nexONEDU Training and Exam Centre** was created with the objective of providing permanent accredited adult training opportunities for those aspiring to acquire a deep and reliable knowledge of payroll and HR management. These fields clearly require stable skills and competences, especially in such a turbulent legislative environment as Hungary. Beyond regular courses (Hungarian Training List) including payroll administrator, social security administrator and social security and payroll specialist, the Centre also offers professional training, for example, on nexONBÉR or on the theory and practice of working time management.

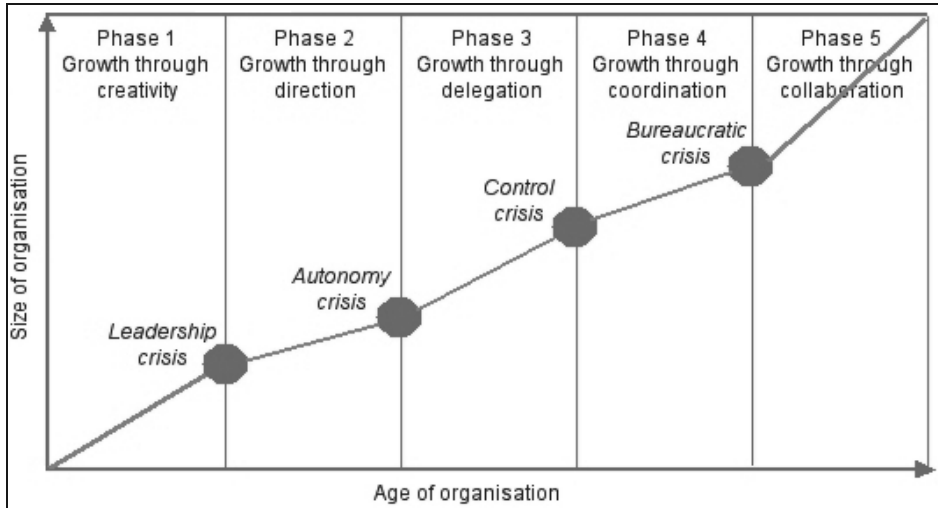
As these briefly described brands show, NEXON places special emphasis on services. The company provides an elevated level of customer support services such as the indispensable legislative monitoring and functional enhancements, maintaining and managing its own customer portal, providing operational support, and telephone and e-mail help desk opportunities. Additionally, NEXON also demonstrates its expertise through intensive consultancy. Moreover, instead of abandoning itself to the pleasure of already provided services, NEXON has just recently started to provide hosting services based on the cloud methodology.

### ***2.1.3 Company development: drivers and barriers***

The economic literature on SMEs has for decades been full of investigations of organisational life-cycles especially on growth phases (Adizes, 1989; Churchill – Lewis, 1983; Greiner, 1998). Each growth model gives a mainly theoretical background on how a company grows, but sometimes they are not based on comprehensive empirical analyses (McMahon, 1998; Perenyi et al. 2008).

Still, these models are of great importance in deciphering the major drivers of, and barriers to, a company's growth. To this end, we turn to the well-known growth model elaborated by Greiner (1998) which gives us a tool to understand how non-technological innovations happen through growth phases.

**Chart 4. The five phases of growth (Greiner model)**



Source: adopted from Greiner (1998)

#### Phase 1: Creativity

Since its foundation NEXON has been able to exploit the potential latent in doing payroll tasks on an IT basis; during this phase the driving force of growth was creativity. The incredible growth rate during the first growth phase (1989-1992) can be viewed as the company finding a market niche at the dawn of the introduction of PCs. There is an inevitable link between the development of computerised payroll accounting in Hungary and the company's development. The above 130 per cent annual average growth rate could not be sustained for a longer period; it was a consequence of entering a new market with extraordinarily performing programs and services. Noticeable development occurred in terms of employment as well, the number of staff almost quadrupled, increasing from 5 to 19. Phase 1 ends with a leadership crisis as Greiner (1998) outlines and emphasises that a professional management is needed in response to the challenges arising from the lack of proper coordination.

#### Phase 2: Direction

In 1992, the two founders faced challenges in the management regarding the issue of how to react adequately to the dynamically changing circumstances (e.g. the growing complexity of business operation due to the widening range of programs and services and the hectically changing legislative environment). In an effort to have a much more balanced direction,

NEXON resorted to non-technological innovation (service, organisational) with the establishment of the separate software development and customer service units. As a result of these changes the company was not only able to extend its market share, but also had a chance to fulfil all the requirements needed for its first MSZ EN ISO 9001:1996 certificate in 1996. By using international standards, the quality assurance system of NEXON covers the whole range of product and service development. Still, a certain need has remained for the further institutionalisation of tasks and responsibilities in accordance with the suggestions of Greiner model. Phase 2 results in a crisis of autonomy which calls for more delegation.

### Phase 3: Delegation

The next milestone came with a service innovation in 1998, when NEXON created the outsourcing unit with the idea of providing cost-saving solutions for companies. This entailed a more decentralised organisational structure, as well. Moreover, in 2000 there was a territorial expansion with the company opening four new offices in Hungary. In 2004 a new individual company division was established for training activity, and an Accredited Training Centre was also founded. This was also the time when NEXON started to host services on the basis of the cloud methodology. Although these changes contributed to the evolution and strengthening of a flat organisational structure, they also led to a control crisis echoed in the Greiner model, demanding more dedicated coordination.

### Phase 4: Coordination and monitoring

As a response to the control crisis NEXON strove to improve coordination by introducing standardisation and formalisation techniques in a more vigorous way. For instance, they put much more emphasis on workload projection by creating an annual service calendar as a process innovation in order to optimise the business operation. To this end, NEXON has been involved in close cooperation with its clients. In an attempt to avoid redundancies, NEXON created a Customer Relations Management Directorate with a service innovation called a one-stop-shop service. These processes did not prove to be sufficient to deal with all of the shortcomings arising from the control crisis. It was more than obvious that a much more sophisticated head office function was required to initiate cooperation among the different units. In doing so, NEXON set up the HR Directorate as a separate unit brought about by the need for better HR management in response to the increasing number of employees (i.e. the number of employees had reached the critical level of 200 by 2006). This organisational change was clearly a manifestation of the division of operative and strategic objectives. Furthermore, better coordination also meant the establishment of the Project

Directorate which is responsible for the prudent management of internal processes. Formalisation can often be taken too far, which may cause a bureaucratic crisis as is discernible in the life of NEXON, as well. This is in line with the model which predicts that Phase 4 ends with some sort of bureaucratic challenge that calls for a more flexible organisation with a view to intensified collaboration.

#### Phase 5: Collaboration

For further collaboration, NEXON moved towards a project-based approach, which not only helps clients to be served much better, even at the stage of installation of new applications and services, but also fosters the flow of information within the organisation. Additionally, the request for more collaboration has been addressed by NEXON by concentrating on cooperation and interaction with clients and partners on professional issues in a more vigorous way (e.g. products on concurrent platforms, ORACLE). Involving clients' own expertise (i.e. open innovation) means better knowledge of relevant and expected future needs to be pursued by the company. As the recently established unit, the Research and Development Directorate exemplifies, cooperating with partners by inviting their experienced developers (e.g. from Microsoft) into the R&D Directorate team is of great importance in the current state of NEXON's development.

After contemplating the five growth phases, and keeping in mind the moderating growth dynamic of NEXON, one may conclude that NEXON needs to tap new markets by stepping into the international arena. Nonetheless, expansion in international markets seems to be a rather delicate issue for NEXON, if for no other reason than it is so extremely specialised in applications and services that are fully geared towards the special features of Hungarian legislation.

## **2.2 The role of incremental non-technological innovations in the company's development**

At this point, the more intriguing question is to ask what innovative fields have been driving the still spectacular – although moderating – growth rate of NEXON, and whether they still have any potential to be utilised in near future. In the following sections we concentrate particularly on the issue of non-technological innovation which has contributed to NEXON's development with the aim of drawing some lessons for its future prospects, as well.

### ***2.2.1 Building on an intensified customer relationship***

Since NEXON defines itself as an IT developer and service provider, forgetting the fact that the customer service aspect is of key importance when the number of clients exceeds 3000 would be a fatal conceit. Both old and new clients prefer the fastest and most efficient way of problem solving. NEXON therefore established and then heightened the role of CRM within the company. The CRM Directorate has been created by providing a call centre and various contact opportunities.

CRM and the relationship with clients are both extremely necessary if a company wants to leave behind conventional wisdom that holds that a company can grow as if it were in an ivory tower by concentrating exclusively on its internal dimensions. When problems or anomalies arise from the clients' side, CRM and the call centre absorb and collect all valuable information which seem to be relevant to localising the problem, converting it into a feasible task, and what is more, doing all this in a more efficient way. This is a noticeable step towards the concept of open innovation when it is not only software developers who are involved in the development processes, but also partners and clients.

Employees working in the field of customer relations are expected to have all the knowledge that might be needed to tackle problems. Moreover, they must always upgrade their skills and acquire knowledge about recent changes, whether it is a version change of an application, or a legislative amendment. Normally, the issues arising are standard ones that can be resolved routinely. Nevertheless, there is a formalised way of problem solving if the given issue requires CRM to involve other company units (e.g. IT, training, outsource, project directorate) in order to get relevant answers.

Dealing with customer needs is also supported by NEXON's internal innovative initiatives. For example, before launching the new HRM performance assessment solution, NEXON applied it to its own HR system and tested it by offering a unique opportunity for CRM-employees, as well, to draw lessons and learn how it really works. Another step forward was the introduction of the one-stop-shop method.

Putting customer needs at the centre also entails an intensified follow-up function. Although NEXON provides organised training and exams with certificates, clients often demand support services on the spot. NEXON not only instructs on its applications and puts them into use, but also updates them which can be seen as a service novelty.



Taking into account that the tendency now is for the traditional way of organising a business along functions to be replaced by a faster changing project-based and therefore project-structured organisational form, the HR applications face new and more complex challenges. NEXON therefore provides a state-of-the-art application which is capable of following dynamically the evolution of the given company structure. This also implies that sometimes more information and details are needed by the clients. Feedback received often leads to minor or major revisions in system organisation, development and testing.

CRM as a tool for more demand-driven (user-centred) innovation has become a growth-engine in the life of NEXON, and its experiences also triggered the introduction of more vigorous knowledge management and training activities by keeping up the buoyancy of growth.

### ***2.2.2 Knowledge transfer and training***

In order to have an opportunity for self-dynamic learning, firms increasingly accept the fact that value is the output of a permanent collaborative process between customers and providers (Lusch et al. 2008). This view has been developed in an independent way at NEXON. In the first few years, there were perceptible shortcomings in the systematically coordinated development, i.e. different and not clearly conceptualised development ideas came to light each year from the software development side. It required a managerial effort to collect more information and to filter opportunities out of this information in an intelligent way.

Subsequently, a more systemic knowledge management has evolved to assist in a better knowledge transfer that also drives creativity and innovation. The major elements of the systemic effort were as follows: process monitoring and registering, documenting and assessing, and then making the formalised knowledge base available to employees affected (still, some of these elements have been delayed).

In addition to this process innovation, a conspicuous organisational innovation also took place when the firm started to recognise the importance of the distinction between operational and strategic decisions (i.e. taking into account, for example, product and service life cycles) even at the level of product and service development. To this end, NEXON set up an integrated development environment (IDE) as an organisational innovation (Lynch, 2007) which serves as an inspiring climate for its established developer team. This team (approx. 18 workers) enables NEXON to react more flexibly to the legislative changes by carrying out the necessary modifications in the applications offered.

But what is perhaps even more important, a project-based approach, as an organisational innovation (Martins et al. 2006), started to pervade the company's development. Thinking and working with projects not only helps the employees' work, but a project perspective also guarantees that customers will receive more attention and they will therefore be given higher quality service. In 2011, NEXON took a further step by establishing a program for technology development with the creation of a totally new organisational unit, the Research and Development Directorate which is in charge of managing the methodology of software development.

The knowledge of how to deal with the complex set of issues involved in project management has been built as a kind of "internal breeding". This was also true in the case of payroll and labour issues in the beginning, i.e. NEXON hired employees and then taught them how to use NEXON software, hence the professional skills have been incrementally acquired.

Concerning the training activity at NEXON, it was a result of experience regarding how clients can cope with software and service developments, not to mention the difficult issue of being always up-to-date in payroll, labour and HR-related regulatory developments. By collecting experiences and problematic issues recurrently arising NEXON had an opportunity to create shorter and longer training courses with the aim of avoiding such problems in the future.

Training courses are designed *(i)* to help old and new clients to rapidly obtain knowledge of NEXON's products and services whereby the firm's sales potential is strengthened; *(ii)* to offer 1-3 day training courses on indispensable regulatory changes and version upgrades; and *(iii)* to provide accredited OKJ (Hungarian Training List) training (e.g. payroll administrator, social security administrator, and social security and payroll specialist) and professional training courses on, for instance, the cafeteria systems for users. In this regard, in 2005, NEXON received the institutional accreditation status issued by The National Institute of Vocational and Adult Education. This status is recognised as the highest qualification and valid up until 2013.

Instead of following the old routine when knowledge was given in just one enormous package to each client and then they were left on their own to get on with it, NEXON's current training courses are organised in a modular way. Despite the fact that Hungarian legislation does not completely allow NEXON to have highly standardised training, a modular method helps to a certain extent to acquire and deliver thematically standardised hands-on

training schemes. Additionally, this method gives clients an opportunity to plan better. In order to save client companies' extra working hours spent on courses delivered outside the firm, NEXON provides training on the spot and, what is more, e-learning (e.g. online training complemented with interactive online conferences with live streams) has also been developed.

### **2.2.3 Outsourcing as a source of further growth**

In the era of the service economy, outsourcing some activities that were once part of the day-to-day running of firms has become a prevalent practice worldwide. The basic driving factors behind outsourcing are competition and the pressure for permanent cost-reduction without endangering product and service quality.

If we take a glimpse at the trends of the most promising and growing fields that are currently being outsourced by SMEs and multinationals, we might conclude that outsourcing business processes (BPO) has started to inexorably outpace the volume of IT outsourcing. There is a growing demand for services related to customer management BPO and HR outsourcing (Push, 2011). Companies competing in the market have recognised that there is a potential for cost-reduction *via* outsourcing activities that are extremely time-consuming, especially in Hungary. Following the regulatory changes, updating the HR system and calculating the payroll for employees deprives management to a large extent of the ability to focus on areas that are conducive to profitability<sup>34</sup>.

NEXON shares the line of thinking which believes in the above mentioned course of development and consequently provides an outsource service (nexONSOURCE) in the fields of payroll and complex HR administration (e.g. entry, and time and attendance accounting). Today, approximately 50 per cent of NEXON's annual turnover is determined by the outsource service. All clients who use NEXON's outsource service have online access to their own systems.

Another novelty (innovation) emerges at this point, because NEXON is pursuing the incorporation of a project-based approach for outsourcing, as well. This is of key importance in localising problems and converting them into solvable tasks by anticipating the time and resource requirements in advance. With project-based outsourcing the customers' needs are placed at the focal point of NEXON's attention. This goes beyond the conventional mode of

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<sup>34</sup> See the paper written by Görg and Hanley (2008) in which the authors empirically demonstrated the positive impetus of international outsourcing on firms' profitability.

outsource service provision, because it gives NEXON an opportunity to deal with clients' special issues. For example, when a client suffering from a substantial backlog asked for special treatment, various affected organisational units joined together in the interest of eliminating the backlog in the fastest possible way.

Beside this type of BPO, NEXON's example proves that cloud hosting and Seas (software as a service) are close connected. NEXON also considers that Hungarian firms and foreign firms operating under Hungarian regulations aspire to increase their competitiveness without investing excessive sums of money in the establishment of complex IT systems. NEXON has therefore put its applications into the Invite Data enter and offers them in the form of Seas which minimises customers' costs (the price is calculated on the basis of effective usage, hence it can be changed in a more flexible way).

It is important to emphasise that NEXON always considers hybrid methods of service and application provision, because of the fact that there are, on the one hand, companies which demand adopted and customised versions of applications and services (e.g. outsourcing), whereas others require standard versions without any modification. The latter group of companies can be served through the Seas approach described earlier.

### **2.3 Evaluation, crisis and prospects**

As far as its major achievements are concerned, NEXON has been successfully manoeuvring itself by regularly reinvigorating its creativity and innovativeness. In the previous sections, we have emphasised that there are at least three specific dimensions that lead NEXON's growth.

When it comes to the issue of customer relations, NEXON has made great strides in an effort to increase the loyalty of its clients *via* convenient customer support services.

As regards the knowledge management and training activities, whose linkage to the outsourcing activity is also observable, NEXON has been devoting increasing attention to the creation of a common knowledge base. Let us add immediately, process and project evaluations have not reached a sufficient level yet.

Even though NEXON will enhance not only the internal knowledge base, but also bridge the knowledge gap on payroll, labour and HR administration for company administrators, there are still numerous SMEs without financial resources and skilled administrators. These companies are not able to send their administrators to training courses (not to mention that

3-day training courses are not enough in this case). This in itself draws our attention to the fact that NEXON seems to have reached the limit of its dynamic annual growth-rate, as was indicated earlier.

As the recent financial and economic crisis – beginning in the third quarter of 2007 – spilled over to European countries, firms tended to introduce measures promising significant cost-savings. One should take into account that the Chinese language considers the term ‘crisis’ as a phenomenon representing danger and opportunity at the same time. Accordingly, providers and clients have opportunities, especially if they think in an innovative way.

Under the intensified pressure created by the crisis, firms are more likely to consider outsourcing their activities to, for example, NEXON. It is hardly by chance that NEXON did not need to resort to large layoffs; instead, its management have carried out quality replacement with an infinitesimally low number of redundancies. Presumably, the reason is that fulfilling the requirements of clients using the outsource service entails a more intensive workload for NEXON which has to cope with an ageing professional workforce, meaning that the availability of highly qualified younger workers (especially in the field of payroll management) is rather limited. This sheds light on the fact that NEXON’s development is heavily reliant on its highly specialised employees.

Crisis can also bring a new *élan* into firms’ innovativeness by emphasising the role of human resource management. Firms are forced to review their systems of motivation, training practice and performance assessment. For these fields, NEXON offers complex and noteworthy solutions. As NEXON illustrates, there is a chance for further development of its existing product and service portfolio by incorporating the newest needs of the Internet generation. NEXON is therefore introducing the next generation of its applications and services for smart mobile phones and progressive user platforms in 2012.

### **3. Conclusion**

With the rise of the service economy, the role of non-technological innovation has been growing. Innovative companies such as NEXON which show high rates of annual growth in terms of annual average turnover may serve as a fertile ground for analysing how non-technological innovation is used to overcome the different growth crises described by Greiner.

As was clearly discernible, NEXON has been driving its growth by resorting to various types of non-technological innovation, mainly to organisational, process and service innovation (e.g. creating developer teams, pursuing a project-based approach, using both internal and external sources of knowledge). These innovations were mostly able to enhance performance incrementally.

Bearing in mind that NEXON's growth pattern has recently been showing certain signs of maturity, we can claim with reasonable certainty that NEXON has not been fully prepared for international expansion, mainly due to its extremely specialised products and services which are adapted to Hungarian circumstances.

As a corollary, NEXON's case delivers relevant messages on at least at two levels. As far as the company level is concerned, the example of NEXON focuses managers' attention on the necessity of having marketing and project management skills and experience even at the initial stages of growth. This in itself can be linked to the policymaking level by advocating the need for coaching, training and interim-management opportunities. NEXON's example is able to call our attention to the importance of business sector specifications that might negatively influence the company's growth prospects. Concerning the level of Hungarian economic policy, a good environment is a must in fostering not only the internationalisation of companies, but also the emergence of innovative ideas within the company's walls. In this regard, a more calculable and stable regulatory environment would be the most expedient way forward, both for service providers and customers. This would be likely to unleash the international growth potential of NEXON by allowing it not to be so heavily specialised to Hungarian circumstances.

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# **Edit Barizsné Hadházi, Zsuzsanna Kiss, Miklós Illéssy: The Introduction of a Web-based Communication System at the Medical and Health Science Center of the University of Debrecen**

## ***Introduction***

The objective of this study is to analyse the process of the implementation of a web-based communication system at the Medical and Health Science Center of the University of Debrecen (DEOEC).

In the case study we aim to analyse the processes related to the introduction of the technological innovation, and to reveal both the facilitating and impeding factors of the implementation process and the reasons behind them.

Therefore, between November 2011 and February 2012, we conducted 7 interviews at the Clinic, one interview at ISH Informatika Kft., and one interview was set up in Dunaújváros with the individual in charge of the IT department of the local hospital.

Each interview took roughly one hour, during which we aimed to understand the issues related to the implementation of the E-MedSolution software with the interviewee. Initially, all participants were requested to briefly summarise the implementation process and then to sum up the possible causes of the issues so we were also able to tackle any remaining unanswered questions.

All but one interviewee agreed to tape-record the discussion, which later enabled us to accurately - even word-by-word - recall their opinions during the analysis and to illustrate this study with quotes, as can be seen below.

Following the interviews, we gained an overall picture of the events on one hand, while we were also seeking to answer whether technological innovation accompanies organisational innovation. If this is the case, on what basis can we make this statement, if not, what were the obstacles which prevented it? We endeavoured to make recommendations based on the

findings in order to allow the people involved to learn from the experience in a similar situation in the future.

The following table highlights the main details of the interviews.

**Table 1. Interviews conducted<sup>35</sup>**

<b>Interviewee title</b>	<b>Interviewee position, place of work</b>	<b>Date</b>
Lead representative of the Centrum-president Office	DEOEC Centrum-president Office	17.01.2012
IT Specialist	ISH Informatika Kft.	12.01.2012
Doctor, Cardiologist	DEOEC Cardiology Clinic	18.01.2012
Administrator	DEOEC Neurology Clinic	24.01.2012
Doctor, Cardiologist	DEOEC Cardiology Clinic	26.01.2012
IT Specialist	DEOEC Centrum-president Office	06.01.2011
Doctor, Physician	DEOEC Institute of Internal Medicine – 1. Internal Medicine Clinic	24.01.2012
Doctor, Neurologist	DEOEC Neurology Clinic	21.11.2011
Head of IT department	Szent Pantaleon Hospital Dunaújváros	10.02.2012

The study begins with a literature review and then we demonstrate the special features of health services as an industry. Following the overview of the two institutions – DEOEC and ISH – involved in the implementation of the e-MedSolution software, we continue with a process description, a detailed outline of the findings and then summarise the primary issues

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<sup>35</sup> The interviewees listed above were all either members of the test group created to launch the e-MedSolution system or were actively involved in the implementation of the system. We consider the interview conducted at the Dunaújváros Hospital important as it adds a different, more objective, angle to the interviews conducted at the Clinic. In this case, there was no full case study developed on the launch of the e-MedSolution system as a consequence of limited resources but the interview serves as a supplementary source of information in our study.

## **1. Literature Review**

Based on the findings of a national and international literature review we can argue that the recent use of information technology by health institutions plays a key role in terms of capacity, cost efficiency, organisational transformation, flexibility and, certainly, medical attendance. The number of technological innovations in the health services is extremely high, and new diagnostic methods and procedures spread relatively quickly.

The implementation of information and communication technology (ICT) has nowadays reached public services, education and health services, while e-administration, e-learning, off-site work and off-site therapy have become generic. Patient records are administered with the help of computers in nearly every doctor's office but in the majority of locations the use of hard-copy patient records is still common.

The 2005 study of the IT3 Műhely predicts the market economy transformation of health services: patient financing, institutional funding and provision of medical services are likely to be split up. In medical IT, reliability, software quality, quality assurance, system linkage and data protection expectations will be greater than in other sectors. The spread of ICT in the medical sector will likely occur similarly to the banking sector: first the roles are clarified and then role-based IT services will evolve on business grounds (*IT3 Műhely 2005*).

According to the study conducted by the e-Health Competency Centre, e-health services is a complex concept that covers the IT background of hospitals, intelligent therapeutic systems, the different methods of off-site therapy, mental and physical rehabilitation, at-home monitoring and protection systems, new approaches to improve lifestyle, and online services.

The Hungarian health service is in need of a complex reform; in most cases it is outdated, inefficient, and loss-generating. The life expectation of Hungarian citizens is worse than people living in countries with a higher standard of living. The number of false diagnosis is significantly greater in Hungary, people visit the doctor on more occasions and often unduly, and the mortality rate is also rising. The reason behind these phenomena is not only the shortage of financial support but the inefficient utilisation of existing resources. It is indisputable that e-health services is a field of key strategic importance for Hungarian society in the coming decades.

Based on research studies carried out by the e-Health Competency Centre, the development of the national e-health service does not solely benefit the health services and governmental sectors but has positive externalities in many other areas, for example:

- in the business sector it offers a highly dynamic national and international market for services and products;
- it can improve the living standards of the elderly;
- it can improve the psychological safety of people in need of nursing and supervision;
- it can support a more efficient assistance of the civil sphere;
- it can reduce the infrastructural disadvantage of rural areas in Hungary;
- it allows the urban population to have access to all around, higher quality services (*e-Health Competency Centre, Information and Communications Technology and Trend Research Centre*);

## **2. A Brief Overview of the Health Services Sector**

Prof. Éva Orosz – analysing the participants in the health services system in her study – considers of primary importance the situation of participants - their interests, efforts, inter-connections, their functions and the existing (or missing) conditions necessary to fulfil these functions. The determining factors of the participants' positions are: (a) their share in power (scope of authority and autonomy), (b) available resources, (c) prevailing ideologies and fundamental attitudes and (d) professional tools/technologies available. These four factors are not independent of each other. The distribution of power has a great influence on the participants' capability to access the available resources, while power itself – without an adequate concept behind it – is not enough for a successful reform, and an appropriate plan can remain unfulfilled if the necessary technical and professional conditions are not available.

A potential grouping of the participants in the health services sector identifies the following principal actors:

- patients, consumers
- service providers (doctors, health services employees, health institutions and the owners and management of the service providers),
- funding providers (private insurance companies, compulsory insurance company(ies), national health service authority),
- education, research and development providing the human resources for health services (as well as institutions fulfilling these functions),
- bureaucracy (central and local government),
- politicians (governing parties and opposition),
- professional and lobby organisations of employees in the health services (chambers, unions, etc.),
- civil interest groups (health protection movements, patient rights organisations, etc.).

It is difficult to define the boundaries of the health system; a broader definition includes the manufacturing industry which produces some of the inputs for provision of health services (medical instruments, equipment and medicine). According to a more narrow definition, activities with the fundamental or direct objective of health provision, protection, recovery and improvement are the only elements in the health services system. The direct objective in the case of the supplier industry is the sales of their products. Using this definition as a starting point, the investment or the medicine consumption (related expenses) of health service institutions are part of the health services system but the manufacturing of equipment is not.

According to this broad definition, the health services sector includes and connects different markets: the market for capital goods, the labour market, the market for material and consumable goods etc., which are produced by medical device manufacturers and the market for health services. Health services institutions are present as buyers on the market for medical devices and pharmaceuticals. The relation of these markets defines the cost of services where free prices, unregulated conditions and aggressive market behaviour are typical, with institutions having a marginal influence on prices. The other element is the service market where the hospital (the health service institution) is the vendor of services, and the health insurance fund (National Health Insurance Fund Administration) is the buyer

of services. The compulsory health insurance fund is a monopoly-buyer and thereby is able to set the terms.

The institutions are in a situation where they face a trend to increasing prices as buyers, yet as vendors they are confronted with a tendency towards decreasing (real) prices. The result of this “double interlock” is institutional indebtedness and pressure for additional resources (consolidation) from the Minister of Welfare (MW) and the National Health Insurance Fund Administration (OEP). In the past few years, the management of hospitals has tried to adapt to the changing conditions primarily by increasing turnover. The primary methods to boost revenue are to increase the numbers of patients treated and to take the opportunities provided by the cost accounting system (HPG: homogenous patient groups), i.e. to cure patients with a treatment classified in a better-paid category, independently of her/his real disease. The management of hospitals are exposed to conflicting pressures: health services employees and doctors expect increasing wages and technical developments, while the owner requires the hospital to avoid making a loss (Orosz 2001).

The February 1997 declaration of the Association of Financial Managers in the Health Sector similarly reflects that: *‘The managements of hospitals work in a double interlock. On one hand unrealistic fiscal and legal demands; on the other hand, the reasonable but - under the current circumstances - unachievable employee demands and public expectations which make it difficult to maintain operability. In practice this means that the managements of hospitals are constantly required to break the law as a consequence of abiding by the regulations of the Civil Service Act and the Government Finances Act. The mechanism of the currently unilateral and badly prepared contracts between hospitals and the OEP is also unsuitable to meet legal requirements. To resolve the legal contradictions our association recommends a review by the public prosecutor’* (Kórház, 1997, 3. quoted by Orosz 2001)

The management’s margin for manoeuvre is limited by a number of additional factors: the characteristics of the budgetary institutional framework go against the concept of a regulated market (the logic of performance-based financing), and the internal power structure of hospitals. Traditionally, the doctors employed as departmental heads define the operations of a hospital. The executive medical directors typically come from this circle (many keeping their departmental head role as well) and therefore try to avoid any conflicts with the departmental leaders. The chief financial officer is not generally authorised to supervise the finances of the treatment departments as this typically belongs to the scope of the executive medical directors. Therefore, the activity of the chief financial officers in the last decade has principally aimed at rationalising the supporting departments. An additional factor weakening

the adaptation capability of the management is that regulations have shifted to a situation in which the OEP acts as an authority (and not as a buyer). The lack of incentives for the hospital management is an additional barrier to more efficient operations as the income of the hospital management is typically independent from the performance and the situation of the hospital. In the 90's management lobby organisations – the Hungarian Hospital Association and the Association of the Financial Managers in the Health Sector – were mainly trying to define their role. Their positions are not thoroughly institutionalised and have no legally defined authority for expressing opinions (Orosz, 2001).

In summary, the health services system in Hungary is inflexible, hierarchical and characterised by bureaucratic organisations and a centralised incentive system. In terms of doctors' remuneration we are next to last in Europe, only ahead of Romania. Hence a large number of Hungarian doctors work abroad where they earn many times the income they can earn at home (*MedicalOnline*). The number of outpatients and inpatients is extremely high at the outpatient clinics and hospital departments. This sometimes results in a surfeit of doctors, specialist assistants and nurses, as well as dissatisfied and anxious patients. The already difficult situation is further aggravated by funding issues. This is exacerbated by the relatively frequent regulatory changes coupled with their resulting requirements.

### ***3. Organisations Involved in the Case Study***

#### **3.1 Introduction of the DEOEC Clinic**

DEOEC is part of the University of Debrecen where the three main faculties are the Centre of Arts, Humanities and Sciences, the Medical and Health Science Center, and the Centre for Agricultural and Applied Economic Sciences.

In 2005 the Medical and Health Science Center of the University of Debrecen featured on the EUROPE'S 500 list of the most dynamically improving small and medium sized organisations.<sup>36</sup>

70 world-class doctor-professors, 90 internationally recognised associate professors and 140 senior assistant professors, as well as nearly 1,000 doctors and 2,000 health service professionals help the treatment of a hundred and fifty thousand patients each year. The outpatient clinics provide access to the highest level of medical care for one and a half million people.<sup>37</sup>

The Center is divided into the following five Faculties:

- Faculty of Medicine
- Faculty of Dentistry
- Faculty of Pharmacy
- Faculty of Public Health
- Faculty of Health

These Faculties can be split into a number of sub-divisions and therefore the organisational structure is extremely complex. Moreover, they not only differ in their responsibilities but – highly important from our perspective – their working processes can be extremely different and hence they also have various expectations of an IT programme to be used in their everyday work.<sup>38</sup>

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<sup>36</sup> The EUROPE'S 500 is an objective ranking of the continent's 500 most successful small and medium sized enterprises. The ranking has been carried out over the past 10 years by the European Entrepreneurs for Growth non-profit organisation. The ranking is calculated by the index using the equation of the American economist David Birch based on performance, turnover and headcount growth between 2002 and 2005. Hungarian entities could apply for the first time for the honorary title in 2005. DEOEC was ranked in 224<sup>th</sup> place, being the only Hungarian organisation in the category of biotechnology and health. The ranking is published every November by the EUROPE'S 500. In 2005, successful organisations from the 25 member states of the EU, Switzerland, Norway and Iceland that had been registered for over 3 years and had employed a maximum of 5000 people at the beginning of the 3-year reference period could apply. 12 Hungarian companies were listed on the rankings and a French company was placed first. Icelandic and German companies proved to be the most successful. Three Eastern European candidates were listed in the top 50. The highest ranking reached by a Hungarian company was 58th.' (Source: <http://www.deoec.hu/hirek.aspx?nid=4717&cid=176> accessed on: 3 February 2012).<sup>3</sup> Source: <http://www.deoec.hu/info.aspx?sp=18>, accessed on: 9 January 2012

<sup>38</sup> Based on the interviews it was found that the new web communication system is used by certain divisions more intensely depending on its functions (taking into consideration that the image-generating feature of e-MedSolution is not used by all departments of the Clinic).



### 3.2 Introduction of ISH Informatikai Kft.

The company has been the leading developer and operator in the Hungarian market for integrated health services IT systems since 1996 both in Hungary and in other Central-Eastern European countries.

ISH Kft. (International System House Kft.) was established in 1996, as a successor to ISH Informatikai Kft., and bought the MedSolution application from IBM at the end of the 90's following several years of joint development. Therefore, the success of the product is attributable to its own developers, project leaders, support and vendors. The decades-long international development tradition and the optimal IT architecture are present in today's MedSolution development technology and documentation.

The MedSolution integrated hospital IT system developed continuously by ISH Kft. is used in more than 40 national hospitals and in the Clinics of four large medical universities serving both treatments and the up-to-date economic operation of hospitals.<sup>39</sup>

#### Medical-IT products of ISH Informatikai Kft.:

- MedSolution: an integrated hospital IT solution

MedSolution is a robust, traditional, integrated hospital IT solution with textual or graphical interface used and applied worldwide. ISH Informatikai Kft. still develops and supports MedSolution according to client needs and ensures compliance with legal regulations.<sup>40</sup>

- e-MedSolution: a web-based integrated hospital IT solution

Thanks to the development work over recent years by ISH Informatikai Kft. the fully web-based e-MedSolution system was launched. The borderless nature of the internet-world within and outside institution ensures a high level of mobility. It is platform independent and provides instant access to data to users via PDA, smartphone or tablet PCs through Bluetooth and/or 3G technology. It does so in parallel with the fulfilment of data protection requirements laid down by law. (The e-

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<sup>39</sup> Source: [http://ish.hu/ish\\_informatika\\_kft/az\\_ish\\_tortenete-397](http://ish.hu/ish_informatika_kft/az_ish_tortenete-397), accessed on: 9 January 2012

<sup>40</sup> Source: <http://ish.hu/termekek/medsolution-430>, accessed on: 9 January 2012

MedSolution is listed among the world-wide verified solutions recommended by IBM.)<sup>41</sup>

- MedSAPsol: an integrated medical and financial solution<sup>42</sup>

#### Services of ISH Informatikai Kft.:

- software development
- system integration
- off-site operation
- operation beyond the hospital
- continuous product support
- supplementary bar-code and prescription printing
- medicine order qualification<sup>43</sup>

#### ***4. Description of Findings on the Implementation of the Web Communication System (Preceding Situation and Evaluation of Planning)***

Since the beginning of the 1980s clinics have been using different types of Clipper-based databases (Clipper is a programming language that was mainly used for the development of DOS programmes and is suitable primarily for the development of database handling applications). The first initiative for the application of a unified medical information system originated in 1998, when the management of the Clinical Centre decided on the introduction of the MedSolution software. The software was bought from IBM and further developed by ISH Kft. A Program Implementation Group (PIG) was formed within the Clinical Centre headed by a leader, and members included doctors, assistants, and nurses. The launch of

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<sup>41</sup> Source: <http://ish.hu/termekek/e-medsolution-407>, accessed on: 9 January 2012

<sup>42</sup> Source: <http://ish.hu/termekek>, accessed on: 9 January 2012

<sup>43</sup> Source: <http://ish.hu/szolgalatasok>, accessed on: 9 January 2012

the ASCII version (single window, DOS-like) was finished by the end of 2002, so the implementation itself took 4 years. The members of the PIG faced significant opposition from the clinical employees during the launch. Different organisational units were using their own systems and did not want to switch to a new one, while many of them had an aversion towards the application of computers. Particular clinics and departments had various needs that could not be fulfilled on all occasions, and therefore the interest of the majority often predominated, causing further opposition from those whose interests were not taken into consideration. The directorate of the Clinical Centre was in favour of the application of the new software, so the implementation process was directed top-down. Nowadays it is in common use with more or less satisfaction from staff.

Security is of vital importance in the use of such a system as academic and patient-service directed applications can only be separated with difficulties which threaten the database through the connection of the internet. To tackle this issue, MedSolution software became Linux based and an intranet system was also developed so that the system can be considered secure as well as less vulnerable to viruses.

The contract with ISH Kft. was extended in the mid-2000s, when a new opportunity came up to launch the e-MedSolution software, and ISH Informatikai Kft. was committed to its quick implementation. In order to support the implementation and testing of the new software a team was formed similarly to PIG, including doctors, administrators and nurses with a high level of IT affinity as well as IT-personnel from the Clinical Centre. Clinics taking part in testing were nominated by the Clinical Centre's president. Members of the test group agreed to use the e-MedSolution programme during their daily work and come together every 2-3 weeks to share experiences with each other and with the employees of ISH Informatikai Kft. This has been ongoing for several years and the members of the group have provided continuous feedback. Bugs were weighted and could be reported at the meetings, over the phone or via e-mail, using a classification system of serious, medium and less serious or minor types of faults. Meeting memos were prepared and during the following meeting the professionals from ISH reported on the repairs to the bugs which had been reported, and the members of the test group noted any new faults. Participants were trained to use the software and they supported colleagues in their own clinics. Anybody who has access to MedSolution can ask for access to use e-MedSolution. The pre-condition is that applicants have to take part in a half-day course at ISH's IT training facility, where they can listen to vital information and obtain the necessary knowledge that enables them to use the software.

Despite all efforts, the implementation cannot be considered successful; currently less than 100 people use the software on a daily basis. The meetings of the test group became less frequent and then were ended about a year ago.

## ***5. Learning from the Introduction of the Innovative Info-Communication Infrastructure***

The issues identified in the case study were quite diverse and mostly strongly interdependent. In order to get a better understanding we have tried to split them according to their nature and categorise them. In this way we have identified technical issues, training related issues, leadership and management problems, issues related to intellectual property rights, and difficulties arising from institutional characteristics.

### **5.1 Technical Issues**

Within technical issues we have identified the following three categories: general software design issues, hardware related issues and problems connected to the introduction process.

#### ***5.1.1 General Software Design Issues***

An insight gained from the interviews was that although e-MedSolution's predecessor, MedSolution was already outdated at this time (IBM developed the basics of the software in the 70s), at least users got used to it and were able to apply it relatively quickly.

Users did not find the new software user-friendly in many ways. Printing an evidence document in MedSol was possible by hitting the Enter key twice while the e-MedSol first prepares a PDF document then, by opening the "Print" window, it is possible to print after clicking several times (selecting the number of copies, print settings, selecting the printer, etc.). This clearly takes more time than hitting the Enter key twice.

While in the former system switching functions was possible with shortcut-keys, in e-MedSol it is only possible by using the mouse, by clicking. This only takes a few seconds (switching between windows, selecting the diagnosis from a scrolling menu bar) but at a clinic where 60 patients are waiting daily these seconds accumulate. If because of the use of the mouse the treatment of one patient takes an additional minute this extends working hours by an extra hour taking into account the current patient turnover. In those areas where a lot of text inputs

are required, it used to be much faster in the former system with the shortcut-keys than with the mouse.

The other requirement in relation to patient turnover is the importance of system reliability as social security payments are running through this software and the appropriate level of hardware background is essential.

*'In the successful financial management of DEOEC over the past 10 years MedSol has had huge significance. Social security payments are run through this. Therefore the reliability of the system is a must. In the past 10 years system breakdown has only happened once and even that created a huge mess. In premises with such high volumes of patient turnover it is impossible that in the case of a system breakdown inspections are recorded using pen and paper and then inputted into the system afterwards.'* (Cardiologist, DEOEC)

Users' access rights settings were not properly constructed either: the system assigned only one doctor to each patient while more (at least three) doctors were in charge. From the users' side the two systems are still not unified. If in one system the doctor has access to the patient's data, in the other system it is not always the case (meanwhile the patient database is common and has no malfunctions). To the best of our knowledge, such errors are corrected continuously and quickly (within 1 or 2 days) and handled with the greatest priority.

Discharge reports cannot be prepared to fulfil two different objectives depending on whether it is given to the patient or to the clinician/general practitioner involved in the patient's treatment. It would be beneficial to produce one report that uses wording and terms that patients can understand, while another could be delivered to the general practitioner or to the other clinician involved in the patient's treatment that phrases the diagnosis more precisely using Latin expressions.

On the other hand the alteration of the coding is a positive change. With the MedSolution software developers expected doctors to do the coding while this should be done by the computer. In e-MedSol coding is done by the computer.

The software is sometimes not realistic as the users were not asked about the work process flow and therefore a few steps were added that do not make sense. The situation is further complicated by the fact that the expectations of each hospital can be different and the software is not capable of handling this either.

Occasional users of the software only use functions of the system that are not provided by MedSolution, such as the image-formation related and prescription printing functions. One of our interviewees for example only used e-MedSolution to write prescriptions.

The former MedSol has a single window structure while the e-MedSol has a Firefox browser based windows system. MedSol has large bright fonts on a dark background that are clearly visible, whereas e-MedSol is less readable. Patient data is fixed on top of the screen and if the screen is zoomed in to improve readability then the whole screen is magnified and half of the screen is taken up by the patient's data (name, address, Social Security Number etc.); evidence and results (that have real importance) are scrollable on the bottom half of the screen and therefore little information is visible simultaneously. If the screen is zoomed out then it is difficult to read as the font size is too small.

Nevertheless we should mention one of the advantages of the e-MedSolution system, that it has a word processing function that enables doctors to write tailor-made discharge reports, edit the text, highlight (bold, italic, underlined etc. fonts), use template texts which can be loaded from the system easily, or write their own texts. On the other hand, despite these benefits of the new software the disadvantages cannot be ignored.

### **5.1.2 Issues Arising from Hardware Requirements**

IT development will soon make the terminal type use of MedSolution impossible. In the former MedSolution system printers are directly connected to the PCs that have a longer setup process but then operate properly. Current printers work in a network mode. Within e-MedSol it is possible to have individual printing settings but if the printer is not set at the workstation accordingly then it will not work as the user desires.

The e-MedSolution system has much higher hardware requirements than its predecessor. Several workstations are being used in the Centre that are still not yet capable of running e-MedSolution. This would require a significant upgrade, which is obviously a financial matter as well. The cost of the upgrade cannot be covered by each hospital and outpatient clinic.

*'There are still terminal PCs in operation that are only capable of running the text based system and the use of e-MedSol would be not possible there. There are barriers from the server-infrastructure side as well because the servers running the current system are nearly 7*

*years old and have to be replaced. Therefore there is a need to change to a faster and more recent infrastructure both in the case of workstations and servers that are outdated.'* (IT specialist, ISH Informatikai Kft.)

Server upgrade would be also necessary as the last renewal of the server park took place approximately 7-8 years ago. As a consequence of the MedSolution graphical interface, data has much more content and the replacement of the data transfer units would be required for it to function well.

*'It is slow because it would require a server with greater performance. The university expects ISH to purchase it. Why would they buy it if it is the property of the university and they are not obliged to do so by the contract? It would be even more expensive to lease. A high performance server would cost 50 million Forints while switches and data transfer units should be upgraded as well.'* (Cardiologist, DEOEC)

The biggest advantage of the e-MedSolution system is the graphical interface. However to display high resolution images, high resolution displays are necessary that are currently not available everywhere. It would be necessary for each clinic to invest in the procurement of 2-3 such high resolution screens worth over 100,000 Forints that enable users to examine high resolution CT scans on these screens. Looking at such images on small resolution displays does not make any sense.

The expectation of hospitals with regard to displaying graphical information varies greatly. In some cases it is required as part of the daily routine, for example at the examination of the scanned image of a brain tumour, while in case of the cardiology department or the women's clinic this has much less importance.

*'In e-MedSol images can be displayed through the graphical interface. To display high resolution images, high resolution screens are required; it does not make any sense to display these on lower resolution screens. If these screens were available at each location then it would make sense but these are really high value devices. This is not really needed at Cardiology and it is not necessary to display ultrasound wave images or angiography images. But in Neurology there is certainly a need for it, for example to visualise a*

*brain tumour. The graphical interface is not required on most occasions. It is required in specialist areas, but even there only 1 or 2 workstations are sufficient to be able to examine the images'* (Cardiologist, DEOEC)

As a matter of interest one interview was conducted at the Dunaújváros Szent Pantaleon Hospital where they seem to have paid more attention to surveying hardware requirements. According to our interview, the head of IT had a similar point of view regarding the launch phase:

*'In 2003 they tested the software at POTE (another Hungarian university-based hospital) but it was not ready at that time; the head of the IT department decided in 2009 that the software had reached the appropriate level of development and could be introduced with no risks. However, as in our case the last hardware upgrade covering the whole hospital took place in 1998, we did not introduce it at that time, as with the lack of appropriate hardware it does not make any sense. Currently we are at the stage where certain departments (urology, ophthalmology, pathology) are using or experimenting with it. In 2010 the Emergency Medical Services department won a tender and got some funds for hardware upgrades, therefore it was launched there, which took 3 weeks.'* (Head of IT department, Dunaújváros)

### **5.1.3 Problems Related to Implementation and Testing**

The e-MedSolution software offered by ISH (the software developer company) was not ready and could only be called a test version at the beginning; indeed, the testing itself was hugely delayed following the contracting process. Further complications were caused by the fact that during the testing phase a high number of errors were reported by the testing team to the developers, e.g. a number of unnecessary, unidentifiable pop-up windows.

*'... And believe me there were a million windows and all of them remained open. And then, I tell you, they really started to use it at some departments, 2 or 3 groups and half an hour later 40 windows were open. There is nobody who could decide which particular window belongs where'.* (IT specialist, DEOEC)



The opened windows were not informative to the users either, but included various codes. This issue has been corrected since then.

During the application of e-MedSolution, due to its slowness, tardiness and complexity, even those who tried to use it gave up. In the opinion of the interviewees, even today it is still unsuitable for exclusive use.

As one interviewee noted – as a consequence of the wide-ranging expectations – even the expectations of clinic employees were not identical as regards the software and this was aggravated by the different point of view of ISH.

*“When a development request was raised, most of them were completed. There were conflicting views where one has to be preferred and sometimes it is advantageous, sometimes not.”*  
(Cardiologist, DEOEC)

There were plans to involve as many people in development as possible so that as much experience as possible could be built into to the system and the number of users could be expanded at the same time but this did not happen. One of our interviewees expressed the view that the experiences of the pilot team responsible for the testing were not used properly:

*‘And then after two years the whole thing ceased to exist. For two years we had bi-weekly discussions. We recruited doctors who really understand IT and were eager to put extra work into this, to test the system and try to help in the development. But in reality it was a complete disaster.’* (IT specialist, DEOEC)

*‘There was a good atmosphere during the discussions; we had tasty scones but there wasn’t much result.’* (Internist, DEOEC)

## **5.2 Training Related Issues**

Issues arose during the training. Participants’ memories of are not consistent with respect to this: while some recalled small group training sessions some others mentioned large team presentations.

*'As a matter of fact, at that time we trained nearly all users of DEOEC...'* (IT specialist, ISH Informatikai Kft.)

*'When they wanted to launch e-MedSol, there was something called training that was nothing except a presentation, where they talked about how to use e-MedSol. This practically had no benefit at all; all affected employees of the Clinics sat there, listened, got upset about the whole thing, and then they told us to forget it, and nothing happened.'* (IT specialist, DEOEC)

It is certain that the training did not achieve its real purpose. Users did not form a positive view of the e-MedSolution software, and there was huge dissatisfaction with it from the beginning due to its functionality and slowness.

### **5.3 Leadership and Management Problems**

The inflexibility and lock-in of users was a barrier against switching to the new system. Why would an employee or doctor start using new, unfamiliar, unknown software as long as the former one was still working? As the two systems operated simultaneously, there was no pressure that would ensure the full-scale use of the new system. But the most important problem was that project management with the proper authority was missing.

*'If we ask people then everybody wants everything, which leads to anarchy. A few people, but not many, should be leading this, and taking it through toughly... It shouldn't be necessary to explain why am I not doing certain things, just do it. You cannot carry through these thing democratically.'* (Cardiologist, DEOEC)

During the system implementation it was critical that on behalf of the Clinic there was no IT organisation represented that could have negotiated efficiently between the two parties. While, as one of our interviewees noted:

*'Currently, and for a long time now, a responsible IT organisation does not exist at DEOEC.'* (IT specialist, ISH Informatikai Kft.)

The most frequently expressed criticism of the software is that it does not respond to the needs of the users who were not asked about their work processes, which implies that the communication flow between the two parties (users and developers) was unresolved. As we indicated above, an 'interpreter' between IT and patient treatment who could have phrased user demands in a language understandable for the software developers was missing.

In this case we face a classic project management problem that occurs most of the time in the case of new technologies.<sup>44</sup> The problem is that for the client (the Clinics) it is generally difficult to phrase its needs in the precisely understandable IT-professional language of the provider (ISH). For the provider it is difficult to understand the internal logic of the client, and to 'translate' the demands into its own language and interpret them appropriately. This inevitably leads to communication and organisational problems.

An IT department within the Clinic could have been the knowledge broker who understands the internal logic of a health services institution and at the same time could have phrased the requirements of the client in a language that is understandable to and used by the provider. One of the internist interviewees phrased this as follows:

*'These development issues were raised but ISH has its own concept of the way such a system should work, and they stuck to it'* (Internist, DEOEC)

In this aspect the example of Dunaújváros, where such an IT department did exist, proved to be especially pertinent. As part of the daily routine they had an understanding of the typical issues and needs of each department at the hospital, and they were aware of the hardware availability as well as the costs of a potential upgrade. As a consequence, they could successfully bridge the gap between the knowledge and vocabulary of the client and the provider. A typical example is that the implementation of e-MedSol at the Emergency Medical Services department lasted for one month.

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<sup>44</sup> For more details please see: Makó, Cs – Csizmadia, P. (2005) Mobilizing Social and Organizational Resources in Project Type Cooperation: The Case of Networking in Interactive Media Firms, COMPETITIO IV:(2), pp. 25-40.

## 5.4 Issues Related to Intellectual Property Rights (IPR)

According to some of the employees of the Clinic who took an active role in the development, DEOEC's intellectual assets are involved within the development of the e-MedSolution software, as it was improved and upgraded based on the opinion of the pilot group, something which made ISH Kft.'s product more competitive; they made a profit, while people taking part in the testing gained no benefits.

*'... we did not let ISH treat it as if they were stealing ideas from here, then include them in their software, and then they make a profit, ... intellectual property and intellectual assets have value and this should be paid for by ISH. In practical terms, the time when this software was developed was spent here, and the truth is that ISH never gave anything back'* (IT specialist, DEOEC)

This issue was raised as part of the disagreement on the development fee. The evaluation of the pricing practice of the software development company is ambivalent: some interviewees had a positive opinion that ISH did everything possible on their behalf to improve the software - what could have been corrected was corrected, and their fee was realistic compared to market prices. Others criticised the unrealistically high fees, and that sometimes errors of the software were handled as new development needs and an extra fee was charged.

*'The errors that have been reported were corrected by the following week by ISH so they were really helpful. ... I had the impression that ISH co-operated to the maximum, they made all the developments that were possible, and it still got stuck.'* (Administrator, DEOEC)

*'Within MedSol there is only one specialist assigned to a patient but the system records only the last one as the specialist, so it happened that I was unable to see my own patient. It takes the former MedSol approximately one minute to create a list of my patients. Once, I called them that this is not appropriate. They gave me feedback at ISH that I should send them a development need – the clinic should spend 100 thousand Forints on something that should be working like this anyway? I'd rather not call them anymore.'* (Internist, DEOEC)

## 5.5 Difficulties Arising from Institutional Characteristics

Often bureaucratic barriers slowed down or eliminated the development needs of the Clinic (due to the clinic's hierarchical decision-making mechanism). Several of our interviewees reported, for example, that any need raised related to the development of the software had to be first discussed with the internal management before notifying the IT provider, sometimes involving several hierarchical levels.

The clinic is a large state organisation with its own bureaucratic operating mechanisms, the information chains are longer and the decision making process is slower, due to the multi-level leadership hierarchy.

Besides, there is a change in leadership at the clinic every 3 years that makes it difficult to work out a unified, continuous strategy and implement it.

*'... Related to the development, we mean long term contracts and when this agreement was signed everybody knew what they wanted, everybody had their own objectives, everybody knew which way was forward. Therefore when you had to co-operate with someone who approved the contract, it was much smoother, compared to someone inheriting something, who had a completely different way of thinking. This did not cause issues on lower organisation levels in day-to-day affairs but it did in maintaining contact with ISH, and in negotiations. The new leadership was unaware of the objectives of the previous management. These contracts were bridging numerous cycles where the leadership of the Clinic may have changed several times.'* (IT specialist, ISH Informatikai Kft.)

*'My opinion is that in practical terms both parties are heavily involved in this whole e-MedSol failure, both ISH and the Clinic. The Clinic is a large state organisation that elects a new leadership every 3 years, while this type of development requires a unified strategy that is missing here. On the other hand, we saw many times that the clients were just paying the bills to ISH but had no demands. Therefore both parties had a significant role in the failure of the implementation. Actually, we tried to find a way out of this whole thing many times but failed to find a partner in ISH, whatever we tried to do.'* (IT specialist, DEOEC)

Another difficulty was that since the Clinic is a priority hospital, the more serious cases are directed here, which has implications for the quantity, quality, and available time for treatments compared to another medical institution which is not a priority institution. It also requires higher standards from the applied IT system.

## **6. *What was Implemented and How?***

The number of users of e-MedSolution on a daily basis does not exceed 50 people. Some people use it occasionally in some cases to display visual information such as x-rays, or CT or MRI scans, or to write a prescription that is not possible in MedSolution. However, the majority do not use any functions. Furthermore, administrative employees, for whom speed is the most important during their work, do not use it at all.

## **7. *Conclusion***

In this chapter we summarise the potential reasons for the failure of the implementation of e-MedSol:

1. The new software was not yet ready at the start of the implementation; major development tasks still had to be solved in which the Clinic was taking part, but the process was not properly controlled and managed, resulting in significant problems (e.g. IPR, sharing development costs etc.) throughout the whole of the implementation process.
2. The software development would have required additional investment in hardware that was not assessed. This would have had major importance as the software is based on entirely new elements (visual interface, network operation etc.) and on the other hand, the hardware background of the Clinic could have been described as outdated anyway. As a consequence, the shift to the new system would have required major developments in hardware as well, which were neither assessed, nor implemented.
3. The majority of the employees have aversions towards using the new system even today as it is unfamiliar and slower than the previous system. They are not keen to change from a system that is easy to handle and familiar just because the new one is

colourful and capable of doing many more things, especially when most functions would never be used.

4. It does not make sense to participate in training sessions, if the employees of the Clinic do not use the system on a daily basis. Knowledge acquired at training sessions becomes quickly outdated when it is not used on a day-to-day basis and is not updated.
5. The parallel use of the two systems is not adequate either, as all developments have to be made twice and there is no pressure on the users to apply the new system.
6. The fact that the various clinics indicate different needs that are sometimes contradictory is also making the developers' work more difficult. In this case, it is inevitable that one party is dissatisfied. The Clinics in Debrecen is one of the largest health service institutions in terms of services, the number of employees and patient turnover. The introduction of a new system in such a large institution proved to be an impossible mission for the parties involved in the project. A possible solution would be to tailor some functions according to the various needs of the clinics, depending on which of the new system's functions are used in reality. It would also have helped to carry out incremental implementation, starting at those departments where the benefits of e-MedSol can be well utilised. With several thousand employees, it is neither possible to develop a new system, nor to organically introduce it at the same time.
7. It would have been of major importance from the perspective of handling the widely heterogeneous developer needs and the naturally arising conflicts to set up a more efficiently working organisational unit that would have fulfilled the project management related tasks. Lacking such a unit, implementation got stuck in the Clinic's hierarchical-bureaucratic organisational structure, and in the labyrinth of interests and conflicts.
8. An actor fulfilling the role of the 'knowledge broker', who could have transferred the client needs to the provider was missing from the development and implementation processes. This would have made communication smoother, helped the development process and could have accelerated the successful implementation of the new system.

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# **Éva Farkas – Mária Petrovics: Developing a Customer Oriented Organisational Culture: The Case of Magyar Posta (Liberalisation and Organisational Changes in the Postal Services)**

## ***Abstract***

Our case study fits into the research framework of organisational changes and organisational innovations by investigating the shift in knowledge demand and changes generated by the liberalisation of the postal market at Magyar Posta Zrt. The study essentially focuses on the transformation process of the bureau-type approach and the modification in the combination of the required knowledge resources, as well as on organisational changes that boosted the development of a customer oriented culture. We can state, based on the interviews conducted, that the process of 'shifting from an office to a service provider' is as yet unfinished. An ingrained customer-focused approach is rather a characteristic feature of employees as, for the time being, the management is more attentive to maintaining its hierarchy and the status quo.

**Keywords:** organisational learning, organisational culture, tacit knowledge, organisational behaviour, knowledge utilisation

**JEL-code:** D23, M14

## ***Introduction***

Magyar Posta Zrt. (hereafter Magyar Posta) offers universal services - at least until the liberalisation of postal services expected in 2013 - which brings with it several organisational, operational and structural peculiarities. Regardless of the profitability of a particular service, as a universal service provider it has a duty to make traditional postal services accessible to all citizens. On the other hand, this means it has a monopoly position.

By the 2000's the liberalisation wave had reached state monopolies. Recognising this, from the end of the '90s Magyar Posta became involved in the market competition for financial and insurance products that was envisioned as the necessary collateral for future survival. Broadening its scope of activity, and expanding its business profile and portfolio to new product types induced several other changes. In the first place, a change in its approach had to take place in order for it to become a service provider from an office and therefore it had to endeavour to fully satisfy the broadening needs of clients. In the internal phrasing of the organisation the use of 'post office' was replaced with 'postal locations' and - not only regarding the terms used - Magyar Posta truly began its journey towards becoming a customer oriented service provider.

The aim of this case study is to show how the customer oriented approach emerged and the key factors influencing the changes which have taken place. In terms of the interpretation of the transition, we concentrate primarily on the specific features of knowledge management and the focus of our examination within this is aimed at the changes in competence demand and at the organisation-specific peculiarities of knowledge transfer.

One of the characteristics of our research methodology is that we relied on 13 structured company interviews, and used publicly available and internal documents. Our interviewees work in the fields of human resources, strategy or sales, while in terms of company hierarchy, our participants represent both top level executives and client service employees. The main criterion in the selection of the respondents was to interview those who have taken a lead in the organisational change, or participated in the change in Posta's day-to-day operations.<sup>45</sup> As a consequence of the research methodology applied, the scope of our analysis is primarily based on the opinion of the respondents and their interpretation of the changes.

Firstly, we will examine the structural changes of the postal sector from an international perspective and then analyse the case of Magyar Posta. In the final part of the study, we briefly follow up on the aftermath of this case study.<sup>46</sup>

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<sup>45</sup> We would like to thank all employees of the Magyar Posta Zrt. who readily helped us during the first part of the project. Difficulties experienced during the second part of the research are discussed in more detail in chapter 4. 'The Aftermath of the Case Study'.

<sup>46</sup> We would like to thank Csaba Makó and Miklós Illéssy for their support as subject supervisors of the TÁMOP program, as well as for their supportive criticism and advice regarding the improvement of this study.

## **1. International Changes in Postal Services**

Besides traditional postal services<sup>47</sup>, organisations in the postal sector perform an extending range of diverse activities, operate postal services in every country and introduce new logistics, transportation and financial services; moreover their activities are increasingly no longer based solely on core postal services. (European Commission 2009; Bailly 2011)

In most member states of the European Union, national posts are among the largest employers, providing work for 1,700,000 employees on the Community level. As a consequence, their effect on the economy is significant. The turnover of national posts makes up for 1 percent of the EU GDP in 2011 with respect to the EU25 member states. The EU15 states account for 95 percent, while the 10 new member states represent the remaining 5 percent of this amount. (European Commission 2012)

### **1.1 External Pressure – Liberalisation of Postal Services on a European Level**

The ambitions of the European Union since the Lisbon Strategy (2000) point towards the establishment of a common market in the postal services sector and a liberalisation of (quality) services in each of the member states. In accordance with this, since 1997 the 'postal politics' of the European Union defines the institutional framework and achievable partial objectives of the liberalised postal services market as part of the continuously renewed Postal Directives.

The achievements of each member state in the improvement of postal services, preparations for market liberalisation and compliance with the institutional framework are controlled by the European Community. Following 1997 (European Commission 1997) and 2002 (Postal Directive 2002/39/EC), in 2008 (European Commission 2008) the Third Postal Directive was issued to set the final deadline for market liberalisation. On the basis of the Directive, the market for postal services is liberalised as from 1 January 2011 in most member states of the EU (mainly in original member states). All preliminary arrangements must already have been in place by this deadline; these include the preparation of national postal services for market opening and the removal of entry barriers etc. The deadline was extended by 2 additional

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<sup>47</sup> Such as collection, transport and delivery of mail and parcel items.

years for the new member states in order to allow them to fully prepare for the challenges imposed by liberalisation. (Okholm et al. 2010)

The monopolist role of national posts will also be ended in the traditional postal services market as part of the liberalisation, and the former universal services (package and mail services) will be market-based. Therefore national posts with high headcounts have to expand into new services to ensure their existence. However, this requires new ways of improvement, and new knowledge and expertise.

## **1.2 Potential Paths of Development**

The restructuring of the postal services sector is an important issue on the European Union level. By analysing former trends and the potential changes due to occur, the Directorate General of Employment and Social Affairs summarised the European results in a comparative publication (Okholm et al. 2010). From the mid-2000s to 2010, the study analyses changes by country, and by the various postal services markets and the mechanisms which have an effect on them. It specifically addresses the legal requirements for regulating the postal services market which highlights the importance of the formation of the postal services market within the Community.

The renewal of the postal services market was established by a comparative study that featured a SWOT analysis of the sector as well as potential scenarios (European Commission 2009). A brief summary of this study was prepared by researchers at the Hungarian Academy of Sciences Institute of Sociology as part of a working paper (Makó et al 2010). In the course of the analysis of the strengths, weaknesses, opportunities and risks, the same factors were highlighted in nearly every country. Most problems arise from the institutional and cultural heritage of the former system (the cognitive lock-in syndrome), and the universal service provider characteristic is an additional barrier to change. Risk factors are the degree of regulation and uncertainty about the future, while liberalisation and the opening of the market as well as the resulting competition can move innovation forward in the sector. The communal postal market provides an opportunity for diverse products and services, as well as for the application of the postal network in new market sectors such as the market for financial services.

The above-mentioned international comparative analysis of the postal sector identified four possible forms of transformation with respect to the degree of changes and information technology support (hereafter IT). Therefore we can refer to scenarios/transformation patterns characterised by minimal, incremental, IT-led and high-pace technology changes.

- (1) The so-called '*Snail-mail*' scenario denotes minimal changes and is defined by the survival of the previous postal service routines, where changes are mainly attributable to internal forces rather than to reactions to market changes. In these postal services markets the demand for traditional and improved services can be considered permanent.
- (2) The '*Post-all*' scenario denotes incremental changes and differs principally from the previous form in that the 'catalyst' of this scenario is growing competition as a consequence of liberalisation. A free market exists with respect to the full spectrum of postal products and services with no legally controlled barriers to market entry. The implications of competition are the dominance of cost-effectiveness on the level of postal organisations, and smaller structural changes.
- (3) Formerly existing potential paths are less likely to emphasise and be based on the opportunities provided by IT developments. One of the potential paths can be called - based on the analogy of those previously introduced - the '*Post-IT*' scenario. As the name implies, this is characterised by the expansion of internet based services. The role of employees with the knowledge required by the new technology is increasingly important and some work in the areas of traditional services becomes redundant, making organisational changes unavoidable. New technology results in the emergence of the kind of new, small-sized companies that can compete with large, traditional postal firms in a knowledge- rather than asset focused sector.
- (4) An increased level of technology orientation characterises the '*Email-round*' scenario in comparison with the previous ones. Traditional postal services have declined to such an extent that workforce requirements are completely transformed, the employment of a workforce which can master new knowledge becomes the dominant pattern and the share of higher value-added services increases. Virtual communities become more important and customers now understand the interconnectedness of services.

To a certain extent the developments and organisational changes in the first two scenarios postpone and delay the more radical changes arising from the growing importance of technology-focused services, while in the long run, the '*Post-IT*' and '*Email-round*' scenarios can result in persistent innovation in postal services.

## ***2. The Importance of a Consumer Oriented Approach – The Case of Magyar Posta***

*Main characteristics of the surveyed organisation (Szűts 2010; Geszti 2012):*

Company name: Magyar Posta Zrt.

Ownership: 100 percent state owned

Execution of ownership rights: Magyar Nemzeti Vagyonkezelő Zrt.

Core services:

- Carriage and delivery of mail and parcel consignments
- Complex logistics services
- Money circulation intermediary services
- Savings and insurance services
- Subscribed press services
- Retail services
- Mobile phone service provider

Organisational characteristics of operations:

- Large enterprise with national significance
- 2 730 permanent post offices (2 023 owned / 707 outsourced)
- 357 mobile post offices (serving 1 037 townships)

Number of employees: ~33 000

Other characteristics: Appointed universal service provider.

After the brief introduction to the international trends and the potential scenarios for development, we cover some characteristics of the organisational-institutional transformation of the domestic postal sector. Magyar Posta is unquestionably committed to the exploitation of the potential residing in the field of IT development. Besides e-postal services, it aims to participate in the field of mobile-telecommunications by acquiring a 10 percent ownership in the fourth provider of mobile communication services in the Hungarian market, and parallel to this investment, supporting electronic services with its current network (Geszti 2012). With reference to the development scenarios, the Hungarian practice currently points towards IT-led scenarios but cannot be precisely classified yet.

Beyond technological innovation, other important characteristics of the development paths are the appearance of the service-type culture resulting from the expansion of services, and a less bureau-type culture. The restructuring requires new knowledge and completely

different attitudes from the Posta's former bureau approach. Hence in our study we examine those attributes of the organisation of Magyar Posta that are unavoidable in order to carry out scenarios related to the restructuring of knowledge, and the expansion of services and information technology. We direct specific attention to the emergence of a customer oriented approach and the disappearance of the traditional bureau-type approach that are unavoidable in the implementation of a service-type culture. Our case study is based on systematic research results which have processed several years of data and documents, and where the analysis of available company documentation is complemented by interviews conducted with participants in the transformation process.

## **2.1 The Cause and Significance of Changes: The New Products and Sales Approach**

Understanding the vanishing bureaucratic attitude long since typical of postal operations and the emergence of a service-type approach requires a brief overview of the arrangements of various functions.

The roots of the transformation of Magyar Posta into a sales-focused service provider date back to the early 1990s. The emergence of a customer oriented and sales approach can be fundamentally attributed to a reform initiated by top management (top-down) as its starting point, rooted principally in the firm's strategy.<sup>48</sup> The diffusion of changes is expected through the arrangements made by the top management and through top-down instructions. We principally denote the transformation and changes in the business tools and strategies adopted by executives during the transformation of the business approach in question.

In the years following the political transition, the rapid expansion in the number of small and middle sized enterprises, and the monopoly of mail and parcel services resulted in a highly favourable market position for Posta. Reacting to the increasing demand for its services, it established a broad network in a relatively short time that mainly met the needs of newly established business ventures. However, as a consequence of economic changes and the short life-cycle of entrepreneurs, this quickly lost importance. Traditional postal services were less and less profitable and, moreover, the monopoly of Posta ceased in the case of press distribution and parcel services.

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<sup>48</sup> It should be also noted that top management involves experienced post office leaders in the consulting body who share their conceptual understanding in workshops.

Firstly gambling, then retail services were introduced as part of a profile expansion. Products that are closely connected to the original portfolio of Posta were traded, such as stationery, later confectionary products, and then mobile phone related items and other 'corner-shop products'.<sup>49</sup>

The appearance of these new products assumed a new approach as former post office clerks were now expected to sell non-traditional postal products, imposing the need to attain a more dynamic, informal type of customer oriented behaviour.

The shift in market conditions, the differentiation of customer needs and the liberalisation of postal services required a further expansion of activities and services. Nowadays Posta is multifaceted: it has entered the mobile service provider market, joined in the execution of the Electronic Public Administration Operative Programme<sup>50</sup>, and still considers the sales of financial and insurance products important. Both the programme – joining public administrations as an intermediary - and selling financial services, required employees to adapt new behavioural patterns relatively quickly, and to develop new personal characteristics and a different knowledge set, since financial issues, for example, require 'intimacy' from both the customer and the salesperson. Clients need to trust the salesperson; the former clerk has to act as a sales provider who convincingly represents the interests of the customer and Posta in equal measure.<sup>51</sup>

In order to attain a customer oriented approach, besides leadership intentions, the salesperson is required to have practical and 'social skills' that help in making and keeping contact with clients, and in achieving a successful acceptance of sales proposals. These competencies are highly appreciated and have become as important as professional knowledge as the new approach is gaining ground.

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<sup>49</sup> Postal shops located at larger post offices were established to sell these retail products.

<sup>50</sup> As part of the Posta AGÓRA programme to assist the operation of e-public services using the postal network. (Gesztli 2011)

<sup>51</sup> Postal services were previously characterised by confidential relations as well; however, these were organised around products (such as traditional postal services) the quality of which was tested by customers over a long period. The relatively quick launch of the new banking type services resulted in less opportunity to test the professional and moral competencies of employees, and therefore the introduction of changes required a high level of confidentiality and a 'mutual learning process'. (Makó – Simonyi 2003)



## 2.2 Competency Needs and Changes in the Training System: Combining New and Existing Skills

Since the management considered the quantity and quality of human resources as given and the introduction of the new customer focused approach emphasised marketable competencies, these had to be utilised through a combination of the existing knowledge available within the organisation.

### Posta Financial Solutions Workplace

The plan revealed by Posta is to maintain its position in the financial services market, to increase its market share in the future and improve stagnating customer activities (Annual Report 2010). It is fundamental in achieving its objectives that these intentions are represented to clients.

The activity of the employees of Posta Financial Solutions (hereafter PPM) is separated from the traditional tasks of 'postal ladies' and 'window clerks' selling traditional services as part of their job, and their duties are now mainly aligned with the role of bank and insurance administrators.

The knowledge required is also clearly separated from what other employees possess something which is also borne out in the selection mechanism. The firm primarily recruits from internal resources, but in the case of PPM employees, it has opened up towards external candidates who have already had experience in the financial services sector. The principal selection criteria are a knowledge of Posta's financial products (and also its banking and insurance partners), and aptitude, whereas awareness of traditional postal services is not crucial.

As regards aptitude, skills highlighted in the *competency profile* of the *Financial Services Sales* job description proved to be a reference point and included: *commitment, credibility – consistency; persuasion, influence; quality orientation; self-confidence and perseverance; flexibility – adaptability; application of professional knowledge; motivation; performance and customer orientation.*

The training of PPM employees has had a high priority in the training system of Magyar Posta. A 'PPM Campus' modular training program was started, made up of 5 sequences. The positioning of the Posta Financial Solutions Workplace within the postal locations is aimed to strengthen the sense of being in a bank, as PPM employees sit at open desks in the client area, stepping out from the bureau-like feeling of boxes separated by large and safe glass windows. However, this solution has proved to be not totally ideal in some cases as they function as an information counter for clients, according to the experience of our PPM interviewees.

In 1999 Magyar Posta changed its former school type education system into a modular one, where the acceptance of previous educational qualifications became possible combined with a shorter, skill acquisition or development focused 'training type' teaching method. The growing significance of the importance of sales activities brought with it the revision and standardisation of job descriptions, and parallel to this, the reform of the training structure. Lately, job functions<sup>52</sup> related to the fulfilment of banking and insurance product services (in line with the shift in objectives) have required different competencies. A so-called competency profile was established for each role which includes all the skills required to

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<sup>52</sup> See text box: Posta Financial Solutions Workplace.

successfully fulfil a given role. The competency profile covers the following for all salespersons: paying attention with respect, persuasion and influencing, self-confidence and perseverance, performance and customer orientation. The first skill is basically a sub-competency of customer orientation which essentially requires high levels of attention in roles related to financial services sales, while customer orientation is the main competence to be highlighted. Besides, the sales approach and the accompanying shift in activities imposed a very new set of skill requirements from the management as well. The elaboration of management competency profiles was connected with the improvements and received primary attention in the training. In the 2000s both local management and top level executives stressed management training as an important factor in transformation and an adequate response to changes.

The 'top-down' approach in human resources development can also be observed in the firm's strategy: participation in training primarily results from management orders. If participation is compulsory, the schedule is called 'training by the order of the management' which consequently has an effect on thousands of employees.

In accordance with the above – based on international experience of organisational development (Nielsen 2006) – we would like to emphasise that the sales approach and customer oriented strategy should not only be rooted on the level of employees' day-to-day contact with clients but also in the company's internal structure, leadership and strategic decision making, and in the company governance as well.<sup>53</sup>

### **2.3 Changes in the Labour Process: Shifting Supervisory Roles and a Customer Orientation Tool**

It can be interesting from an external point of view to illustrate the shift in approach and structure of Posta (and to provide a unique opportunity for the interpretation of changes) and see how the *traditional (technology) supervisor role* in some cases *turns into sales support*<sup>54</sup>.

The technology supervisor was responsible for compliance with certain technical and security regulations in individual post offices, ensuring that the work processes were in line with the internal 'regulations' of Posta: for example, the placement of the sender and receiver on mails, parcel packaging methods and also rules for handling money . If any deviation from

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<sup>53</sup> It appears from the interview findings that the need to change the employees' approach was emphasised, while less attention has been paid to management or owners.

<sup>54</sup> Although technology supervisors and sales support roles still exist separately at postal locations, several times it has occurred that a former technology supervisor was trained to fill in a sales support position - as referred to in the demonstrated example.

the strict rules was experienced, then acting as an internal authority, they had the right to question employees and post office managers, and hence they became 'feared' colleagues in the Posta organisation. Technology supervisors were not subordinate to post office managers and were not connected to post office locations either, which resulted in great importance being given to their functions and tasks and to the individuals themselves.

With the introduction of a customer oriented approach, the focus of their duties related to the compliance with postal regulations turned towards sales activities and this resulted in the revaluation of the technology supervisors' role. The newly created sales support job function matches the former technology supervisor tasks in many respects, particularly regarding the nature of the activity itself and its measurement/control functions, but the job execution related approach is utterly different.

The activities of the technology supervisor can be described as the processes of measurement, control, and questioning types of feedback/sanctioning, while with sales support, the emphasis is not on control but on assistance and support for salespersons. This incorporates knowledge transfer, knowledge management, action plans for sales campaigns and putting sales activities into practice in the form of a coaching-type support.

The previously feared technology supervisor role ceased with the shift in approach and a role with different objectives emerged, where the support for successful sales was provided through advice and recommendations which required the mobilisation of significant investments from both employees and trainers.

The shift in the content of the sales support job function was supported by various types of training, as it is a fairly complicated business to change employee attitudes. One potential explanation is that even though it is rare, it sometimes still happens that sales support employees act as supervisors: they visit post offices, assess sales results and advise on what should be changed to comply with technical regulations, instead of providing recommendations to achieve better sales. It should be noted though that this behavioural pattern is repressing and a constructive, assisting type of approach is more typical in the sales team.<sup>55</sup>

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<sup>55</sup> An organisational cultural survey was also carried out at Magyar Posta. In 2008 the management showed commitment towards cultural development, the objective being 'To ensure preparation for postal liberalisation and for maintaining a competitive edge, and therefore merge postal heritage and values with the targeted future cultural expectations, as well as its organisational communication and deployment in day-to-day operations.' (*Confidential internal source, interview nr. 4*) According to the applied methodology, the efficiency of an organisation is essentially determined by the behaviour that the organisation supports. Based on the collected results of the survey, constructive cultural elements are high or higher in the sales field.

The efficiency of sales support employees is highly affected by the attitude of co-workers and post office managers. Despite the fact that support employees are well trained and that their approach is characterised by providing professional guidance rather than maintaining control, the attitude of the above-mentioned parties has a great impact on the success of sales support activity. Despite the changes that have taken place, post office managers still have the same image of supervisors in some cases, which makes successful sales significantly more difficult.

Changing the sales and sales support roles upon executive orders did not result in a comprehensive shift in work processes and employee relationships in the short run, but the continuous enforcement through learning at work and training can result in significant and permanent results on a long term basis. It is also worth noting that the related interests can also enhance co-operation as the incentive system and incentive instruments were aligned with sales performance.<sup>56</sup>

## **2.4 The Praxis of Knowledge Development and Transfer**

In the day-to-day practice of Magyar Posta Zrt. sharing and applying knowledge is more likely to happen formally than informally: the activities of the Training Centre and the continuous learning requirements mainly serve formal knowledge sharing and development. Informal knowledge sharing can also be observed and can be illustrated by the *relationship between the Posta Financial Solutions (PPM) and 'window' employees*. The sales process of banking and insurance services is the following: the 'window' employees – generally in the course of postal products sales – offer certain financial products. If the proposed banking or insurance product interests the client, the 'window' employee redirects him/her for further information to colleagues who are in charge solely of selling financial services and finalising deals. Redirection is considered as transferring a lead and hence plays a role in performance evaluation: the 'window' employee who evoked the client's interest is registered by the PPM employee. As a consequence of their role, PPM employees have deeper and wider product knowledge and broader sales negotiation experience. On top of this, the sales focused training of PPM employees is more regular. Knowledge mastered on training courses also comes in handy for 'window' employees who have client contacts and therefore knowledge sharing is of strategic importance. Discussions on new sales techniques and knowledge transfer are in the interest of both parties. In practise, there are discussions on the materials

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<sup>56</sup> If the sales person accepts the recommendation of the supporting colleague and the sales results improve in the meantime, a higher premium can be expected. Meanwhile, if the employees supported by the colleague perform better in sales, their bonus is increased as well.

of the product sales training and, moreover, in some cases PPM employees assist the 'window' colleagues in acquiring new sales techniques.

#### **A 'Good Practice'**

The appearance of the sales approach can be shown by the practice of one of the post offices that occasionally carry out sales activities outside of its location and shop. This can be illustrated by a historic international sport event where employees of the local post office were selling retail and special post products (e.g. sports and sports history related stamps, envelopes, postcards etc.). Besides generating revenues, the aim of the post office manager was to improve the community's opinion of the Posta and to demonstrate the diversity of postal services. In addition to the sales of retail products during the event, the sales material for banking and insurance services was distributed by the employees to promote services to potential clients. This practice unquestionably proves the existence of the sales approach, although, admittedly, such positive examples are fairly rare to date.

Besides taking part in (formal) training, there are regular discussions on day-to-day experiences as PPM employees do not only pass on the new methods acquired to the 'window' colleagues, but also inform them about the practical applicability of these methods. It is also a common expectation from post office managers that colleagues who participated in training courses pass on the knowledge acquired and share experiences with their co-workers.

A good example of social innovation as the so-called 'community of practice' is the MÁT.<sup>57</sup> Each morning preceding work, discussions are held on the positive and negative experiences of the previous day regarding a certain product and joint assistance is called for to decrease any negative experiences. Recommendations are summarised by a member of the group, and solutions and practical experience related to the issues are shared with the whole work community. There is an opportunity at these meetings to interpret individual ideas and experience.

## **2.5 Benchmarking**

The formation of a successfully operating company structure is the result of a lengthy learning process, where the individual, and primarily the collective (organisational), learning ability are of vital importance. This has been recognised by Posta as well, in accordance with experience, and as part of the first phase of the organisational (collective) learning process the technique of benchmarking was applied. Interpreting its activity in terms of mechanical or

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<sup>57</sup> MÁT is an approach aiming for better client service and sales promotion, and is the abbreviation of 'Address', 'Redirect' and 'Inform'. Basically it stands for a new client contact routine, a complete process. We emphasise in our study the acquisition of this process and the preceding learning mechanism.

intelligent benchmarking, the Magyar Posta Zrt. practice tends towards the latter type<sup>58</sup>. By analysing international examples, 'best practice' was adopted and organisational innovations were carried out based on the application of these practises.

The organisational benchmarking activity in the practice of Magyar Posta can be considered intelligent, since in the case of each business unit and activity ranges it is not only different practices typical for that particular area that are adopted, but staff involved in the transformation take the specific features of their operations into consideration and do not just promote a mechanical copying of patterns applied by others.

#### **Establishing the eService Provider Capability**

During the past few years, Magyar Posta has placed great emphasis on mapping customer requirements, and besides the challenges, the opportunities provided by the information society are increasingly recognised.

The appearance of *hybridmail* among mail deliveries can be considered as a major innovation, where electronic mails are delivered by Posta as hard-copy letters on paper. This form can be applied to both private and official correspondence and it looks to be promising, although no customer feedback is available yet.

The nostalgia for traditional correspondence is to be maintained by *personal stamps*, where the service allows clients to send their mail with unique patterns tailored to their needs.

The *client card* for 'identifying' SMEs and the *consumer client database* can be also categorised as an innovation. Products and services frequently purchased by the client are recorded, making it easier to successfully offer personalised banking and insurance services, or even to identify a group of logistics services.

*Creative mail* (self-enveloped direct marketing mail), the electronic newsletter, and logistics and additional advertising services fall into this category. (Geszti 2011)

A pilot project deserves mention as a form of innovation; this is the introduction of the so-called self-service system at main post offices. This means that retail products can be selected by clients while queuing and the counter value is not paid at the Postal Shop but to the 'window' colleague.

Within the organisation of Magyar Posta – at least on a strategic level – internal and external sources of knowledge have equal importance. The methods of restructuring postal activities and the structure of operations are essentially based on external sources, adoptions of other best-practices and on the previously cited intelligent or reflexive benchmarking, while innovations can be observed in product and service development as well.<sup>59</sup>

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<sup>58</sup> For more details see Schienstock/Hamalainen (2001).

<sup>59</sup> See framed text: Establishing the eService Provider Capability.

### 3. Summary

The objective of the innovations introduced over the last 10 years at Magyar Posta Zrt. was to maintain the company's competitive edge and to allow an appropriate preparation for postal market liberalisation in 2013. The instrument selected was an increase in the importance of sales activities, and to realise this, a sales and customer oriented service approach has been introduced. Among the scenarios highlighted in the introductory part of the study, it seems that the 'Post-IT' strategy was adopted. To bring this into effect, the necessary organisational changes were first manifested in the transformation of the functional structure into client oriented units that nowadays is again based on the separation of business functions. In the case of an organisation with such a huge number of employees and such a complicated structure, a change in approach cannot be achieved in an instant. By recognising this, Magyar Posta restructured its formerly extended educational system to include new types of training activities that help acquire competencies which support sales activities. In terms of the knowledge required, the emphasis is shifting from mechanical professional knowledge towards social skills. In advance of, and parallel to, creating the training structure, a list of required competencies was devised for each job function, called the competency profile. Subsequently, the training content was aligned to the competency profiles.

Magyar Posta has invested extraordinary resources in education and internal training. According to its strategy, changing the business approach and turning the sales approach into generic practice are executed primarily through the training and re-training of existing human resources, and only in exceptional cases (PPM employees) is a search carried out for candidates with the required skills and qualifications in the job market. It can be considered a positive feature that experiential learning or on the job learning<sup>60</sup> are present at Magyar Posta; however, this is primarily an individual phenomenon and organisational (collective) learning processes (knowledge management) are promoted less actively. Despite this, an emphasis on collective learning may be a step forward for Magyar Posta in the future. Through the service market decentralisation attached to liberalisation, its advantage can be preserved by utilising collective and informal learning, and by using the opportunities offered by its extensive network.

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<sup>60</sup> See the example of PPM and 'window' employees or sales support and 'window' employees

The crucial – not just Posta-specific – finding of our analysis reveals that the vital precondition of a permanent renewal of leadership and workflow practice to improve the sales approach is to make extensive use of organisational innovations which ensure and sustain various forms of individual and organisational (collective) knowledge development.

#### ***4. The Aftermath of the Case Study***

Our research started at the turn of 2009/2010 just when the company management realised the importance of organisational innovations. This realisation was proved by the management's being readily available, by their allowing us to observe the previous decade's positive and negative organisational changes, and also by our being given the opportunity to interview employees on various levels in relation to process assessment. A brief case study was put together as the result of our fieldwork in 2010 which mostly analysed the firm's formal and informal training, and investigated how radical and incremental changes can be supported by company training. Our line of thinking was defined by how a firm with an essentially bureau-type approach can be transferred into a service provider.

A significant finding of the case study was that major organisational changes occur every 2 years within Magyar Posta Zrt. and therefore we wished to analyse the results of the 2010 processes at the turn of 2011/2012. However, the previously supportive management approach and the openness of the organisation changed unexpectedly. The contact individuals formerly assigned to us became unreachable and the top management did not react to any of our invitations. In accordance with the findings of our previous case study, collective learning and openness of management are essential in order to preserve the firm's position; however, we experienced a step-backwards in this area. The report resulting from the previous work session was studied by several managers, and our analysis and findings were unambiguously valuable for the development of the organisation. For this reason, it is hard to understand from a researcher's perspective why a change-management strategy based on communication and openness altered to such an extent.

During the second phase of our analysis we found that forced liberalisation<sup>61</sup> made the organisational structure closed; control and reporting became stricter and individual decision

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<sup>61</sup> Our repeated enquiries were turned down on this basis.



making constrained. This is best proved by the former respondents who did not want to publicly assist our work and reported that their decision making rights had been significantly restricted.

In line with the attitude experienced it is hard to imagine that a service approach has been successfully established among the firm's employees on a long term basis, since, if seclusion to such a degree is experienced in the case of the management, then no co-operation could be expected on lower levels either.

Experience gained during the second phase of our research evidently proves that organisational communication and management openness, as well as formal and informal learning are crucial for successful operations and for the proper management of liberalisation. It is essential to give a high priority to a service and customer focused approach if Magyar Posta wants to be present on the Hungarian and European markets as a financial, postal and mobile services provider. According to employee surveys this shift in approach has already taken place in the case of front-office employees; however, it is not so significant on the management level.

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## Appendix

### Main Characteristics of the Respondents

#	Gender	Job function	Business unit	Date
1	female	Business Unit Director	Consumer Division	December 2009
2	male	Director	HR-Development Directorate / Educational Centre	December 2009
3	female	Area Director	East-Hungary Regional Directorate	December 2009
4	female	Office Manager	Sales Monitoring and Data Management Office	December 2009
5	female	Head of Division	HR Finances Directorate / HR Planning and Finances Department	January 2010
6	female	Group Leader	Educational Centre / Development Group	January 2010
7	female	HR System Development Executive	HR Development Directorate / HR Development Office	January 2010
8	female	Sales Director	Consumer Division / Sales Directorate	January 2010
9	male	Director	Strategic Coordination Directorate	January 2010
10	male	Head of Division	Strategic Coordination Directorate / Enterprise Change Management Office	January 2010
11	female	Operational Development Executive	Strategic Coordination Directorate / Enterprise Change Management Office	January 2010
12	female	Post Office Manager	Central Regional Directorate / Post office	January 2010
13	female	PPM Executive	Central Regional Directorate / Post office	January 2010
14	female	Post Office Manager	Central Regional Directorate / Post office	January 2010
15	female	PPM Executive	Central Regional Directorate / Post office	January 2010
16	male	Executive Support Manager	HR Chief Directorate	22/12/2009 - 31/01/2010 Continuous consultancy
17	female	'Window' Clerk	Regional Directorate / Post office	November 2011
18-22	-	Employee focus group (5 participants)	Regional Directorate / Post Educational Centre / Local Trainings	May 2012



# **Ágnes Hidi – Péter Csizmadia: The Role of Organisational Innovation in the Efficient Match of Knowledge Supply and Demand (The Operation of the Schönherz School Co-operative in the IT Sector)**

## ***1. The Appreciation of a Flexible Workforce and Knowledge Application***

*‘Globalisation, resulting in increased competition and the need for flexibility, together with the necessity to provide competent answers to the present labour market crisis, drive the participants in Hungarian society and the economy to experiment with new workforce application practices’(Makó-IIIéssy-Csizmadia 2010:33)*

Favourable labour market conditions, as well as the flexible adaptation ability of the labour market, are some of the factors that play a key role in successfully keeping up with global economic practices. In forming this favourable system of conditions, flexible employment forms provided by an adequate institutional environment and a well-qualified workforce capable of adapting to rapid changes are equally crucial elements. On the one hand, flexible adaptation ability incorporates the requirements expressed on the individual level and the institutional conditions that motivate and bring these to the surface, as well as exploiting these individual abilities. The employee’s appropriate qualifications, his/her ability to adapt on a daily basis, commitment, responsibility taking, mobility and ability to take the initiative all characterise the individual dimension of flexibility. In the knowledge-based economy the significance of these characteristics has appreciated, and it is not only professional knowledge, but motivation, as well as the social and cultural features of commitment and the maturity of social relations which play a key role in the knowledge application and development necessary to maintain the competitiveness of companies and certain national economies. While earlier the sources of employees’ knowledge were formal education and training institutions, these days ‘soft’ or social knowledge such as teamwork, communication skills, problem-solving ability or taking personal responsibility also play a determining role, and are primarily accessible and transmittable through social-organisational contacts, and can be acquired through experience (Makó –Simonyi 2003).

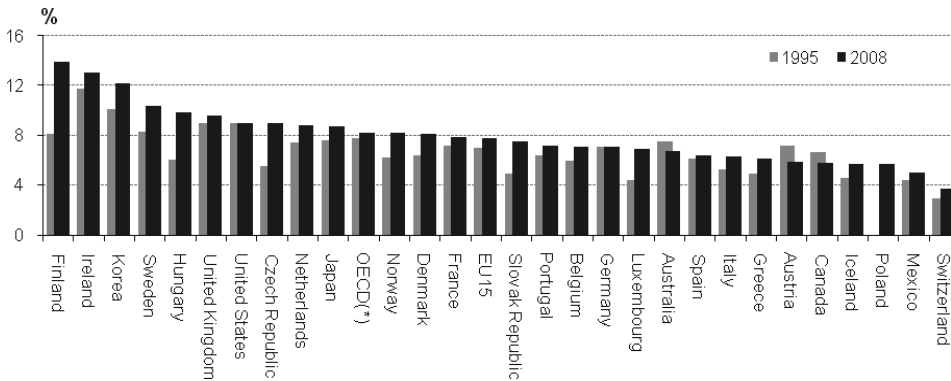
The adaptation ability expressed on the individual level is only one element of a successful catch-up for the national economy. It is necessary to adequately respond to the changes on a corporate level as well. Increased flexibility on the corporate side can be realised by *external* - layoffs, hiring, fixed-term contracts, etc. - and *internal* tools – better qualification and knowledge, technological development, more efficient use of knowledge sources – as well as complementary combinations of the above. In the interest of permanent, long term adaptation ability, firms must undertake quality changes either in their internal organisation or in external production relations for the sake of growth and survival (Makó-Simonyi 2003).

## **2. The Significance of a Flexible Workforce Application in the IT Sector**

*'[all areas of the IT sector] are characterised by fast-paced technology development, hence a well-educated (and flexible) human resource is given a primary role. ... organisational structure seems to almost "dissolve", the main aspects are efficiency, flexibility, and problem solving, and the structure always aligns with the current situation' (Csonka 2009:20)*

The need for flexible adaptation is a particularly important requirement in those sectors that have to adapt to fast-paced technological innovations and market needs. Characteristically, the information- and communication technology (IT) industry with its dynamic growth indicators can be classified with those industries that play a determining role in the Hungarian economy. In the nearly one and a half decades preceding the 2008 economic crisis, the proportion of the added value of the IT sector within the added value of the whole economy grew from 6% to close to 10% – in this respect Hungary exceeds the OECD countries' average performance and occupies a noble fifth place amongst the member states as well as playing a leading role on a regional level, leaving all Central and Eastern European countries behind.

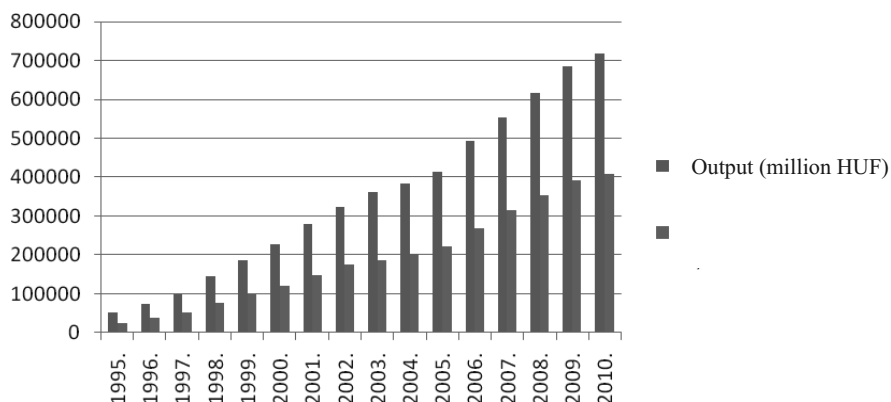
**Table 1. IT sector share of the added value of the entrepreneurial sector (1995-2008)**



Source: OECD 2010

In terms of economic performance, market environment or dominant knowledge requirements, and knowledge application, the sector cannot be considered homogeneous. This case study focuses on the labour market demand of enterprises related to 'information technology and other information services' based on a statistical classification. The performance of this segment in the IT sector with respect to both output and gross contribution to GDP has shown an exceptionally dynamic growth since the mid '90s. This field did not experience a decline during the 2008/2009 economic crisis, indicating the strong competitiveness of the sector.

**Table 2. The output of the ‘information technology and other services’ sector**



Source: KSH

The sector is experiencing hard times despite its notable performance, characterised - among other things - by low R&D expenditures, predominance of low value-added products, low marketability on an international level and weak industry-university connections. Of the different types of active companies in the sector the domestic small and medium size enterprises (SMEs) are the most common, although the subsidiaries of multinational firms are the key elements of the sector in terms of production indicators and financial resources (Csonka 2009). The truly successful SMEs require low investment demand and rely on well-qualified employees with flexible adaptation ability in order to accomplish conversion to the fast-paced technological evolution. Primarily, they are concentrated in the subfields of IT software developers and service providers (for example IT software development firms providing unique solutions, IT consultancy enterprises, firms dealing with integration etc.), where an opportunity exists to undertake activities that produce greater added value, attracting higher income and growth potential. This is a special sector of the Hungarian economy that requires relatively low financial investment and could become one of the competitive and key sectors relying on highly-qualified labour located within Hungary. We have seen an increasing number of examples recently - such as the international Hungarian successes of Prezi.com or the case of Graphisoft ArchiCAD products - indicating that this small segment could be competitive in the global market as well. (Csonka 2011)

Below we present a firm that specialises in serving the workforce demands of the IT sector. The preferential employment arrangement accomplished through a school co-operative is



based on legal regulations. In our opinion, the example of Schönherz School Co-operative illustrates very well the previously mentioned difficulties and, in particular, offers a possible solution related to the demand for flexibility.

The case study is based on interviews prepared with the management of the school co-operative between January and March 2012. In order to get a full picture, we endeavoured to take into account the opinions of all participants affected by the co-operative's services, and hence we prepared additional interviews with the instructors and students and with the representatives of the business sphere using the manpower leasing service. The list of interviewees is given in Appendix 1.

### **3. An Extraordinary Market Player – the Legal Background to the Founding of the Schönherz School Co-operative**

*‘The field of school co-operatives is a special area that generally nobody is aware of ... When we need an accountant, a lawyer or any kind of administrator, we have to begin by explaining what a school co-operative really is... this is such a neglected field...’*

*V.F. Chairman, Schönherz School Co-operative*

The concept of school societies is regulated by the 2006. X. act stating that ‘the co-operative is founded through equity share defined in its constitution, operates an open membership policy and according to the principles of variable capital, and it is a legal entity with the aim of promoting the fulfilment of the economic and other communal (cultural, educational, social, hygienic) needs of its members’. Within the co-operative framework, the school co-operative is a social co-operative that can be founded by at least seven members, at least one of which has to be an educational institution. It is possible to become a member by joining the co-operative and at least 85% of its members must be full-time students. Joining the co-operative, leaving and exclusion are regulated by the law and by the constitution of the co-operative, according to which there are no other conditions of admission except for equity share purchase and full-time student status. Each member of the co-operative owns an identical ownership share in the form of an equity share. Members can leave at any time and the co-operative will buy back their share.

According to the law, the aim of the school co-operative is to search for income generating and work experience opportunities for high school and graduate school students. For the school co-operative to provide services the employee must be a full-time student and a member of the school co-operative at the same time. The co-operative also signs an employment agreement or a commission contract with its members. The school co-operative is obliged to organise and monitor all aspects of work processes: contracting, providing a healthy and safe work environment, abiding by the law and paying wage are all tasks of the co-operative. Neither full-time member students working for the school co-operative nor the co-operative itself have any obligation to pay social security contributions for these member students.

### **3.1 From a Dormitory Office to National Presence. The Story of Schönherz School Co-operative**

#### **The Beginnings: the 1990s**

Schönherz School Co-operative was founded by students of the Technical University of Budapest (BME) Faculty of Electrical Engineering and Computer Science living in the Schönherz Zoltán Dormitory in 1995, based on the legal regulations highlighted above. The foundation of the co-operative type organisation was mainly driven by two objectives: on one hand to ensure that the finances of the Electric Engineering and Computer Science Student Union could operate in an organised structure and that students taking up work would receive their salaries in a legally controlled framework. During the first five years the co-operative operated in line with these objectives and co-ordinated the income distribution among around 50 to 100 students who found employment on their own, as well as administering the finances of the Student Union until 2001.

The current president took leadership of the school co-operative in 2001 and started the reorganisation of the co-operative's activities with his fellow students. The restructuring was facilitated by the recognition that, due to its special features, the co-operative enjoys opportunities that can serve as the basis for establishing a well-functioning recruitment agency specialising in unique needs. One of the facilitating factors was the Schönherz Zoltán Dormitory itself, as the institute had close and active co-operation with market players in the electric engineering and IT market, as well as with many companies operating in the segment, through its former students currently in employment. Another favourable factor was the student community that even today hosts the majority of the BME electric engineering and computer science university students. The new operational model was built on discovering adequate job opportunities for these students who were – compared to the majority of other disciplines – able to find employment in the job market with an employable professional skill set before finishing their university studies.

The co-operative operated with the new management in an office provided by the Dormitory. Subsequently, continuous expansion meant that both a new employee and an office located outside of the Dormitory had to be found. Three years after the restructuring it became evident that the new concept was feasible and by this time revenue had increased more than four times since 2001, from HUF 70 million to HUF 300 million.

### 3.2. The Foundation of Schönherz Informatikai Stúdió Ltd.

The co-operative expanded quickly and a growing number of students from other universities and colleges found employment with its assistance. Finally, with the opening of an office in Debrecen in 2004, Schönherz School Co-operative started to move away from its original concept – namely acting as the school co-operative of the Schönherz Dormitory. The legal situation was settled by the founding of the Electric Engineering and Computer Science Student Union so that the whole student community employed by the co-operative became members.

Meanwhile, an additional functional difficulty arose: the management noticed in the course of establishing contact with firms that the co-operative framework gives rise to distrust on the employers' side since it was perceived as an outdated legal form which is unable to deliver quality professional work – it was mainly associated with other school co-operatives that rely on skilled work. In order to avoid negative associations, the co-operative established Schönherz Informatikai Stúdió Kft and its market performance proved to be more successful despite its scope of activity being fully identical with the Schönherz School Co-operative.

*'Practically speaking, the main reason was the legal background... but then we decided to be present in the market with two images... one is Schönherz Informatikai Stúdió Kft – the IT company, where the fact that it deals with student work stays in the background; the other company is the school co-operative, where student work is brought to the forefront and IT stays in the background. (...) So in practice we advertise ourselves as Schönherz Informatikai Stúdió without a company name and always state that this covers two companies in reality. This is how we are presented'.*

*S.I., Sales Director, Schönherz School Co-operative*

The operational management of Schönherz Informatikai Stúdió Kft. was taken over by a former fellow student as well. As a result of the continuous expansion, the co-operative moved to a more spacious office building that still serves as its current base, and additional staff joined.

The school co-operative achieved a 30 to 40 percent revenue increase in the years following the reorganisation and behind this success lay the initially experimental, and later deliberate, specialisation in the recruitment of electrical engineering and computer science students, and the quick jump in demand in the IT market. The service proved to be successful and students carried out quality professional work.

*'... at the beginning of the 2000s more and more companies used IT but very few employed IT staff, especially SMEs... Therefore there was a shortage, a vacuum in the market, when students interested in IT had knowledge that electrical engineers qualified forty years ago were lacking in. (...) At that time, from a firm's perspective a third or fourth grade student's knowledge had a similar value to a fifth grade student or graduate ... This is now changing...'*  
V.F., Chairman, Schönherz School Co-operative

The model worked organically, so it was not deliberately structured. Management split tasks vertically, from sales to project management. The related administrative and organisational tasks were carried out by the project leaders reporting to the management; the searching for, and screening of students were performed by a one-man HR department, and the implementation of each project<sup>62</sup>, from the search for partners to execution, was overseen by one individual. New clients came as a result of personal connections developed in Schönherz Dormitory over the years, and by word of mouth.

### **3.3 The Effect of the Crisis – Reorganisation**

*'We were running until 2008 (practically working in parallel with each other within the company). Then in 2008 the crisis gave us a bit of a shock as the stock of our contracts decreased. Then we changed to a structure where people deal with their strongest areas: me trying to bring in new companies and once they are in, then L. and his team tries to execute. This is the way it is now'. S.I. Sales Director, Schönherz School Co-operative*

The crisis in 2008 hit the IT market – and therefore the demand for the services of Schönherz School Co-operative – deeply as well. There were no new partners brought in and the number of orders from existing partners declined, whereas 2009 brought stagnation. The temporary standstill was used by the management of the school co-operative to rethink operations and to prepare for the uplift following the crisis.

The reconsideration of the organisational structure and the division of work processes resulted in several insights:

- It became clear that the scaling of tasks is not efficient, parallel work is frequent and co-ordination among the members of the management is weak.

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<sup>62</sup> At Schönherz School Co-operative a given project represents the fulfillment of the order from the emergence of client demand to execution. Such project-type tasks include getting in touch with a new partner, searching for the right candidate for the vacant position, placement with the partner firm, contracting with the partner company when the suitable student is found, administrative tasks related to employment, and maintaining continuous contact with the partner firm and the student, and handling of problems arising.

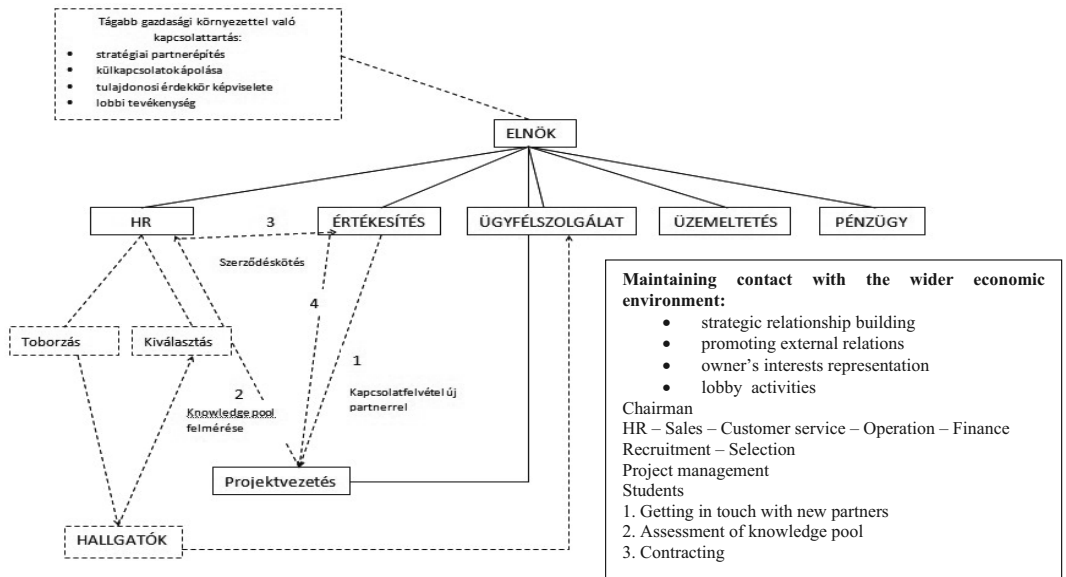
- The provision of certain tasks – sales, project management, administrative tasks and external relationship management – proved to be more successful under the control of different individuals. This led to the conclusion that each task can be executed more efficiently when tasks are divided on the basis of individual skills.

The structure of the company was extensively transformed in 2010, based on these insights. Management tasks were reorganised in line with individual skills. As the provision of some tasks exceeded the physical capacity of the management team, extensions in the HR and Finance functions took place. In parallel, the school co-operative opened new offices in Miskolc, Szeged, Kecskemét and Székesfehérvár. The search for new clients was accompanied by a better informed sales activity and the reorganisation of HR tasks with a more efficient recruitment and selection process. The new and more successful operational model that emerged as a consequence of these changes is covered in the next section.

#### 4. Professional Leadership: A New Organisational Model

Due to the restructuring over the years following the crisis (the executives withdrew from the operative tasks), the management of the co-operative became professional and the following functions were differentiated, of which we outline the ones relevant to our topic.

**Table 3. The organisational-operational model of Schönherz School Co-operative**



## 4.1 Human Resource Management: Systematic Labour Intake and Knowledge Application

HR plays a key role in the activity of the school co-operative as its tasks focus on the process of recruitment and selection, and on the organisation of professional training when needed. Before the reorganisation in 2010, recruitment generally meant the search for suitable students to fill a given position<sup>63</sup>. Open positions were commonly advertised on its website or through university mailing lists and selection was based on the CVs received and negotiations over the phone. In contrast, an informed recruitment-selection system was developed as a result of the restructuring:

### *I. Recruitment*

Recruitment is generated through advertising on the website of the school co-operative, newsletters, word of mouth, poster placement in student dormitories, representation at various higher education events, leaflets and possibly prize contest promotions.

*'Plenty of advertisements are placed in dormitories, searching for students to fill in a wide range of positions. If nothing else, students begin to think "Gee, well, this is professional work, I can already take on some kind of professional work in my second or third year and I don't have to distribute leaflets or sell burgers in McDonald's!?" Students reflect relatively soon on the fact that they possess some kind of useable knowledge already; this is thanks to the PR activity of the school co-operative'. Sz. T., Sales Director, CloudSoft Hungary Kft.*

### *II. Selection*

#### *a) Application*

The first step is that students familiarise themselves with job opportunities on the website of the school co-operative and subsequently apply after registration for the positions they are interested in.

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<sup>63</sup> Recruitment of students meeting special criteria defined by the partner company (for example searching for students with a given programming language knowledge and professional experience who are available for given weekly working hours)

*b) Professional interview: professional test and face-to-face interview*

Students applying for a given position have to complete a professional test in the office of the school co-operative and then participate in a face-to-face interview. Technical knowledge which is still unclear or could not be established following the evaluation of the test is scrutinised during the interview.

*c) Human Resources Advisory*

In addition to the assessment of technical preparedness during the interviews, the school co-operative staff provide help in perfecting CVs, advising on successful job interview techniques, and also shed light on the difficulties and problems that may arise during the job search.

*'When we started with the interviews, students did not have a clear idea about how you need to present yourself at a job interview or what CVs and motivation letters should look like etc. We put a lot of energy into IT students. And now... we see it already that students applying for IT jobs arrive in suits, well organised and well prepared... incomplete CVs are less frequent and motivation letters are well composed. While those for whom we did not put in much effort – I would think that an economist or a philologist is more aware of what a job interview is all about -, they have to be told, for example, how to dress for an interview organised by a firm' L. I., Office Manager, Schönherz School Co-operative*

*Formation of a differentiated 'knowledge pool' based on 'the depth of knowledge'*

Students are classified by the HR staff into 5 - relatively loose - categories based on the professional interviews and according to expertise, practical experience and personal skills:

- the first category consists of students who do not possess suitable qualifications for professional employment
- the second category covers those students who does not yet possess adequate professional preparedness but on the basis of their information technology knowledge can perform, for example, system administrator, Help Desk or similar tasks that require no special knowledge



- the third category comprises IT and electrical engineer students who already have the necessary technical knowledge gained in the course of university studies but do not yet have practical experience
- the fourth category incorporates students with sufficient expertise and skills (motivation, initiative, good appearance, team work skills etc.) and with at least half/one year's work experience
- the fifth category consists of those students who have at least two years of relevant professional experience and special - for example programming language - knowledge

An up-to-date database comes into existence through candidate classification, based on which the sales department can calculate the number of students who can be referred to a given position.

*'... this whole thing took on a good shape, especially because the sales team is aware of the type of students we have and responds to those positions and job adverts, and contact those firms who are roughly looking for the kind of students we have'. Sz. P., HR Director, Schönherz School Co-operative*

## **4.2. Sales and Project Management**

Sales functions became fully separated from project leadership and HR tasks following the reorganisation. Sales tasks are restricted to seeking new partners and maintaining contact with existing partners.

Service sales are fulfilled through several channels:

- Passive sales: firms look for information on the website of the school co-operative and as a result contact the sales department

*'... we try to spin up our website a little bit... firms are getting to know our website already and one or two calls come in every week as a result. This really is as easy as pie, we do nothing for it and if it works, we establish contact with the firm'. S. I., Sales Manager, Schönherz School Co-operative*

- Follow-up on job advertisements: if a firm announces an IT or electrical engineer position for which the school co-operative can nominate suitable students, the sales team gets in

touch with the advertising company and outlines the alternative opportunities offered by the school co-operative

*'Generally speaking roughly 40 to 50 new job advertisements are posted fortnightly here in Budapest. Out of these circa 25 advertisers respond to our call and in some 20 cases meetings are arranged as well. Two-thirds of those we meet give us an order and then we can either fulfil it or not. That's what we aim for really, to achieve these orders to the greatest possible extent. S. I., Sales Director, Schönherz School Co-operative*

- Cold calls: potential partners are contacted over the phone based on a database and the firm's scope of activity, and the services provided by the school co-operative are outlined. Cold calls have proved to be an efficient method; however, it is primarily successful in the case of traditional, typically skilled, student work and mostly in towns located in rural areas.

Project leadership primarily covers administration tasks. The first step is to assess the feasibility of the orders coming in from the sales team, based on the knowledge pool. Full co-ordination is taken over following contracting and the selection of the suitable candidate if the order is likely to be carried out, and this involves a dual task:

- Keeping in touch with the partner companies and conducting satisfaction surveys with regard to the students, generally one or two weeks following employment. The replacement of lost staff if necessary, and mediation in case problems and conflicts arise, are also part of the project leaders' tasks.
- Keeping in touch with employed students, arrangement of assignments in case of multiple work, collecting attendance registers and completion certificates, and summarising the number of worked hours etc.

Traditional customer service tasks (handling of phone calls, reception of students and partner companies etc.) belong to the customer service department, which also performs the administrative tasks necessary to register a student as a school co-operative member, provide help in filling in the entry documents and in filling in, or modifying, work contracts for taking up or changing roles, and other related administrative tasks. The finance department undertakes payroll, book-keeping and controlling tasks.

## **5. The Pros and Cons of Student Employment**

The essential difference between the Schönherz School Co-operative and other school co-operatives is that it does not primarily focus on traditional student work<sup>64</sup> recruitment but focuses principally on jobs suitable for electrical engineering and computer science students. It is the only school co-operative in the country to represent this market segment. Establishing this direction was made possible as a result of its unique past and social network; however, success and acceptance by market players are attributable to the interplay of many other factors. The realisation of opportunities inherent in student labour and bringing quality services to the forefront both have a key role in the success of the model.

### **5.1 What are the Advantages of Employing Students in Professional Positions?**

#### *Cost efficiency*

The employment of university students through a school co-operative results in significant savings for the company. The social security contribution burden of full-time students is state-financed due to the specific legal regulations of school co-operatives, which results in a 30 to 40 percent saving from an employer point of view. Besides, student labour cannot be treated as full-time employment by its nature and therefore does not incur fixed, but only variable, costs. This has major significance in the case of software development companies specialising in project-based assignments<sup>65</sup> in line with orders; therefore the period between two projects does not impose a salary payable to student-status developers, and students can be employed more dynamically, aligned with projects.

#### *Motivation*

IT functions involving routine and no challenge for professional engineers with several years of experience – such as software testing for developers – provide great opportunities for learning and development for a newly employed engineering student. Students perform these tasks with responsibility, desire to prove themselves and motivation; besides, wages

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<sup>64</sup> Traditional student jobs are typically physical, administrative, and interpretation or hostess assignments

<sup>65</sup> The workload of firms dealing with software development is not even and adapts to the life-cycle of projects.

are aligned with the significance of the position and therefore incur much lower salary costs compared with full-time employees.

*'... the lack of experience is not disadvantageous at all. Moreover, those without experience are motivated even when it comes to routine tasks. On the other hand, those who have experience will think "Why should I be dealing with this when I can add much more to the story?" Practically, this is what we targeted in the market'. S.I., Sales Director, Schönherz School Co-operative*

#### *Adaptation to the organisational culture*

Students employed through the school co-operative are typically starting their first job, and therefore lack the mindset, mentality and attached routines picked up at other companies so that they adapt better to the organisational culture of the employer.

#### *Up-to date knowledge and reliability*

In the rapidly developing IT market, knowledge gained as part of university education erodes in a few years. The third to fifth grade students possess up-to-date knowledge that can have particularly high value for employers. Typical stereotypes against student employment are the unreliability and unpredictability of students ('I will throw a sickie after a night out'). The experiences of the school co-operatives show that students undertaking professional work do not think of it as a seasonal-type of work, but rather from a long-term career perspective which provides room for development, and therefore keeping their job is as important for students as for a full-time employee.

## **5.2 Drawbacks of Student Employment**

Employing students certainly implies some difficulties as educational duties impose barriers on work to some extent.

#### *Working hour restrictions in employment and the risk of unpredictability*

A student can work on average 25-30 hours a week as a consequence of educational duties, moreover, they need more days off during exam periods and assignments are not continuous. There is a risk that in some periods students cannot be employed at all, or only for a few hours as duties related to studies change in each semester. As a result, the execution of an entire project based on students is not always possible.

*'Sometimes it happens that a student works through the summer to the employer's great satisfaction but they have to leave by autumn as the student cannot undertake the number of weekly working hours the company requires to work efficiently. This is unfortunately a type of risk we cannot avoid. It is unpredictable what classes students will have in the next semester and how subjects can be grouped... Some universities allow flexible subject registrations but some places have a fixed schedule that cannot be modified. It varies greatly from one institution to another. B.L., Managing Director, Schönherz Informatikai Stúdió*

#### *Professional Deficiencies: the Lack of Soft-skills and References*

Students usually possess a set of framework-type skills obtained during university studies when taking up work and lack special knowledge originating from the rapid changes in technology and market demand – e.g. they do not know special programming languages – therefore their training may last for several months. Meanwhile, the time of a company employee is inevitably taken during the training period and therefore it is a double investment. The necessary factors of efficient and innovative work include skills and competences such as communication and collaboration skills, initiative taking etc. Most skills can be obtained primarily in social situations related to work processes. There are limited opportunities to gain the individual work experience and skills necessary for teamwork during university studies, and this can further complicate the training and adaptation process. In the case of a first job, the professional qualities of students can only be measured based on their studies and achievements. No references are available, so the potential employer takes some level of risk with the new hire.

### **5.3 Why is the Model Popular despite its Drawbacks? The Significance of Trust**

Despite the risks in student employment, the services of Schönherz School Co-operative have proved to be remarkably popular, as is reflected in the fact that many new partners heard from the co-operative by word of mouth and get in touch with the sales department based on positive feedback. Building up trust towards the school co-operative plays a key role for new partners in overcoming initial uncertainties with regard to student employment and has developed as part of a multi-stage process during the operation of roughly ten years.

*'When we became aware that we are specialising in electrical engineering and computer science students, we set an objective to approach companies not just through Schönherz connections, but to be able to knock on the doors of entirely new companies. Ever since, it*

*has been of great importance to earn credibility with our partners'. V.F., Chairman, Schönherz School Co-operative*

### **5.3.1. Factors in Establishing Trust**

*Highlight drawbacks*

*'The important thing, and in my opinion we make continuous improvements in this, is that the partners have to be aware all the time what they will get. They should be clear about the costs and benefits of what they get, and if it is beneficial, then know what to expect. In truth, this is a kind of business trust that should be built up and then it cannot be played up. We never over-promise by proposing to send a person who possesses the same qualities as someone from the market with 4 years of experience. It is not the same...' V.F. Chairman, Schönherz School Co-operative*

Companies typically approach the school co-operative with unrealistically high expectations that often cannot be met. The sales department puts a great deal of emphasis on mapping the imperfections when contacting new partners, preparing for the difficulties that come with the training process, and highlighting the fact that the provision of an adequate student within a tight deadline is not likely to happen. Therefore, in the course of initial negotiations, companies are encouraged to employ students as part of their mid-term strategy. Thereby students obtain the necessary skills during the training period, undertake the previously mentioned routine tasks at the same time, and can be treated as equivalents to full-time employees some months later during busy project periods, but with significantly lower costs and high workload. Following the crisis of 2008 with the fall back in the IT sector, companies are paying more attention to this opportunity and taking advantage of it.

### **5.3.2 Providing Quality Service**

The objective of the selection process is to pick the best students. The multi-level screening process was developed by the school co-operative to allow for suitable students who meet expectations and who have already proved themselves in professional knowledge tests so that they can be nominated to potential employers.

*'... We send 3-4-5 alternative candidates to the company... "they are the suitable ones who would be interested; contact them, do an interview, have a chat and select the most suitable student". There are many criteria we cannot filter, such as empathy... Therefore we must*

*send more candidates than they would expect otherwise'. Sz. P. HR Director, Schönherz School Co-operative*

### **5.3.3. Safety for Students**

Building up trust towards students plays a significant role as well. Project leaders provide assistance in problem solving and conflict settlement through continuous communication with students and companies; the school co-operative also provides some degree of safety for students exposed to the vulnerability of the job market (support for salary negotiations, safe working conditions, assistance in conflict settlement at work etc.).

*'We ask all students to let us know if they have problems and we will try to find a remedy, and get in touch with the company. We have to pay attention to this, as frequent communication is important. When employed, students are not left alone, either. When they come in, as part of the necessary administrative duties, we have a chat with them... they tell us how they are doing and we get a picture of their situation'. L.I. Office Manager, Debrecen, Schönherz School Co-operative*

## **6. Flexible Ways of Adaptation – Basis of the Model's Operability**

### **6.1. Company Adaptation to the Changing Economic Environment. Student Employment as a Potential Solution**

*The role of student employment at small sized IT companies: short-term resource expansion*

Small companies with limited financial resources employing a maximum of 20 to 30 people often engage students for the provision of project tasks as part of a 'contingency plan'. A typical situation is when a development project is running late and with the deadline approaching the firm would like to employ an experienced, professional candidate able to start immediately but the project budget cannot cover a full-time senior developer. In such situations companies turn to the school co-operative. Satisfying such demand only succeeds rarely; a long-term strategy built on future student employment is atypical in the case of these companies.

*'... there was a specific example when we had the interview at midday on a Friday and then the company asked: "could you guys start at two o'clock?" We had them signed up and they started at the company at 2pm'. L.I. Office Manager, Debrecen, Schönherz School Co-operative*

### *Adaptation of mid-sized companies: a resource for strategic development.*

According to the experience of interviewees, companies employing 30 to 100 people are most likely to employ electrical engineering and information science students based on strategic considerations. These strategic considerations cover cost reduction, mastering the specific knowledge applied by the given company and aspects of organisational socialisation as well. Prior to the economic crisis of 2008, players in the dynamically expanding IT sector did not have to cope with financial difficulties; cost-efficiency was given priority following the years of the growing crisis and resulted in firms taking on the difficulties related to training and gaining practice in student employment. Such difficulties are briefly covered below:

*Resource-allocation* The training process unavoidably drags human resources from one of the highly paid, full-time employees of the company. Management have to take into consideration that the twofold costs of investing in the training of students only return in the mid-term.

*'Considering it from the perspective of project control, if that particular task had been done by a senior developer, it possibly would have been cheaper... but we get the return on the long run as that person will become a senior developer. We have just this kind of positive experience as we have a guy who started last year as a junior, and now he is right up at the senior level; he will be with us for an additional one or two years and will become a software designer who can manage a project on his own. So he is a highly-qualified guy and very loyal at the same time'. Sz.T. Sales Director, CloudSoft Hungary Kft.*

### *The role of student employment at large companies*

In the case of large or multinational companies, demand mainly arises for traditional student employment – for example the provision of administrative tasks, call-centre customer service etc. Savings gained through the application of professional knowledge-based student employment is not significant in this case and their mid-term strategy of future student employment is hard to plan. It is difficult for the school co-operative to get in touch with their decision makers and therefore the target market of Schönherz School Co-operative is essentially made up of small and medium-sized enterprises.



## **6.2. Adaptation of the Model to Labour Market Conditions**

The illustrated business model has an influence on the local labour market as well. Based on the interviews conducted, a unique landscape can be observed in Debrecen. At the beginning of the 2000s, IT students graduating from the University of Debrecen principally tried to find employment abroad or in Budapest and its neighbourhood, or possibly at local multinational companies. One of the reasons for workforce outflow was that students were unaware of small local IT companies. These companies have recognised by now that their position can be strengthened by working together with Schönherz School Co-operative and the Computer Science Faculty of the University of Debrecen. Companies became recognised by students and can now access the best quality students and fresh graduates, and the migration of IT experts is less likely to take place.

## **7. Adaptation of Students to Changing Labour Market Needs**

*The management of working hours in line with workplace expectations.* The target group of the school co-operative consists of students who are professionally well prepared, but less consciously focused on career building (e.g. participation in student competitions or career programmes) and whose primary motivations for taking up work are to gain financial independence and acquire professional experience. Students employed during their university years typically schedule their time thoughtfully, and their timetable and exam schedules are aligned with workplace expectations, implying that the employer only incurs a 20 to 30 percent reduction in output in the exam period, for example.

*'I only had to ask for a tailor-made timetable at the beginning, since then I can manage to go in or attend classes so that it would not clash with anything'. V.Cs. Student, Information Science Faculty, University of Debrecen*

*Motivation to finish studies as soon as possible.* The relatively high remuneration in the IT sector and the professional challenge are highly motivating for students to improve their performance. The general experience is that employed students put professional advancement to the fore and duties related to studies prove to be an obstructive factor. As a consequence, their motivation to finish university or college studies becomes stronger in parallel with work.

## 7.1. Effective Instruments for “Matching” Knowledge Supply and Demand

*Market demand pointing towards higher education.* According to school co-operative and company leaders, market feedback testifies to the fact that besides the prestige of university/college graduation, employers equally take into account the professional experience of future employees. One reason behind this is that the assessment of students from a professional point of view based on the prestige of the institution where they graduated from is not necessarily as determining a factor as practice suggested at the beginning of the 2000s. The development of the two-tier higher education system made transfer among institutions more flexible and therefore the quality of knowledge gained at the place of graduation is more difficult to identify. In parallel to this, the field of IT education has become more competitive in the last ten years and the quality guarantee of universities is now less typical. The other reason is that theoretical knowledge gained during university studies has to be complemented with up-to-date technological knowledge and the importance of soft-skills is becoming more appreciated.

Therefore the majority of companies impose three requirements on students and career starters:

1) *Way of thinking.* The principal and most important requirement of the IT profession is the analytical, engineer mindset that students can acquire primarily during their university studies.

*‘Among the three skills it is definitely the way of thinking that is the most important as technology is rapidly changing, and if somebody has the background in the way of thinking and is reliable, and let’s say has the engineer-approach of having an in-depth view of things, then he can get the hang of technology. Desire to learn and meta-level thinking are things that we cannot transfer’.* Sz.T. Sales Director, CloudSoft Hungary Kft.

2) *Technology proficiency.* University/college courses generally equip students with a framework-type knowledge, meaning that knowledge aligned with the rapidly changing technology requirements cannot be secured by higher education courses, and can only be obtained during work or practical training.

*‘Everybody is clear about the basics, that’s for sure. So at the university they learn things that are, say, the basics of a JAVA programming language. The highest demand from the company side is something special, a small thing, a given framework, using a certain version*

*of a software development platform etc. This is the kind of little extra we really would like to pass on to them, for example in the form of development training, but if we start that kind of training with 15 people, no 15 companies would want students to achieve the same thing. Therefore these extra things are picked up when they are there, unless they have already met them in life: at home, as a standalone course or just as a passion'. Sz.P., HR Director, Schönherz School Co-operative*

3) *Soft skills.* Reliability, accountability, ability to work in a team and initiative taking are an absolute necessity for professional success. Higher education studies touch on these skills – e.g. through teamwork or independent courses. Becoming familiar with the business environment, adequate communication with team members and managers, following the rules of play, and overcoming difficulties of integration all require a long learning process. The staff of the school co-operative help students in the course of face-to-face interviews to overcome the initial barriers, such as writing a CV or successfully taking part in a job interview; however, the required skills can only be obtained by taking up a job or, in some favourable cases, through participation in research group projects. This is the less frequent case, as research groups related to IT education are quite rare in higher education in Hungary.

*'If I put together a Schönherz team (i.e. students from Schönherz Zoltán Dormitory) either as a development team, sales team or anything else, they have the background of working together, they have the common language, they know each members' strengths, have the group dynamics, the roles, and we do not have to go through the group formation cycles but we can start straight away with the execution phase. This is the thing provided by the Dormitory as they have gone through many small pilot projects. This results in reliability, loyalty, team work - many things that are extremely important in the job market'. Sz.T., Sales Director, CloudSoft Hungary Kft.*

### **7.3. The Role of Strategic Co-operation between Higher Education Institutions and the Business Sphere**

The observations based on the case study interviews highlight that analytical thinking obtained during university studies is inevitable for professional success, but some weeks/months of compulsory professional training in higher education is not enough to acquire technology knowledge. As a result of the short time span, students do not face significantly challenging professional tasks and therefore are less motivated to deliver outstanding performance during the compulsory professional training. However, the results of

the introduction of the two-tier higher education system show that individual work and deep knowledge of certain technical areas are becoming a more significant pre-requisite as part of the information science course, both effecting initiative taking and the acquisition of specific technology knowledge. Nevertheless, the course outline of higher education institutions can only slowly adapt to the extremely rapid changes in the IT industry service market and to the new technology requirements, therefore, it is primarily focused on providing framework-type knowledge and the basics required to acquire technology skills.

*The importance of the so-called collaborative training based on co-operation*

An alternate solution is the foundation of collaborative courses with the business sphere, something which currently exists on various levels at higher education institutions, and only in a basic form in several cases (e.g. business professionals give guest lectures as part of a course or provide assistance as a thesis advisor). Obtaining additional skills and knowledge expected in the job market is most of all possible through the close co-operation between the industry and the university. Such co-operation was executed by the Computer Science Faculty of the University of Debrecen by launching a university course that is outsourced to a local large enterprise and is aligned with the company profile, providing the opportunity to gain practice in addition to the theoretical lectures given by the company employees, while students can understand the daily operations of the business sphere. The 'return' on such co-operation for the company is that it gets to know at first hand the skills of the students and offers job opportunities to the most suitable ones, while students completing the course enter the labour market with professional knowledge, market acumen and more advanced social skills. The additional gain of a closer co-operation between the industry and educational institutions is that the course guidelines can be aligned with the expectations of the market demand. The interviews serving as the basis of this case study testify to the fact that despite the expectations and a few success stories, this type of co-operation is not commonly diffused in higher education in Hungary.

## **8. A Potential Innovative Institutional Example: the Role of Schönherz School Co-operative as a 'Bridge' in Matching Knowledge Supply and Demand**

*Transferring labour market demand towards higher education institutions*

Schönherz School Co-operative itself considers as its mission the transfer of IT market needs towards higher education institutions, something which proves to be feasible primarily through informal channels. In the case of certain universities, successful discussions developed between the management of the school co-operative and the faculties, lecturers, course leaders or student unions, where the common intention is to align courses with market expectations.

*'We were bridging between IT companies and the Computer Science faculty. Keeping contact with IT companies, with the requests and vacancies we see, we know exactly what kind of people companies would like to have, and from the Computer Science faculty we see the knowledge of students, and we have a real picture of the differences between the two of them. We provided assistance for many events at the faculty; if they had a project in which the partner companies were interested then we forwarded the information to our partners. We have not been able to influence the university at a central level, but we were able to transform the mindset of one or two lecturers; they were open too, and came to discussions where they were able to meet companies, and took things into consideration as part of their own courses'. L.I., Office Manager, Debrecen, Schönherz School Co-operative*

An example of successful co-operation is the jointly developed non-compulsory course by the Computer Science Faculty of the University of Debrecen and Schönherz School Co-operative, in which students regularly visit companies<sup>66</sup>. The course proved to be highly successful especially in those cases where the companies themselves asked students to report and devote extra energy to acquire a deeper understanding of their activities. Participation in the course became more popular also among businesses, as the goodwill of

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<sup>66</sup> The course falls beyond the scope of student employment; in this case the school co-operative made its business connections available.

a company spreads quickly among students, and hence the lesser known IT companies are able to find highly-qualified students among the graduates. Beyond co-operation developed through informal connections, communication within various IT clusters proved to be effective, providing a platform for correspondence between higher education and market players, and in which Schönherz School Co-operative is an active participant as well. Apart from the success achieved in Debrecen, examples like this with tangible results could not be achieved in the case of other higher education institutions.

#### *Flexible adaptation to market needs*

To adapt to the needs arising from the business sphere, the school co-operative substitutes the lack of technology skills with its own training. These training sessions principally focus on those special areas that cannot be learnt as part of university studies. The objective is to increase the number of highly-qualified students eligible to work in various positions.

*'... there are companies that require the kind of knowledge that is unavailable in the market, i.e. a niche, unknown technology that is not covered in university courses or anywhere else, only in some very expensive training courses. On such occasions we help with organising courses, where the company is coming to us, we bring in students, students can learn a technology they would not be able to elsewhere, and the technology used by the company becomes more popular, develops, and is diffused. The company picks the 3-4-5 students with the best performance and offers them a job, so there will be more people who have a better understanding of the given technology and in the long run this can serve as the basis of the new supply'. V.F., Chairman, Schönherz School Co-operative*

The courses, which run for a few weeks, started in 2010 in parallel with the restructuring of the operational model and nowadays run on the basis of various setups:

- Proactively started courses reflecting the potential market demand, where a higher salary level is secured for people passing the course. The costs are paid by the co-operative; this course type is popular with both existing and new partners.
- Courses based on incoming requests from companies and built on the expected expansion of the given company. The infrastructural background (venue, workstation etc.) is provided by the co-operative in this case, whereas the lecturer and the course outline are provided by the companies. The advantage of this solution for companies is that they can offer positions to the best performing students trained for their needs, whereas the benefit for the school co-operative is that an additional 5-6 students gain

special knowledge and later have a better chance of being placed with other companies. This model works with companies building on a medium-term strategy.

Students are charged 10 percent of the actual costs on both courses and the objective of the fee is to filter motivated students. Course completion obliges students to take up a yearlong assignment if the school co-operative finds them an adequate position, otherwise the full cost of the course has to be paid back. The courses are relatively expensive but are worth the price and are successful as a result of the quality education and the niche knowledge offered. Students finishing the course can have higher salary expectations, and their training requires less effort from the lead developers of companies; they also start generating profit right from the beginning of their employment.

*'... The first expert training was held in 2010, so it really started one and a half years ago, but we have already received positive feedback from students: we receive mails saying "When is the next course, one of my friends would like to attend...?", so it seems that demand is there from students as well. I think that when they have to pay the significant university tuition fees then it will strengthen even more'. S.I., Sales Director, Schönherz School Co-operative*

There were previous attempts to introduce training that facilitates the acquisition of soft-skills and supports workplace socialising; nevertheless, experience has shown that the attainment of these skills is only possible on a long-term basis and through practice.

## **Summary**

The model demonstrated above acts as a bridge to ease the inflexibility in the supply and demand of career starters in the IT sector in Hungary. The unique cost-efficient operational model of Schönherz School Co-operative became feasible due to the favourable legal environment, its specific – electrical engineering and computer science focused – solution is unmatched in its market segment. The employment of students in parallel with their university studies provides the opportunity to gain the kind of competencies and skills that cannot, or can only partially, be acquired during higher education studies. It opens up additional opportunities for students to gain the special professional knowledge which changes continuously due to the rapid development of the IT sector, whereas in the course of university studies essentially only framework-type knowledge is obtainable. The cost efficiency of the employment form provided by the school co-operative offers short-term

savings to companies – primarily small-sized enterprises – and in the long run it ensures a continuous supply of experts who can later be employed full-time and it also adapts to the strategic expectations of large companies. The unfavourable economic conditions make cost-efficiency factors increasingly important as a result of the changes imposed by the world economic crisis; therefore, favourable salary expenditure has acquired a higher significance in the past few years. Experience proves the operability of the model and the recognition of the medium and long-term benefits for companies confirms its ability to adapt to changing conditions. The advantages of the employment model demonstrated in the case study can only be exploited by companies that do not focus solely on the short-term benefits which essentially arise from lower salary expenditure, but who treat the employed students as a medium-term investment. This approach however assumes co-operation: flexible adaptation to company requirements from the students employed, while firms have to invest – in particular cases at a temporary loss – in the training of students and support their professional socialisation.

The deficiencies on the supply side arise from the structural rigidity of higher education institutions. The active co-operation between the business sphere and higher education institutions seems to be filling the gap; however, the diffusion of strategic partnerships to date has been low in the Hungarian economic praxis. In the future, a potential way of development may be the kind of organisational-managerial innovation that is represented by the operation and development of Schönherz School Co-operative.



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## **Appendix**

### Appendix 1. List of interviewees

<b>Name</b>	<b>Organisation</b>	<b>Title</b>
V.F.	Schönherz School Co-operative	Chairman
S.I.	Schönherz School Co-operative	Sales Director
B.L.	Schönherz Informatikai Stúdió	Managing Director
L.I.	Schönherz Informatikai Stúdió	Office Manager
Sz. P.	Schönherz School Co-operative	HR Director
Sz.T.	CloudSoft Hungary Kft.	Sales Director
J.I.	Computer Science Faculty, University of Debrecen	Principal Lecturer
V.Cs.	Computer Science Faculty, University of Debrecen	University Student

# Beáta Nyerges: Understanding Organizational Learning in a Technology Focused SME Understanding Organ

## 1. Introduction – Background and Scope

According to the New York Times foreign affairs columnist Thomas Friedman in his book on globalisation, the world is becoming flatter and this requires countries, companies, communities, individuals and even governments and societies to run faster in order to stay in place. Not exclusively, but largely due to technology convergence, BRIC<sup>67</sup> countries and many other emerging economies have become part of the global supply chain, raising competition - mainly in services and manufacturing - onto a dimension never before experienced, where only adaptable entrepreneurs and companies are empowered. In Friedman's terminology "flat" means "connected". Besides the strong impact of the digital revolution, trade and political barriers are being constantly lowered at the same time, further enabling business to be done on a global level. Focusing on the key players of this transformation, what he defines as "Globalization 3.0" is mainly driven by freelancers and innovative start-ups (Friedman, 2005).

This is parallel to Charles Handy's concept, in which he outlines the ongoing influence of the digital revolution on business over the last two decades. Handy describes a world of "elephants" – organisations – and "fleas" – self-employed, independent individuals. In the context of organisational learning he points out:

"... I decided that to be different rather than better I would need to step outside my area of expertise if I was going to glean new insights and new ideas... ... the real innovations usually come from outside the industry or the firm; those that come from inside are typically developments of the familiar, not truly new." (Handy, 2003)

The increasing level of competition and technology changes impact the way employees or self-employed individuals can get access to and deliver everyday jobs, and therefore the emphasis is on the importance of adapting organisational learning capabilities to the changing marketplace.

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<sup>67</sup> BRIC – Brazil, Russia, India, China

The aim of this case study is to provide an overview of the implementation of organisational learning through the example of a Hungarian technology-focused SME.

Setting the framework of the analysis should, however, be preceded by a definition of the concept of “learning organisations” as this logical construct is subject to many different interpretations. The definition and the applied theoretical models provide the basis for an in-depth understanding of the subject of this case study.

## 1.1 Defining “Learning Organisations” – Theoretical Framework

In historical terms, the concept of “learning organisations” started to grow in popularity in the early 1990s as shown in Chart 1<sup>68</sup>, while as Smith and Tosey (1999) note, it became more widely known following the work of authors such as Senge (1990).

**Chart 1. – The occurrence of the term “learning organisations” in books from 1980 to 2000, as charted in Google's nGram Viewer**



**Source:**

[http://books.google.com/ngrams/graph?content=learning+organisations&year\\_start=1980&year\\_end=2000&corpus=0&smoothing=3](http://books.google.com/ngrams/graph?content=learning+organisations&year_start=1980&year_end=2000&corpus=0&smoothing=3)

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<sup>68</sup> Google nGram Viewer – <http://books.google.com/ngrams> – “A team led by biologist Jean-Baptiste Michel and bioengineer Erez Lieberman-Aiden, both of Harvard, tracked the frequency with which various words appeared in nearly 5.2 million digitized books published between 1800 and 2000. That works out to about 4 percent of all books ever published, and roughly one-third of Google's digital archive.” - <http://news.discovery.com/human/google-digitized-books-culture-101217.html>, Accessed on: 26.02.2012

According to the Senge's (1990) definition learning organisations are, "organizations where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together".

It is worthwhile analysing in the case study the five disciplines proposed by Senge (1990) for the development of learning organisations, namely putting away old ways of thinking (mental models), learning to be open with other colleagues (personal mastery), understanding how the organisation really works (systems thinking), forming a plan all team members can agree with (shared vision) and, last but not least, working together to achieve the objective (team learning).

Referring to the OECD's general definition of learning organisations:

"A learning organisation is an organisation that promotes management tools concerned with the improvement of individual and organisation learning".<sup>69</sup>

Nevis, DiBella and Gould (1996) identified seven learning orientations to characterise stylistic variations in organisational learning capabilities as defined in Table 1.

**Table 1. – Learning Orientations**

Name	Approach
1. Knowledge source	internal ... external
2. Product – process focus	product ... process
3. Documentation mode	personal ... collective
4. Dissemination mode	formal ... informal
5. Learning focus	adaptive ... innovative
6. Value – chain focus	design / make ... market /deliver
7. Skill development focus	individual ... group

<sup>69</sup> OECD (2010), *Innovative Workplaces: Making Better Use of Skills within Organisations*, OECD Publishing. pp. 9 [10.1787/9789264095687-en](https://doi.org/10.1787/9789264095687-en)

**Knowledge source** is seen as a scale which moves between capitalising on internal resources, and generating ideas and schemes derived from external sources. The difference is often referred to as the borderline between innovation and adaptation, and at times underrates the latter.

**Product – process focus** defines whether the area of product development or process development is being prioritised in a firm's approach. Significant investment in process development can help companies in achieving a competitive edge.

**Documentation mode** refers to whether more emphasis is placed on the tangible conservation of knowledge that is closer to a higher level of documentation, or whether individuals serve as the source of specific knowledge due to their experience or educational background. The latter may have a negative impact on the collective memory of the organisation as a consequence of fluctuation. Also, structured information processing and storing support the long term accessibility of knowledge.

**Dissemination mode** in the context of organisational learning is defined as the difference between a controlled and an organic diffusion of learning. The main difference between the latter approach and a structured one is that the structured approach prefers decision-making about methods, insights and knowledge sharing as a consequence of institutional acts. The application of the controlled approach occurs in written communication platforms and the presence of formal educational methods. On the contrary, role models who behave in a compelling way set the boundaries of the informal approach.

In reviewing different methods, **learning focus** can reveal an explanation of organisational performance problems by setting the difference between improving what is already being done against the assumption testing of what is being done. These problems are less likely to be the result of poor efficiency and more likely to be due to the (in)ability to articulate and check the underlying assumptions.

In the context of the **value-chain**, the valuation and support of core competencies and learning investments can be defined in an organisation as 'engineering-focused' or 'marketing-driven' focused. The first presumes a concentration of resources on the design-and-make end of the value chain, whilst the latter emphasises the market-and-deliver end. Learning investments cover both the allocation of staffing and funds.

**Skill development** can be characterised by individual and collaborative learning. Instead of focusing solely on one of these aspects, it has been argued that both are necessary to maintain a healthy balance of learning development within the organisation. While some authors (Kasl et al., 1992; Marsick et al., 1991; Senge, 1990) argue that collaborative learning is better for organisational purposes, it is clearly not a binominal decision. As the Wired Magazine article<sup>70</sup> highlights:

“As Susan Cain points out in her much-discussed new book, *Quiet: The Power of Introverts in a World That Can't Stop Talking*, introverts get a bad rap in American culture. Ever since Dale Carnegie began writing manuals on glad-handling your way up the corporate ladder, US society has embraced the idea that extroversion is a key to success: Your achievement – and even your level of creativity – depends upon your being gregarious and outgoing and able to work well in a team. (...) Yet this incessant teamwork isn't useful. A mountain of studies has shown that face-to-face brainstorming and teamwork often lead to inferior decision making. That's because social dynamics lead groups astray; they coalesce around the loudest extrovert's most confidently asserted idea, no matter how daft it might be.”

## 1.2 The Economic and European context

On a European level, the Fifth European Working Conditions survey in 2010<sup>71</sup> found that despite the economic crisis and therefore rising levels of unemployment, “training paid for by employers was at its highest level since 1995 (for the EU15), with 34% of workers receiving training in the 12 months prior to the survey. This is a break in a 15-year trend in which employer-provided training had not increased”.<sup>72</sup> (Chart 2).

While one interpretation of this finding may be the recognition of the importance of training in many European countries, the Eurofound report also highlights an employee-driven increase in the level of activity, while short-term working schemes that include training can also have an effect.

From the perspective of this case study, it should be also noted that according to the study findings, “permanent employees benefit much more from employer-paid training than do

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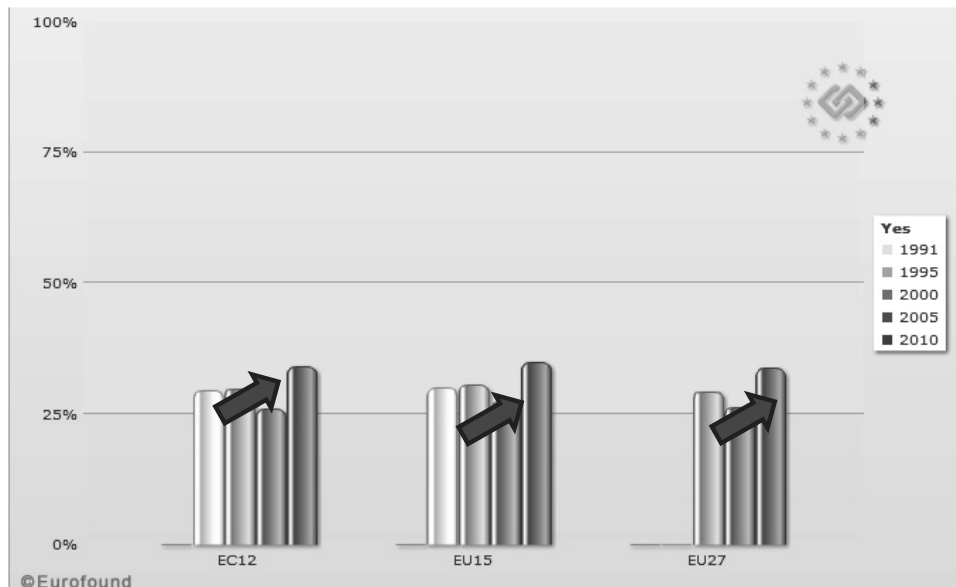
<sup>70</sup> Wired Magazine, April 2012 – Clive Thompson: Solo performance – Shut up and start acting like an introvert pp 36.

<sup>71</sup> Fifth European Working Conditions survey – 2010, <http://www.eurofound.europa.eu/surveys/ewcs/2010/index.htm>, Accessed on: 25.02.2012

<sup>72</sup> EWCS 2010 - Skills, training and career prospects, <http://www.eurofound.europa.eu/surveys/ewcs/2010/training.htm>, Accessed on 25.02.2012

those employed on other arrangements: in 2010, 39% of permanent employees accessed employer-paid training, compared with only 26% of other employees.”<sup>73</sup>

**Chart 2. - Have you had training paid for by your employer (or self if self-employed) in the past year? (q61a), EWCS 2010 Survey**



**Source:** [http://www.eurofound.europa.eu/surveys/smt/ewcs/ewcs2010\\_08\\_03.htm](http://www.eurofound.europa.eu/surveys/smt/ewcs/ewcs2010_08_03.htm)

By analysing the study findings on a cross-country level, Hungary with 26.7% of employees on training paid for by the employer (or self if self-employed) in the past year, is significantly below the EU27 average of 33.7%.<sup>74</sup>

### 1.3 Highlights from the OECD paper

As the previously cited OECD paper<sup>75</sup> points out, the subject of organisational learning cannot be detached from the potential trade-off employers are facing between keeping control through standardised processes and dynamic properties, since the changes or

<sup>73</sup> EWCS 2010 - Skills, training and career prospects, <http://www.eurofound.europa.eu/surveys/ewcs/2010/training.htm>, Accessed on 25.02.2012

<sup>74</sup> Fifth European Working Conditions survey – 2010, [http://www.eurofound.europa.eu/surveys/smt/ewcs/ewcs2010\\_08\\_03.htm](http://www.eurofound.europa.eu/surveys/smt/ewcs/ewcs2010_08_03.htm), Accessed on: 25.02.2012

<sup>75</sup> OECD (2010), Innovative Workplaces: Making Better Use of Skills within Organisations, OECD Publishing, pp. 12. [10.1787/9789264095687-en](https://doi.org/10.1787/9789264095687-en)



innovations should be sustainable. This also has an implication on the design of organisational structure, how employees can access resources and knowledge within the organisation, whether it is an organic expansion of knowledge through collective contribution, a result of centrally coordinated human resource practices, or a combination of these. It is important to analyse whether knowledge development is attributed to specialist problem solvers or direct “producers” of knowledge within the entity. Appraisals and regular feedback on employee performance, including formal training improve the transparency of the organisation’s incentive and promotional policy.

## **2. Company Case Study – Mortoff & Ideal**

Mortoff & Ideal have been providing business and IT consulting services and complex IT solutions to customers since 2002. The company services cover the full working process, from the definition of goals and tasks to the implementation of recommendations. The dynamic development of the enterprise started in 2004 with an annual growth rate of fifty to one hundred percent. Growth is also reflected in retained earnings, despite the credit crunch in 2008, as illustrated in Table 2.

**Table 2 – Mortoff Kft. – Retained earnings – on a year-on-year basis**

	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>
<b>Retained earnings (000 HUF)</b>	4 362	20 832	14 541	62 016
<b>Annual result change YoY (%)</b>	n.a.	477%	-31%	426%

**Source:** Ministry of Public Administration and Justice – <http://e-beszamolo.kim.gov.hu>

The company operates on the Hungarian market as one of the largest solution providers with full Hungarian ownership. Their offering is based on customised solutions managed and supported from the initial formulation of ideas right up until the execution phase.

The organisational credo is to work with highly qualified and experienced experts who create measurable value for customers. Best practices are utilised throughout each individual project where continuous training of people ensures that clients’ expectations are exceeded.

In 2010 the owners of Mortoff & Ideal decided - after close co-operation between the two companies - to raise cooperation onto a strategic level and modify the structure and ownership accordingly. Before the merger, the need for whole project processes to be managed by one project owner often came up. This requires the participation of, and strong collaboration between, project leaders, developers, consultants and operators, and hence increasing efficiency. The second objective was to develop a proprietary product-line in the mid-term where some products would be unique on the Hungarian market. The companies are currently working together under common management. Ideal brought system management and testing as core competencies into the merger, while Mortoff was stronger in consultancy and project leadership areas. This new organisational structure enhances operations and customer service, providing ever higher quality.

Mortoff & Ideal is a member of various professional bodies and entities, including IVSZ (Hungarian Association of IT companies), the Central Transdanubian Regional IT Cluster, the Automotive cluster and HBCC (Hungarian-Bulgarian Chamber of Commerce). The company also holds an ISO 9001:2001 certificate related to the implementation and development of unique applications and IT systems, testing and consulting.

## **2.1 Organisational Background, Product and Services Overview**

The company services cover consulting, software development, testing, systems integration and IT outsourcing. The two main pillars of Mortoff & Ideal activities are consulting and IT services in which the second layers are business- and IT consulting, and development and testing, respectively. One of the strongest unique selling propositions of the company is in exploiting the synergies between general business consulting and state-of-the-art IT consultancy services. In terms of the organisational structure the same employees handle consultancy services and execution. Development represents approximately one fifth of all income, consultancy is one third, one third is testing and the rest comes from outsourcing type activities.

The other main business driver of the company is flexibility where the biggest challenge is to keep this running parallel to organisational growth. While the organisational structure is deepening with more hierarchical levels, position changes are open to employees in horizontal directions. The most valuable people within the organisation possess both developer and consultant capabilities where the latter requires the acquisition of soft skills. One of the underlying goals of the firm's staff recruitment policy is to select people with good communication skills who possess the potential to move horizontally later. Another aspect of

intra-company mobility is related to testers and developers, where the former have the potential to become developers. Generally it is easier for fresh graduates to start as members of the test team, but within a few years they can work as developers, with better remuneration. As testing is typically neglected or less valued by clients, higher prestige is also associated with a developer position.

Competency outsourcing is one of the internally developed services where buyers can lend “brain power” from the short to the long run. Parallel to this, outsourcing services are typically contracted for testing applications, whereas all other assignments of the company tend to be on project basis.

Software development - with no off-the-shelf products - does not represent a significant share of total activities but most projects on this area are being developed from scratch. These are generally frameworks and elements that can later be used within bigger projects. In the short run, project based developments might be more profitable for the company because they incorporate less risk and allow for better cost estimation as the client has to accept the budget and financial details of the project. This is in contrast to off-the shelf products where the first phase of the product development generates high costs and in-house risks, while later it can become more profitable with high sales volume and lower costs. The indirectly associated benefit of general system development - even when only break-even is reached- is to connect with bigger market players and later be shortlisted for “invite only” projects.

## **2.2 Market Overview**

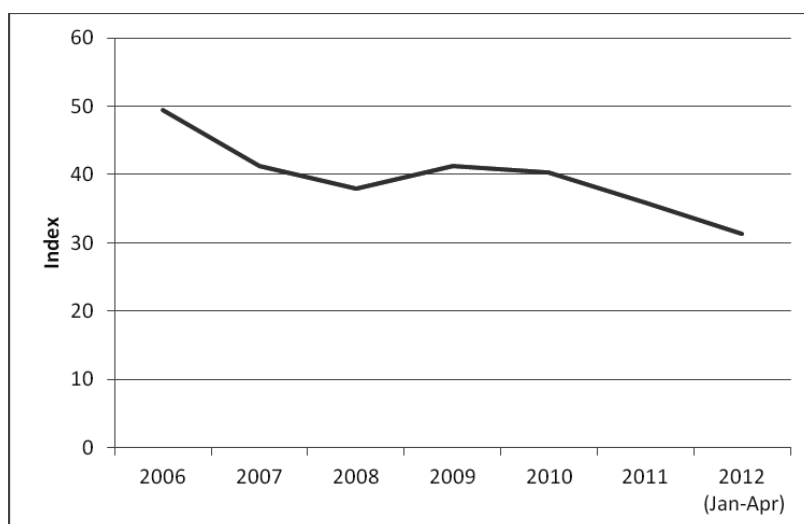
Mortoff originally started as a consultancy company. The potential number of Hungarian-owned companies on the market using external consultancy sources is limited. The recession which started in 2008 also had an impact on the market as smaller companies often face payment problems and therefore fall out of the frame as new business opportunities.

Seasonality has a strong influence on market opportunities, the end of the year being the strongest period, while the start of the year and summer periods are weaker.

Interest towards consultancy services has been also declining, probably due to the economic recession. (Chart 3)<sup>76</sup>

Mortoff & Ideal mainly targets large multinational companies and the telecommunication sector is over-represented in their portfolio. Clients also come from the areas of finance, banking, industry, the processing industry and machine engineering with the exclusion of the government sector. Beside domestic clients, business partners include foreign entities such as a German machine engineering company with many years of cooperation in the field of outsourced testing and development.

**Chart 3. - Web search interest: “tanácsadás” (consultancy) – Hungary, Jan, 2006 – Apr, 2012. (Yearly average)**



**Source:** Google Insights for Search – <http://www.google.com/insights/search/#q=tan%C3%A1csad%C3%A1s&geo=HU&date=1%2F2006%2076m&cmpt=q>

<sup>76</sup> With Google Insights for Search, search volume patterns across specific regions, categories, time frames and properties can be compared. The numbers on the graph reflect the number of searches that have been done for a particular term, relative to the total number of searches done on Google over time. They do not represent absolute search volume numbers, because the data is normalised and presented on a scale from 0-100; each point on the graph is divided by the highest point or 100. - <http://support.google.com/insights/>

## 2.3 Organisational Structure and General Workflow

The company operates with a total of 60 employees. The leader of the consultancy division, the head of IT, the managing director and the financial director form the top management level of the company. Recently created new positions in the company have been the sales and business development leaders and since the merger the sales unit has reported to the head of sales instead of the managing director. The consultancy area consists of nine levels, the development unit has six stages and the testing unit has five levels in the organisational hierarchy.

The consultancy division defines business needs, forming the basis of conceptual and detailed execution plans that help clients in solving their business problems. IT consultants become involved when detailed system plans are defined, highlighting how functionality can support problem solving. The consultancy division is the first point of contact for clients. The main objective is to find appropriate solutions and also to define entry points necessary for tool support related to development or implementation.

Consultancy services presume the strongest level of connection with clients, where employees are preferably hosted at the client premises. Development can be split into phases, where the start and the beginning require the highest level of collaboration with the client. This is represented by the presence of daily client contact. Testing, where the emphasis is on detailed problem specification by the project launch, has the least need for daily client contacts.

Projects generally start with a request for resources through a project initiating template, which enables the top level management to plan and control the required resources within the project deadline. Not all projects are standalone profitable but are rather considered as an investment for the company. Usually the project leader is fixed and takes control of the whole team. The project managers' main responsibility is to ensure the professional delivery of the projects, while account managers are responsible for client satisfaction. The workflow-plan guides the testing team and other teams at each entry point of the necessary tasks to be carried out. These cover expected and input values for each step. The process is previously approved by the testing team and all other teams involved in the project. It is essential that developers create documentation to help the work of employees responsible for testing, but this is not complete most of the time. The reason is not business secrecy, but that developers treat it as an extra element, not related to their core activities. Another reason is that as an organisational grapevine this phenomenon is a form of "safeguard" on

the developers' side, i.e. with a lack of documentation they have a better chance to keep their jobs. More experienced testers can better understand incomplete documentation, but this can cause difficulties for someone at entry level. For developers there are project status meetings every day, where a review of tasks is carried out. Projects incorporate a lessons-learned phase where all major steps, upcoming issues and solutions are documented for later use. This provides high learning potential for future projects but the success of this approach depends significantly on the organisational culture. Project based operations can, however, suffer from cross-coordination difficulties within the organisation, such as resource allocation and planning.

Sales professionals are responsible for finding and converting new business opportunities. Experts accompany them in case additional competencies are required. The speciality of the consultancy field is that general sales people are not necessarily effective as the success of sales is highly correlated with trust. Hence professional expertise serves as a basis for establishing trust, later resulting in sales.

## **2.4 Organisational Development and Training**

Specific training sessions are delivered as fundamentals to core business activities such as project management and testing theories. Unique training needs such as system planning are fulfilled and judged on an individual basis.

The company possesses a wide range of competencies organically. The testing and the consultancy teams support each other in providing client workshops, as required.

The firm holds internal training sessions with the help and involvement of senior colleagues. A notable example that highlights the importance of this area was a conference the company organised about business processes in 2005 where places were reserved for internal employees as well. The underlying scope of the conference focused on building closer business relationships and on competence development rather than just pure profit generation. The company's long term goal includes the codification of the different knowledge-elements. The preference of training sessions is weighted towards internal skills development and the necessary training time is provided by the company. Besides high costs, the diversity of available technologies makes external training less frequent. Shortly after the merge of Mortoff & Ideal, the company organised an internal workshop on project management, covering both methodology and personal experiences. Due to the success of

the workshop they plan to expand this initiative onto a broader level, later potentially developing into a knowledge base or a wiki-interface.<sup>77</sup>

In some cases developers' projects do not currently cover a common knowledge-base, but this is not standardised on a company level. Currently developers check for problems on the internet, and try to find out solutions in face-to-face discussions or based on "unwritten tradition".

The efficiency of knowledge distribution within the company is heavily dependent on individual employees. Some people find a short presentation highly involving, transferring it into everyday knowledge while discovering new areas within the organisation at the same time. Notwithstanding the fact that the internet provides easier access to knowledge, the challenge is to filter this vast amount of information and finally pack it into a market-capable service. Work in progress within the company is to create step-by-step methodology descriptions of services provided, such as testing – in order to guide the client through these processes. Holding back information and knowledge is atypical, and some of the consultancy positions require that knowledge be shared with junior staff.

There are clients who provide on-site learning opportunities for the outsourced team members through which they get to know new technologies that later become part of their competency matrix. This enables the selection of employees for certain projects based on their previous expertise. Learning from clients is also evidential when working in new industry sectors. Even small scale organisations can provide a schematic framework of the given sector showing how processes and companies generally operate. This can be transferred into internal knowledge, as any new project in the same industry would not need to start from scratch - the main characteristics of the given sector are already familiar to the employees. An unquestionable benefit is realised both in the case of the testing protocol and the testing strategy as it helps to narrow down potential solutions of certain issues. A potential flaw in the learning from clients' areas is that if the contact person is not particularly interested in technical details information received might be biased to the developer's side.

Knowledge transfer is relatively easy on a project by project basis as all have a preceding research and analysis phase where the main scope of the project is defined. This is supported by learning from previous relevant experience and references.

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<sup>77</sup> A wiki is a website whose users can add, modify, or delete its content via a web browser using a simplified markup language or a rich-text editor. Wikis are typically powered by wiki software and are often created collaboratively by multiple users. Examples include community websites, corporate intranets, knowledge management systems, and notetaking. – <http://en.wikipedia.org/wiki/Wiki>

Project to employee or employee to project knowledge transfer is more complicated and not supported by a formal protocol within the company. This latter is supported by an approximately two hour long meeting held every month or every second month during which participants host a session about their topic of interest. Seminars can cover projects through a step-by-step approach. Employees can also nominate topics that they prefer to discuss and would like to know more about. The final topic is decided, based on votes cast. There is no direct motivation to take part in these meetings - employees decide whether they want to participate or not. The greatest benefit of these meetings is that newly acquired information can later be implemented in their own projects. In the company's opinion knowledge transfer as described above works well but implementation is rather more difficult. More experienced consultants can influence their project peers more easily and hence a new approach can be applied in practice.

Exhaustive selection of new staff is of major importance for the company. One main source of finding new resources is based on the recommendation of current employees, while the other is the recruitment of fresh graduates through close cooperation with universities. Graduates participating in the program can start working on projects immediately whilst their workload is being controlled and within one or two years they can work independently. Despite the strong technology orientation of the company, in terms of educational background consultancy roles can be filled by either IT or economics graduates.

Compared to other areas of operation developers' knowledge deteriorates most rapidly, and therefore requires constant improvement and training.

## **2.5 Evaluation, Appraisals and Promotions**

Employee performance is evaluated on a half-yearly or yearly basis, depending on job type. Except for the managing director, the whole company are evaluated in this way. Feedback is provided by the unit leaders working in the previous year together with the individual evaluated, where evaluations can be related to projects and general work. Each division has different types of evaluation forms, and these also differ according to levels of experience. The evaluation consists of a form to be filled in and a personal discussion. This provides feedback to employees about areas that require improvement, how they fit with their position in the organisation, and sets objectives for the future.

Each project is evaluated by clients following delivery, which is also part of the employee evaluation system. This is a compulsory element of the ISO as well, although it is not always carried out properly.



Company philosophy is motivation through the clear establishment of goals and proper feedback. The lack of a rigid organisational structure also serves as a motivational factor, as the number of people on a certain level is unlimited, or is only limited by employees' personal achievement and skills. People are compensated based on their professional knowledge which also serves as a safeguard measure to retain valuable employees. There are no significant negative measures taken when deadlines are missed or mistakes made, but more emphasis is placed on providing smaller scale, continuous feedback.

Employee benefits are standardised throughout the organisation, with some exceptions due to the organic growth of the company. Performance bonuses are occasional, as the system was found to be difficult to operate and use. Evaluation and financial compensation are not directly linked. However employees can only be promoted to the next level if their performance is good, so the effect is indirect. While different competence areas can be grouped for evaluation purposes, goal setting is also defined on an individual level.

Overtime is compensated in terms of holidays, but this is not on a standardised level, and is more likely in the case of project-based extra-work.

### **3. Conclusion**

Mortoff & Ideal, as a technology focused Hungarian SME operates in the context of a turbulent economy, where the effect of increasing competition from emerging countries has just been magnified by the implications of the credit crunch, highlighting the growing importance of organisational learning. Freelancers and innovative start-up companies are on the rise, and this is particularly true in the technology industry where the company operates. At the same time, regarding the technology landscape the speed of the change has been multiplied by the diffusion of digitalisation.

In parallel with defining the concept of the learning organisation based on the work of Senge (1990) and the definition set out by the OECD (2010), Mortoff & Ideal has been analysed through the methodology framework of Nevis, DiBella and Gould (1996), as to how it fits into the seven learning orientations proposed by the authors.

The company cannot be considered in isolation from the context of the economic crisis and the European market environment, therefore data concerning training paid by for employees

has been analysed. The results of the 2010 Working Conditions survey revealed that a break in a 15-year trend has occurred, while training paid for by employers was at its highest level since 1995 for the EU15. From the perspective of Mortoff & Ideal, as some projects involve external capacities, it should be noted with reference to the survey findings that permanent employees benefit much more from employer-paid training than do those employed with other arrangements. Not only focusing on the case of Mortoff & Ideal but on a national, macro-level, it is also important to note that in Hungary, the proportion of employees on training paid for by the employer is significantly below the EU27 average.

An additional point worthy of note from the OECD paper (2010) regarding Mortoff & Ideal is that the company is trying to maintain a healthy balance between keeping control through standardised processes and encouraging dynamic properties. Standardisation is ensured by specific training delivered in core business areas such as project management and testing theories, accompanied by a set of ad-hoc training sessions provided on an individual basis. The dynamic aspect is delivered through initiatives such as self-organised employee seminars, where projects can be covered through a step-by-step approach.

Considering the classification by Nevis, DiBella and Gould (1996) from the perspective of knowledge source orientation, external resources are occasionally utilised by Mortoff & Ideal, involving friends or acquaintances in projects, while they also offer competency outsourcing. If there are no individuals possessing the required skills within the organisation, they look for freelancers on the market and negotiate for the buyer. This type of cooperation is typical of the consultancy area. However internal sources of skill development are preferred by the company, as they incur lower costs, while external training efficiency is reduced by the diversity of available technologies.

In terms of product-process focus, the company prefers to elaborate general frameworks and elements that can later be used within bigger projects, instead of investing significant resources in the development of off-the shelf products. Knowledge transfer is applied on a project-by-project basis, as a research and analysis phase precedes each project, where the main scope is defined. This type of learning is supported by the use of relevant previous experience and references.

The vast amount of information available on the internet does not make utilisation of external information easier, even for a technology company. In the learning orientation classification, the documentation mode used by Mortoff & Ideal is slightly biased towards a preference for individual knowledge. Individuals have a role in internal training, through the participation of

senior colleagues. On the other hand all projects cover a lessons-learned phase for later use, with the documentation of all major steps, upcoming issues and solutions. The company has established the arrangement of the different knowledge-elements as a long term goal. To counter-balance the role individuals in the organisation play in distributing knowledge, some efforts have been made to set up detailed methodology descriptions about services provided, for use later in guiding clients through various services, such as testing.

Considering the dissemination mode, elements of the controlled approach can be found in centrally coordinated training, while employee collaboration reinforces the organic flow, through the co-operation of the testing and the consultancy teams by providing, for example, workshops for clients. Mixed elements appeared in the centrally coordinated workshop which deals with project management, where personal experiences have been shared as well. Being more complicated, project to employee or employee to project knowledge transfer is currently not supported by a formal protocol within the company.

Regarding learning focus, Mortoff & Ideal is putting greater emphasis on incremental improvements to increase efficiency, which is obviously related to the nature of its business. This can be also tapped in the company's learning from clients approach, where working in new industry sectors provides a schematic framework of the given sector, transferring it into internal knowledge, by providing a shortlist of potential solutions to certain issues, both in the case of the testing protocol and the testing strategy.

Analysed from the perspective of the value chain, Mortoff & Ideal is closer to the "engineering end", while offering less stand-alone solutions to potential clients. However the "market end" focus is not neglected, as the company has also realised that general system development is a potential means of making connections with bigger market players and later being shortlisted for "invite only", ad-hoc projects.

In relation to skills development, organisational learning within the company is fundamentally supported by the organisation of collective learning occasions, such as training sessions, while recognising the fact that the efficiency of knowledge distribution within the company depends heavily on the individual employees. Simply by a deeper analysis of participation in centrally organised presentations, some employees will find a short presentation highly involving, and will be able to transfer it into everyday knowledge while discovering new areas within the organisation at the same time.

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## **Chapter 2.**

### **Innovations in the Higher Education**



# István Polónyi – Mária Ujhelyi: Defining Factors of Economic Integration and Innovation Performance of Higher Education

The topic of our research is the examination of the institutional specialisation of developed capitalist and post-socialist capitalist economies, as well as the role of the organisational network, value chain and clusters in the global economy in the context of different developmental samples, and the examination of the incidence of organisational innovations. Within this, the aim of the analysis is the overview of economic integration and the innovative role of higher education training and research, partly in international literature and partly, related to this, with the help of Hungarian case studies.

## ***1. What Moves the Economy Forward***

It is by now a trivially accepted economic-political fact that if a country is low on mineral resources, the labour force decreases and foreign working capital inflows slow down then only human capital remains as an exploitable developmental resource. This means human capital and innovation.

‘Successfully modernised small countries through their economic development achieve or have achieved “production-factor controlled growth” (namely workforce, land, raw materials or a capital supply defined specialisation) by way of “investment controlled growth” (where the determining factors in terms of competitiveness are the capital accumulation ability of the economy and its capital adequacy) moving to “innovation controlled growth”, where inland R&D and innovation activity are the main sources of improvements in competitiveness (Kiss Judit 2001).

In the economic literature it is generally agreed that knowledge capital is becoming increasingly important in economic production<sup>78</sup>. A number of studies have established that the increase in the average productivity of countries has become independent of

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<sup>78</sup> See e.g. Temple, J. (1999), “The New Growth Evidence”, *Journal of Economic Literature*, Vol. 37, No. 1, pp. 112-156.

investments, land, workforce and machines, and traditional capital.<sup>79</sup> Analysis has shown that the proportion not explained by traditional factors (one-half of all economic growth in the United States between 1945 and 1985) is one of the results of individual learning within economic systems. It is not, then, surprising that universities, whose prime mission includes knowledge production, retention, dissemination and extension, are regarded as an important factor in economic success. It is necessary to add that many analyses consider the role of the universities passive, in that they impact the real economy fundamentally and decisively through their graduates (Arbo – Benneworth 2007, pp. 31).

## **2. Innovation, Human Resources and Economic Development**

Firstly, some fundamental concepts are clarified.<sup>80</sup>

The classical economists already recognised the economic role of inventions. Adam Smith – the father of economics – already stressed work surplus provided by ‘the invention of a great number of machines which facilitate and abridge labour, and enable one man to do the work of many.’ (Smith 1992, pp. 7). Later, neo-classical economics perceived innovation as an exterior condition, and considered its effects as externalities. ‘The economic-political measures of a government related to research and development (R&D) are important in the definitions of the long-term views of the economy. Government intervention is justified as R&D activities have several characteristics typical of public goods.’ (Stiglitz 2000. p. 715) Stiglitz also points out that scientific results may be of two kinds. ‘As we may notice, in those areas where research products can be patented, R&D bears only one of the two characteristics<sup>81</sup> of public goods (since patent rights ensure that others may be locked out from knowledge usage). However, in those areas where the research product cannot be protected, neither with the retention of information nor with patenting, and where others may easily imitate the development, R&D accomplishes all essential characteristics of public

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<sup>79</sup> See: Romer, P. M. (1994), The Origins of Endogenous Growth, *Journal of Economic Perspectives*, Vol. 8, No. 1, pp. 3-22 and Solow, R. M. (1994), “Perspectives on Growth Theory”, *Journal of Economic Perspectives*, Vol. 8, No. 1, pp. 45-54.

<sup>80</sup> This section builds largely on Chapter 2.1 of the author’s book published in 2010 (István Polónyi (editor): The Academic sphere and innovation - domestic higher education and economic development, Új Mandátum Kiadó Budapest 2010)

<sup>81</sup> ‘Public goods have two distinct characteristics. First, their usage cannot be dosed. Secondly, to dose their usage would not be advisable or expedient.’ (Stiglitz 2000. pp. 143) Therefore, on the one hand, exclusion is not expedient (providing stock for an additional consumer requires zero marginal cost), on the other hand, exclusion cannot be realised. R&D (or more precisely, knowledge as the result of research) bears the first characteristic, and often the second characteristic as well. ‘If a bundle of knowledge is made accessible to additional individuals then it is not subtracted from those who already possessed it earlier.’ Here Stiglitz adds in a footnote that ‘we must not confuse this fact with the fact that the yield that a person may reach through a bundle of knowledge largely depends on the number of additional people possessing the information. The information owner in a monopolist position may reach a level of yield that would be inconceivable in a case where information could be acquired freely. (Stiglitz 2000 pp. 705)



goods.” (Stiglitz 2000 pp. 706). In the case where R&D information transmission ‘occurs gratis, it would not be worth creating new knowledge. Therefore the government either has to support knowledge formation through the direct support of R&D, or has to ensure that individuals or companies creating the knowledge receive some sort of financial compensation for their performance.’ (Stiglitz 2000, pp.705)

The evolutionary economic concept of innovation developed from Schumpeter’s<sup>82</sup> approach emphasizes the evolutionary nature of technological changes<sup>83</sup>. According to the evolutionary concept, innovation achieves - if it does indeed achieve - results in the course of a number of trial and error based experiments in a process which is not supported by the market. This innovation-related market failure justifies the intervention of state policy (science policy, innovation policy). (Hronszky 2005)

‘The essence of new tendencies, the economic geography approach, is that innovation (new products, the development of production procedures) is interpreted as a collective process in which, built on the technological traditions in the region, the local industrial enterprises, business service provider firms, and privately and commonly owned research institutes develop the region’s innovation performance in continuous co-operation.’ (Varga 2004) In this approach, the task of science policy and innovation policy is the promotion of this co-operation.

‘The university is able to influence the region’s economy fundamentally in two ways ....: through the multiplicative effect of employee and student consumption (the so-called expenditure effect) and through (academic, technical, technological and economic) knowledge (the knowledge effect) flowing from the university into the business sphere. .... University knowledge transfer ... can be defined as a process in the course of which fundamental contexts, information and innovation flow from the university to the private sector. Four wider categories of knowledge transfer mechanisms can be classified:

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<sup>82</sup> Joseph Alois Schumpeter Austrian economist (1883 - 1950)

<sup>83</sup> ‘The technological change takes place through new solutions coming into existence as the result of the innovation process, the choice (selection) between them and through the related learning process.’ (Bajmócy 2008)

1. knowledge transfer through published research results and patent documents;
2. knowledge transfer through the (formal or informal) networks of university and corporate experts (which functions on the basis of common research, the labour market for graduates or provisional employment of university students in the industry, but personal, informal contacts are included here as well);
3. knowledge diffusion through formal business relationships (spin-off firms, technology sales);
4. knowledge transfer as the result of industrial enterprises using the physical establishments of the university (for example libraries, scientific research laboratories).<sup>1</sup> (Varga 2004)

There is no doubt that Hungarian economic development depends on the innovation performance of the domestic economy. One of the key elements of this innovation system is the academic sphere. By the academic sphere we mean higher education (in this case primarily research taking place in higher education) and state research institutes.

The role of education, and within this, higher education, is also stressed by the fact that strong links and the context of innovation and human capital is trivial in the current economic approach<sup>84</sup> and development policy. In the development policy of the European Union the 'quantitative and qualitative strengthening of human capital potential is the principal factor in economic catching-up.' (Kőrösi 2008)

A striking tendency of the 21st century is that innovation policy in Europe is becoming ever more comprehensive; its aim is to increase Europe's competitiveness compared to the United States and to Japan, and to become the most competitive and most dynamic knowledge-based economy in the world. This entails the extension and redefinition of regional policies that affect higher education requirements and their theatre of operation. The higher education institutions are important actors in this policy since beyond the establishment of high-tech innovation and a knowledge base they link up with so many strands of the region's economy and society (Arbo – Benneworth 2007, pp. 17-18).

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<sup>84</sup> Theodor Schultz writes about the external effects of human capital, emphasizing that they have a significant positive effect on economic growth. These effects, the spill-over effects, are favourable external effects occurring as a result of a strong human capital environment. This means that the level of people's proficiency, knowledge and expertise is higher in a more productive, high human capital environment than in one with a low human capital environment. Human capital increases the productivity of both the work(force) and physical capital. (Schultz 1993)

At the same time, despite all the efforts, the innovation performance of the European economy lags behind the indicators of the United States and Japan. At the same time, the failure masks important results<sup>85</sup>. It is clear that despite the failure of the Lisbon Strategy, Europe has no other choice - and this is true for Hungary as well - than to increase the innovation performance and the promotion of its economic utilisation.

Higher education plays a decisive role in this process.

### ***3. The Organisational Sociology Transformation of Higher Education and Science – and Innovation Performance***

The relationship between science and the universities has been a matter of course in history. It has been natural in some parts of the world, for example, in continental Europe, that leading figures in society, and later the state, had a say in the management of university scientific life. This is well-illustrated by the Super Speculam Bull of Pope Honorius III in 1219, which besides providing some allowances for lecturers and student clerks, also defined that the studium generale – i.e. the ancestor of today's university, at least according to the interpretation of Henricus de Segusio – can only be considered as such, if, besides the seven liberal arts<sup>86</sup>, the trivium and the quadrivium, theology and canon law are taught as well (Ferencz 2001).

However, the first truly radical education and science policy intervention in the life of the universities happened at the end of the 18th century and the beginning of the 19<sup>th</sup>. The antecedent to this was that the 'institution of the universities found itself in quite a deep crisis in the first half of the 18<sup>th</sup> century. University education and scientific research at this time took place practically independently of each other. The aim of university education was to provide suitable training for state or church employees. The university professors were traditionally required to be well-skilled in the subjects they taught (theology, mathematics, law etc.), however, independent scientific results were not expected of them - and their aspirations in this direction were not very much supported either. Generally court scholars

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<sup>85</sup> 'Since LS [Lisbon Strategy] started, it has become fashionable in both political and analyst circles to show displeasure for its efficiency and strategic necessity, as its original aim to catch up with the United States was not apparently fulfilled by 2010, and its entire progress has been accompanied by greater or lesser failures. In fact LS is a great success in itself, since it is historically the sole example of social planning that – acting as a fundamental centre of direction – has made the co-ordination of the most divergent political areas possible in the continually expanding EU, as well as encouraging the start-up of synergies. LS is actually a compelling experiment in linking the economic and social dimensions of development, and the internal and global external dimensions of the EU, namely, on the one hand linking the Union's economic policy and social policy, and on the other hand its "internal affairs" and "foreign policy".' (Ágh et al. pp. 197-198)

<sup>86</sup> The seven liberal arts included text-related disciplines (the Trivium): grammar, rhetoric, and dialectic, and the other four disciplines (the Quadrivium): astronomy, arithmetic, geometry and music.

engaged in sciences, individually, and mostly at the mercy of their royal principal.’(Békés 2001) ‘Scientific research work, according to the standards of its age, was carried out mostly outside of the walls of traditional universities, primarily in those scientific societies and scientific academies that were formed one after the other in significant European countries from the middle of the 17<sup>th</sup> century. On the other hand, the old-world higher education institutions only took note of the new discoveries<sup>87</sup> with a considerable delay, particularly in the case of scientific discoveries.’ (Tóth 2001)

Certainly there are other reasons for this as well. Tóth (2001) points out that ‘the European universities - as a result of their guild-like structure, corporative privileges and their relatively wide autonomy – became the source of serious administrative problems by the 18<sup>th</sup> century. The undergraduates, long since freed from monastic discipline, yet enjoying certain traditional franchises, were believed by the public to neglect their studies and take advantage of their informal existence by leading a lifestyle that appeared immoral in the eyes of their contemporaries. This became a source of constant scandals, tensions and conflicts, so that sometimes students clashed with troops in certain cities.’

It was time for the politicians to intervene. ‘In the second half of the 18<sup>th</sup> century and the beginning of the 19<sup>th</sup> century, the pedagogical and educational policy reform concepts formulated in France and Prussia mostly reflected double expectations: the universities of the future had to be simultaneously modern, the elaborators and mediators of knowledge that became indirectly or directly efficient in social practice, and the inspiration for the civic loyalty to be shown towards contemporary authority, as well as the educator of the legal, political, technical and military elite, the creator of cultural cohesion.’ (Tóth 2001)

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<sup>87</sup> Let us add that besides all these it is also true that medieval universities had a role in the scientific revolution of the 16<sup>th</sup>-17<sup>th</sup> century. McGrath (referring to Edward Grant) points out that the roots of the scientific revolution can be traced back here after all. He stresses that the large Western European universities founded in the Middle Ages proved to be of fundamental importance in the development of the natural sciences. McGrath (2003)

Otherwise, Leibniz - as the first president of the Prussian Science Academy – had a fairly negative opinion of the universities of his age and considered them as obsolete, dying institutions (Békés 2001). Certainly, it is worth noting the opinion of Klebersberg who wrote that ‘Leibniz founded the Science Academy in Berlin in the reign of the first Prussian king, Frederick I. However, if we consider the operation of this Academy in the beginning of the 18<sup>th</sup> century, we must recognise that the Academy was a mere foundation. Since Leibniz did not have any colleagues, the whole institution ran into the ground when Leibniz departed from Berlin. Frederick the Great reorganised the Academy, though he established a French institution on Prussian grounds in Berlin which did not take note of Kant, Herder, nor of Goethe, and so it necessarily remained a foreign affair.’ (Klebersbeg 1932)

We are not far from reality if we add that, throughout history, and right up to today, presidents of almost all Academies have expressed the opinion that university standards were often low; however the universities always survived these so-called crises, while the academies – in the more developed part of the world – have now turned into archaic clubs, and lost their former roles as organisers and cultivators of science.

It is worth considering these reorganisations briefly, as the difference between the Prussian, i.e. Humboldt's, and the French, i.e. Napoleon's educational and science policy reorganisation is effective even today.

As a result of the Prussian educational, science and cultural policy reform which is still associated with Humboldt even today, one of the most important elements of a university is autonomy, which defines partly the inter-relationships between the state and the university, the university and society, and the university and the church, and partly the internal, autonomy of the cultivation of education and science. 'So Humboldt - as the outstanding representative of early German liberalism - firmly rejected ... every specific intervention in the upbringing, education and generally in the sphere of intellectual culture ... [though] Humboldt - as a Prussian politician and political thinker - also found it desirable that the modern Prussian state had a quasi-supervisory role in the modern Prussian university. Namely, first and foremost, this was in the form of the appointment of university professors and teaching staff.' (Tóth 2001)

As a result of these reforms the Humboldtian university conflicts in many ways, not only with the 'feudal' (i.e. orders or denominational) university, but with Napoleon's reforms as well. As Karády puts it: 'The French University had less and less to do with the institution - modelled on the Humboldtian university concept - that we know, as if the intention of its creators was to establish in all aspects the opposite of the pre-French revolution, independent university network of medieval origin which was then under renewal in Europe, at least from three perspectives. Firstly, in terms of nationalisation, secondly in terms of centralisation, and thirdly in terms of the bureaucratic integration of the entire institutional spectrum of elite training in one single administration. This state administration was called the French University.' Karády (2006)

An important characteristic of Napoleon's university model is that 'scientific performance or research only played a considerable role in the self-reproduction of the system in the case of a few metropolitan institutions which trained academics, and so it was not significant in the training and selection of the faculties, nor in the academically specialised colleges, nor in the training of high school teaching staff.' (Karády 2006) 'In these faculties - with the exception of Paris - besides university education there was no scientific research of any kind for a long time. ... The gap between university education and scientific research linked to the above state of affairs only started to be recognised in the 60s of the past century in France, and a number of reform measures were introduced from 1975. ... In the interest of the actual demolition of certain elements of Napoleon's model, more serious efforts only took place in

the period following 1968.’ (Tóth 2001) ‘The autonomy of the French university and university research was only reinforced by the higher education management law named after Minister Edgar Faur of 12<sup>th</sup> November 1968 (the Faur Act). The French higher education institutions became autonomous, participation-based, multidisciplinary institutions in the course of this act. ... [f]aculties existing until then ... were transformed into educational and research units.’ (Mandel 2004)

### **3.1 The Post-Humboldt University**

‘Although the term “European University” (particularly in relation to the Middle Ages) is clearly the result of a reasonable generalisation, the higher education system of an entire continent (and particularly sovereign national states in the Modern Age, i.e. the university system of a Europe divided into regions that choose various paths of development) can be hardly considered as a uniform whole, a homogeneous formation. .... It is more expedient to view the higher education system of individual European countries as the some kind of totality, a heterogeneous formation. ... [A]lthough the significance of the British (and more recently the American) model cannot be underestimated, in the intensive transformation of the university systems in Europe, presumably up until the 1968 higher education crisis and the formation of the new left-wing, the French and the German higher education model played a decisive role.’ (Tóth 2001)

Besides the Continental higher education model that formed based on the French and German model, it is worth touching upon the British model which can be identified as in the vanguard of the differing conceptions of the European university. Besides Great Britain this model is typical of the former colonies, mainly the higher education of Australia, Canada and New-Zealand; its essence is the determining role of the academic community, respect for traditions and – although in the 19<sup>th</sup> century it was already receiving a budgetary subsidiary distributed by the academic body – the absence of state intervention.

The competition for students and research grants plays a determining role in the case of the American model. Direct state intervention is absent, although governmental research commissions – besides the orders received from the economic players and the tuition fee – play a substantial role in financing. The institution is mainly run by the management and the role of the academic community is quite modest.

The Japanese model is usually identified as a mixture of the Continental, the British and the American models. The high prestige of academics and the respect for traditions are similar to the British model, whereas the connection between large universities and state bureaucracy,

and state financing recalls the Continental model, and the close connection with the economic sphere and strong competition are the effect of the American model.

In the second third of the 20<sup>th</sup> century, partly due to social changes, partly as a result of several shocks, these university models became much more similar to each other.

The social change fundamentally influencing the function of universities has been the emergence of mass higher education. The 60s and 70s were a period of economic prosperity (with state financing available for the development of higher education) and the view that higher education is the engine of economic growth came to the fore. The emergence of mass higher education – and secondary education – can be explained in various ways (Kozma 1998). One is that it was necessary to make room in the educational system for the primarily young workforce that was becoming redundant. According to another interpretation, the reason for the emergence of mass higher education at the turn of the 60s and 70s was that social democracy came into power across Europe which, among its political objectives both advertised and achieved the principal of general and equal schooling. An additional explanation interprets the large demand for education as the result of the welfare state, i.e. as some sort of overproduction crisis. It was also significant that the large age groups born after World War II reached the age of 18 to 20 at that time and thus there was increased public pressure from the demand side. Additional explanations for the emergence of mass higher education point out the admission of certain minority groups, primarily women into education. And last but not least, the broadening of the middle class is a determining reason, namely that a broadening and increasingly ambitious social class was aiming to establish a higher social status for its children through education, and thus the broadening and democratisation of the middle class became a decisive element in the emergence of mass higher education.

In mass higher education the student community has become more heterogeneous, and social strata and groups have emerged that were not able to gain admission to higher education earlier (children of less qualified parents, or from a low-income family social background, members of disadvantaged ethnic groups); consequently we can state that numerous social groups with varied values have emerged at universities which previously transmitted élite values. Another consequence of mass higher education is that the increased number of fresh graduates meant a plentiful supply not only for the academic world (scholars, teachers) and higher ranking civil servants, but for industry, business life and services which also demanded highly trained specialists. So higher education should have responded to the demands of the economy and society.

However, higher education could not initially measure up to the expectations of mass higher education and democratisation. This led to the student rebellions<sup>88</sup> in 1968, which had a major effect on higher education and on higher education policies. The institutional management and the state management of higher education were transformed. The governing bodies of the higher education institutions were restructured and the students given seats in university councils (Hrubos 1995). State intervention became stronger as well, and this was formulated as an unambiguous requirement that the tasks of the university are the transmission of useful knowledge from a socio-economic viewpoint and the pursuit of relevant practical research.

Governments increasingly defined the direction of developments, the academic structure of courses, the requirements of education and exams, and their contents. In continental Europe – where the state traditionally played a fundamental role – state control and central planning strengthened even more. The instrumental role of the state, particularly on the federal level became stronger in the United States as well. The emergence of mass higher education and its encouragement occurred predominately as a result of state initiation, and state financing and governance. (Before World War II half of students attended state – i.e. public – institutions, whereas this proportion was 3/4 at the beginning of the 90s) In this sense the American model moved towards the continental European model. (Hrubos 1999)

In the second third of the 20<sup>th</sup> century the other considerable factor that fundamentally defined the development of higher education was the economic crises of the 70s, and the transformation of public financing that followed. Governments tightened the financing of higher education institutions, and student allowances were cut. The so-called indirect management system was introduced. The higher education institutions were given autonomy, and were induced to work as market-based institutions and to boost their income by the introduction and increase of tuition fees, and by taking on external research-education

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<sup>88</sup> In 1968 as a result of the polarisation of mass education (between “elite colleges” and “mass universities”) French higher education students rioted (Pokol 1999). Students started the demonstrations and then workers joined them. The movement completely gripped the leading French intellectuals, even those whom the young did not want to accept. The movement was not a movement, but a multifaceted ‘happening’ (this word started being used in this sense at that time). (Heller 1997)

In mass higher education students demanded a larger say - but the anti-war mood contributed to the development of the student agitation in America (‘Whether students vote on something with a ‘yes’ or ‘no’, counts only so much for me as if they announced whether they like strawberries or not’ – says the Dean in “Strawberry and Blood” and the university war in the movie erupted after that. (Karcza 1980)

But the rebellion was directed against both the course contents and the ethics of the universities: the Parisian students wrote on the wall of the University of Sorbonne: ‘Professors, you are as senile as your culture!’ (Hahner 2008)

Then the spring turmoil tailed away by the beginning of the summer. As Karnoouh wrote: The inscription on the walls of Sorbonne in July 1968 reflected the true position of the movement: ‘Under the paving stones, the beach.’ It was time to march off peacefully in the direction of the summer holiday camps (Karnoouh 1998).



commissions. Part of the budgetary funds was distributed based on tenders and competition. This confirmed institutional bureaucracy – and rather overshadowed academic interests (Hrubos 2006).

Higher education turned into a large-scale firm, a large service provider that shifted towards an enterprise type of function – the entrepreneurial university – which is characterised by the emergence of a professional management and entrepreneurial culture, and the authority of faculties, departments, lead instructors and small collectives were forced back. The educational and research autonomy decreased, and in their place corporate (university) strategic and business plans and marketing emerged.

In the case of entrepreneurial or service provider universities “the “supremacy” slips through the fingers of the professors, professorial bodies and the academic staff and it is transferred to the administrative staff, to the university managers’ (Hrubos 2004). Service provider universities aim to enter into an integral partnership with their region – besides their students, their customers and a great proportion of their business contacts also have regional origins. In the course of selecting the research, development and innovation topics, expedience and earnings play a decisive role.

### **3.2 The Development of Science Structure and its Science Policy Implications**

Science policy partly means the lobby activities connected to science and to a country's scientific systems, and can be defined as a speciality policy, the sum of the development theories related to science. The two definitions are not independent of each other as lobbying means achieving defined objectives, which can be reached through the elaboration and tracking of well-defined development programs.

As science had a very significant role during World War II, the first phase of science policy following the war, and ending by the beginning of the 70s, was characterised by the high level of autonomy provided for science. “Politicians trusted the scientific community with the elaboration of rules and operations” (Mosonyiné 2008). The favourable economic situation provided fairly abundant financing. However the situation started to change by the end of the 60s, and politicians wanted to be more and more involved in the control of science. In the 70s, as a consequence of the previously mentioned economic downturn they basically changed the system of science control which had emerged after the world war, into one in which politicians wanted to control scientific research financed from public funds, measure performance, and expected efficient operations.

However, social attitudes towards science did not change in the 70s solely due to the economic situation. Engineering and the environmental effects of energy developments, military research, and gene research all aroused opposition and protest from wider society. The expectations that science will solve society's problems turned into distrust, and distrust towards science turned into a social problem (Elzinga 1995). The OECD report 'Science, Growth and Society: A New Perspective' published in 1971 was already emphasising that social control should be practiced in the control of applied research, and more room should be provided for science policy within the full spectrum of government policies. (Mosonyiné 2008)

As a consequence of scarcer economic opportunities, the "project world" emerged (Laki, Palló 2001). "In the project world researchers enter tenders with exactly defined objectives. Their projects can aim for primary or applied research, they can emphasise disciplinary interests, basically anything, but they have to specifically define their objectives. Finalisation in the project world can be considered general. .... It seems that the project world is the adequate system for the monetarist system. Researchers are small enterprises in reality, medium sized enterprises as a maximum, but even universities act as entrepreneurs in the knowledge market." (Laki, Palló 2001)

However, it is more than just about the more significant diffusion of research project-organisation. The system of science itself is changing.

In the beginning of the 60s Derek de Solla Price and Alvin Weinberg first introduced the idea of the transformation of science, the emergence of science on a large scale, known as "Big Science". "Basically both formed an opinion based on their observation, that the new era of science had arrived, where not just the level of investment and the number of people employed grew unprecedentedly, but also the monumentality of the hardware." (Laki, Palló 2001). Examples of Big Science are the Manhattan project, space vessels, or the development of the radar and the computer. "Following World War II, (mainly in particle physics, astronomy and biology) more and more research started that can be considered Big Science by its size, but this did not result in the disappearance of Small Science. However as Big Science had certain characteristics in the area of science organisation, science policy, and the core fields of research which deviated from the experiences emerging around Small Science, it seems appropriate to consider Big Science as one of the latest forms of the scientific system." (Laki, Palló 2001). Besides large scale and highly valuable equipment Big Science can be characterised by:

- a high level of funding concentration in a lower number of institutes
- the personnel of these institutes have more specialised knowledge
- the emergence of the team leader, lab manager and business coordinator functions
- (in addition to, and parallel with personal commitment, the value system based on the intellectual relevance of Small Science) the emergence of references to social and political objectives, and to health, economic and military interests, thereby taking into consideration interests outside science as well as intellectual relevance. (Laki, Palló 2001)

John Ziman drew additional conclusions about Big Science at the beginning of the 1990s. He concluded that the manager was appearing in the science system, the distribution of research funds was transferred into fund management, the activities of the scientific manager did not differ much from the activities of the manager operating in the market, managerial and scientific leadership functions were becoming linked. In relation to this, science was being evaluated according to new concepts: input and output indicators, accountability, critical mass, priority rights, etc. The whole research process was characterised by finalisation: research programs were aligned according to specific theoretical or practical objectives. Ziman finally concluded that science had entered into the post-academic phase, which is characterised by the disappearance of traditional scientific values (e.g. that scientists' main motivation is the search for truth, making universal statements, and the interest-neutrality of science). (Laki, Palló 2001) 'In post-academic science research is transformed from an individual activity into a collective activity, and researchers work on problems that they themselves do not select. This science produces "intellectual property" instead of knowledge in the public domain, and does not represent the creation of a universal, unified scientific world view.' (Laki, Palló 2001)

In the middle of the 90s another theory was formed about the transformation of the system of science. The Mode 2 concept elaborated by Gibbons, Limoges, Nowotny, Schwartzman, Scott and Trow argues that science is basically knowledge production. The traditional method is Mode 1, and the transformed method is Mode 2. 'Mode 1 follows the disciplinary structure applied by universities with central governance. On the other hand, research work itself is based on individual initiative and creativity, quality control is performed by the scientists.' (Laki, Palló 2001). The most important characteristic of Mode 2 is that knowledge production occurs in the 'context of application', which means that the division of science into primary and applied research should be discounted. Here 'research originally aims for a

practical objective, and the missing knowledge related to the natural world is replaced by a needs-based search, without applying the two-step logic operating in Mode 1. Applied and pure scientific research results become indistinguishable.' (Laki, Palló 2001). The other characteristic of Mode 2 is that knowledge production is trans-disciplinary, namely diverse specialists take part in the process, depending on the requirements of the task. An additional characteristic is that besides universities, non-university research institutes such as research centres, government agencies, industrial laboratories and consultants are involved, all connected by a communications network. The main characteristic of Mode 2 is accountability and reflexivity. In Mode 2 – unlike Mode 1 – quality control is not provided by peer review, but by market success, social acceptance, cost-efficiency and other such criteria. (Laki, Palló 2001).

In the second half of the 90s the Triple Helix theory of Henry Etzkowitz and Loet Leydesdorff was born – as previously described in detail – and operates on a wide international knowledge base, providing at the same time a mathematical model, describing the operation of science on the communication links between three factors: the university, the industry and the state. The 'interaction of the three elements ensures that the whole of science progresses forward on a spiral line. The basic principle is "endless transition" where complex dynamics operate between the three elements, formulated by requirements similar to modern market demands, market forces, governmental power, institutional control, social movements and current technological requirements' (Laki, Palló 2001). According to Etzkowitz and Leydesdorff the biggest advantage of the university is that students form a very significant share of research resources. The presence and fluctuation of students (new students follow graduates) makes the universities highly flexible. These authors believe that instead of a post-academic period we are witnessing the second academic revolution since the end of World War II, or rather since the end of the Cold War. The university is being transformed from an educational institution into an institution that combines education and research. According to the Triple Helix theory the most important scene of research – the university - is itself transforming. It is beginning to be entrepreneurial since, on one hand it cannot exist without the other two agents, and on the other it is initiating its own ventures; meanwhile the creation of patents is growing in importance, i.e. the possession of knowledge, and the creation of knowledge that is marketable and not part of the public domain (Laki, Palló 2001).

It is easy to observe that Small Science or the Mode 1 model of science is typical of the traditional or Humboldt-type of university research. On the other hand the theories point to the fact that the transformation of science system is means that science based mainly on individuality and autonomy has been radically transformed. It has been partially replaced by

research in response to commissions, and partially by large-scale application-oriented projects justified by social policy objectives. This has transformed both science organisation, turning it practically into management, and science policy and science governance. These processes are clearly connected to the noticeable shift in higher education towards the entrepreneurial university.

Based on all this, since the 80s in the science policy of developed economies the facilitation of cooperation between universities and industrial companies has come to the fore, as well as foresight, and in practical terms, strategic planning. Large scale projects have played a major role in science policy (in microelectronics, biotechnology, and the material sciences) (Mosonyiné 2008). In this way “academic capitalism” has been created.

“Academic capitalism” is sometimes termed “academy capitalism” or “scientific capitalism”, but the most appropriate synonym is the commercialisation of science. Slaughter and Leslie compare this to globalisation, and at the same time consider it an answer to this process; they summarise its main characteristic as universities and faculties paying more and more attention to the promotion of research, and research increasingly becoming a kind of market potential (Slaughter – Leslie 1997). The essence of this phenomenon is that – as a consequence of decreasing state funding – higher education is forced to turn to external resources to a greater extent.

The consequence is that research is less and less ‘curiosity driven’ but more market-based. Parallel to this, funding without conditions disappears. Market commissions require profit - profitable products, processes and innovations. This process started in the US in the 70s (Slaughter – Leslie 1997). As the authors point out, as a consequence of science commercialisation, prestige, marketability and research funding become interlinked. Since World War II, the United States federal research and development policy’s highest priority has been technology development to improve global competitiveness. The commercialisation of science is most visible in the case of applied science and technology. This only has an effect on humanities if they are connected to the marketable areas of the university (Slaughter – Leslie 1997).

With what is in essence increasingly global science, the acceleration of its globalizing trend transforms the state of science policy. Discussing the globalisation of science, Némedi writes that ‘the financing institutions necessarily work as power centres too. Until now these centres wielded power within the framework of the nation state but today pure science is becoming

globalised. It is also the case that the topic-defining skills of science centres and their power in the distribution of recognition work as an invisible force.' (Némedi 2002)

Science thus increasingly involves the emergence of worldwide research teams and research networks so that groups and networks work from the funds provided by the large research source distributor centres, on topics pre-defined by tenders. Among the research source distributor and topic-defining centres the EU, the US government and various large research centres in the United States, and multinational companies play a determining role. Outside these centres the room for manoeuvre of national science policy is narrowing.

At the same time, we must only formulate general inferences carefully. Ildikó Hrubos points out that there is no general tendency in the case of higher education at all. 'At the beginning of the 19<sup>th</sup> century the structure of universities diversified and this tendency will likely prevail in the future. The ... entrepreneurial university is one element of this diversified world. Presumably it will not become general in the foreseeable future. The large, high-prestige traditional universities are not forced into such a radical transformation. Less suitable are the comprehensive universities with expansive areas of science and specialities, as diverse orientation has a centrifugal force; it resists uniform thinking.' (Hrubos 2004)

### **3.3 The Innovation Force Field of Higher Education in Hungary**

We must examine if lecturers in Hungarian higher education have any motivational or employment characteristics as researchers that affect their innovation performance. We presume that the innovation performance of higher education researchers is determined by two groups of factors. The first is the hosting institutional environment's organisational sociology characteristics which include partly the higher education institution's organisation and leadership characteristics, and partly the characteristics of the educational and science policy force field affecting the institution. The other is the lecturers' or researchers' employment characteristics which, besides performance evaluation and remuneration, include the rules of promotion, the career path, and any motivation arising from them.

To understand Hungarian (state-owned) universities as business organisations – based on our former analysis<sup>89</sup> – we treat them as authoritarian, self-governing socialist enterprises, considering the three factors which together constitute the most important characteristics. To

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<sup>89</sup> This section is based on the study by Tibor Szabó: Az intézményi környezet sajátosságai (Polónyi 2010, Chapter 6.2)

somewhat simplify the problem, we are looking for the answer to the question of whether these three attributes of the university strengthen or weaken its eagerness to innovate.

State-owned higher education institutes in Hungary are budgetary authorities; according to classifications in force they can operate as public institutes or market-based public institutes. Therefore we should firstly analyse those organisational and cultural characteristics where budgetary authorities differ from organisations with an outstanding innovation performance.

State-owned universities are run with various government subsidies, as a consequence of their main self-governing function, maximising the salary-type of allowances, according to the interests of those employees with the highest status (professors and leaders). Therefore their innovation capabilities are primarily used to gain state funding and allowances.

State owned universities and their environment's organisational, cultural characteristics are more similar to the socialist system described by János Kornai (1980, 1983, 2007); innovations are not impossible, but not properly supported by any vested interest. Therefore, in the case of state owned universities, in theory it is the previously mentioned innovation, the non-Schumpeter type framework which is more frequent, as is noted by Kornai, given the presence of special conditions. In this way, different government initiatives (the army, public health etc.) can, in a given time period, form certain types of centralised, bureaucratic systems, capable of innovations by the concentration of resources; moreover non-profit cooperation networks can create innovations – in some cases.

Higher education is really only funded by government grants and by generating market revenues built on legal allowances. Its environment is mostly identical to the partially deregulated market characteristics of the market-socialism of the 70s and 80s. University, college managers – as in all redistribution systems – do not want to satisfy real demand, namely students' requirements or the research demands of companies, but try to influence the redistributor - the government that provides funds. This phenomenon has many aspects, including, but not limited to, networking, cross-employment,<sup>90</sup> the influencing of government development plans and funds<sup>91</sup>, and the framing of the legal system.

It is of fundamental importance whether in a state owned university education and research can be treated as a mission, and innovation processes strongly connected to these. We can

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<sup>90</sup> Delegation to, and employment of, university lecturers on committees deciding on state funds, programs, development funds, and on supervising bodies. The (secondary) employment of ministry officials at universities.

<sup>91</sup> Taking part in the planning of primary authority development objectives and programs, ensuring prioritised participation of universities in research programs.

presume that the organisation and operations would be self-governing in order to fulfil this type of mission more easily. This would result in the state providing the funding required for these activities, and the tasks of planning – organisation – guidance – leadership would stay with the universities, as universities know best how to allocate this money, and independent of the type of financing on the demand side, they spend it effectively.

On the other hand, if we examine the research and development structure of higher education, we can identify a completely contradictory structure to this, which is more a sort of a top-down managed system than an internally guided innovation system.

Based on these findings we draw the following conclusions:

a.) The different state actors provide funding for research, development and innovation activities based on highly diverse legal methods, since, according to their presumption the universities or colleges would not be able to decide, or would decide wrongly about the type of research or innovation that should be supported from this. Based on this, for state owned universities Kornai's assumption would very likely be right, i.e. that the innovation efficiency of organisations not operating with a mix of market coordination (ethical and bureaucratic coordination) is low by default. The paradox of the situation is that the remedy is the hair of the dog: they want to inject money into the area with the same coordination mechanisms that are responsible for its failures.

b.) The influence of higher education actors is extremely significant in the decision making bodies of supporting actors, and in cases where fundraising is not based on the self-governing model (OTKA), the influence of higher education actors is decisive. This means that it is a simple case of bargain-hunting: higher education institutions try to soften the budgetary limits through the plan-arguments familiar from socialism, using all means possible.

c.) Based on the previous two points it should be clear why the innovation activity of state-owned universities is so weak: compared to market players, the multiple symbiotic system of connections formed with state organisations running in many diverse areas, is likely to be much more profitable. As a consequence it seems to make more sense if the higher education institution allocates its resources into applications for tenders, and the influencing of decisions (calls for tenders), and allocates the money gained among internal interest groups. This is where it is successful; they have existed on this for decades. Consequently – even if we exclude the qualifications and commitment of managers – the bargain-hunting of state funds (for innovation) seems to be a very strong organisational



behavioural element, which is fundamentally different from the management of innovation processes boosted by market coordination.

Analysing the organisational culture of Hungarian state owned universities from the perspective of innovations, the following factors and characteristics can be highlighted:

- a. The innovation performance of the university is significantly reduced by the fact that the resources available are mainly governmental; so the managers in charge of this process mainly focus on acquiring these. Due to the specialities of the situation innovation efficiency and effectiveness is low, as both actors (government bodies, higher education institutes) are not very interested in measurement and feedback.
- b. The authoritarian university organisational and employment hierarchy acts against competition and does not favour processes which drive innovation.
- c. The university organisation, built on traditional ethical coordination based on its weakness, and the bureau-university, building on bureaucratic coordination based on characteristics experienced in socialist companies (socialism), can generally only support innovations with very low efficiencies, or only in certain special cases.

### **3.4 Some Employment Specialities of Hungarian Tutors and Researchers in Higher Education from the Perspective of Innovation**

To be able to evaluate factors which have an effect on the performance of research institutes and researchers in higher education regarding innovations, we have to understand the higher education research institutes' organisational, leadership, motivational and interest structures, the evaluation system which characterises employment, and its developmental tendencies. In the next section we will demonstrate the factors of these higher education institute dimensions in a simple model to provide a fuller picture.

#### **a.) The definition of research areas**

The most typical attribute of research institute employment is the definition of the research and development area, i.e. the source of the definition of the research and development topic. With the previously illustrated<sup>92</sup> historic, scientific and organisational sociology development of higher education institutes – from the Humboldt-type of university to a service-type of university – this topic definition is changing.

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<sup>92</sup> See: Polónyi (2009a)

The characteristic of the Humboldt-type of university is that the topic definition originates from the researcher's curiosity. The research and development topic is defined mainly by tutors and researchers. Obviously the topic definition is the right of the department head, research lab head and the university lecturer; the lower ranked lecturers are less likely to enjoy this kind of right or have limited rights.

The next phase of development is when this topic definition is linked to projects (calls for tender) and/or purchase orders. Therefore topic selections are limited by tender documents or purchase orders but as part of this, the definition of the topic – or more accurately the selection of the topic – is still the right of the department head, the research lab head and university lecturers, and lower ranked lecturers are less likely to practice this kind of right or only have limited rights; in fact often they can only practice this right under the aegis of the lead tutors (attributed to them). (To be frank, the tender runs in the name of the department head or research lab head, or a lead tutor, but in practice it is executed, and coordinated by a tutor or lecturer). Currently Hungarian higher education is at this level, and the same is true for the tender issuers, where the above-mentioned lead tutor either participates or their influence is significant.

The next stage in the development of universities is when the decision to take part in tenders and the cooperation in research and development with companies is not decided on a department level but rather on a faculty level, or with the involvement of more than one faculty, or on a university level. Here the decision-making rights of department heads or university lecturers are limited. The actual tender decisions and company level research and development cooperation decisions are made on a faculty or university level. Departments and research labs contribute to mega-projects, and to company level work, and their jobs are defined by project plans and research plans. The topic definition of research labs is guided and originates from the strategic and business objectives of the large-scale incorporating organisation (the department, institute, faculty level co-operation or university).

With the development of universities and science organisations the funding of research is also changing.

The financing method of the Humboldt-type of university is mainly department research or department-sourced financing (where the source is often based on a normative or on negotiated central government sourced funding without performance expectations).

The next stage of development is the appearance of “out-of-budget” orders and sources. Parallel to this, state-originated tenders acquire a more significant role.

If the service-type of university research funded from the institute's budget completely dries up, research and development sources are government mega-tenders, company orders and sources originating from cooperation with companies. Ways arise for the university itself to make use of research results, or take part in joint ventures.

Hungarian research funding is somewhere in between the two levels. Institute and central budgetary sources still have a significant role; in research institutes they are often decisive. However, as we pointed out in our former analysis<sup>93</sup> Hungarian higher education research and development income represented slightly more than 12 percent of the total income at the beginning of the 2000's, and approximately one-fifth of this was orders originating from the business sphere, while four-fifths originated from tenders. Normative funding of state-owned universities for scientific purposes was about 18 percent of the total funding.<sup>94</sup> In absolute terms this amount was one and a half times more than research and development expenses originating from income. (It should be noted that this share is much higher according to the calculations of the Hungarian Central Statistical Office, as a certain proportion of tutor's time is also taken into account). Overall, more than half of the financing of higher education research at the beginning of the 2000s – taking into account the actual expenses (and not including the cost calculated on the basis of the tutor's working hours) – originates from institutional funding by the government, while more than a third originates from tenders (mainly government sources again), and only one-tenth comes from the business sphere.

The tutors and researchers of the Humboldt-type of university are practically public servants. They have a guaranteed basic salary based on classification levels (lecturer, associate professor, senior lecturer) and years of experience. The evaluation of research and scientific performance is mainly based on academic degrees and titles, and the acquisition of these titles (PhD, habilitation).

The next stage of university development is when, in the evaluation of scientific performance, besides titles, a continuous evaluation of scientific performance is conducted. Titles still form the basis of evaluation, but at the same time in the assignment of titles and promotion to the next level, evaluation takes into account the current and continuous evaluation of scientific performance, i.e. tenders won, publications, patents, and the number and quality of references. However, these evaluations are still only linked to the assignment of titles and promotions related to work-rank classifications. The major share of the salary is still based on

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<sup>93</sup> Polónyi (2009b)

<sup>94</sup> See: Polónyi (2009c)

the office-rank qualification, and the remuneration connected to the title. However, extra income originating from tenders or orders is acquiring more importance.

The next stage of development is when the measurement of scientific performance is based on continuous scientific results. The academic degree has one level, where the objective is to prove eligibility for scientific research. Office rank qualifications remain, but retaining classification levels is linked to continuous evaluation of scientific performance, where evaluation is based on the number of tenders won, their total amount, publications, patents, and the number and quality of references. Salaries shift from guaranteed remuneration to market-based remuneration, and are significantly differentiated.

The remuneration model of Hungarian higher education lecturers is almost identical to the Humboldt-type of university. A multi-stage qualification system and system of titles emerges, including the dr. univ, PhD, candidate of sciences, teacher with habilitation, Doctor of Sciences, external member of MTA, corresponding member of MTA, and full member of MTA. The common factor is that all these are connected to academic activity and final exams. Therefore thesis and inaugurals have to be written, where titles and qualifications are assigned by the approval of a committee formed by honourable members from the given scientific area. These titles and qualifications are pre-conditions to workplace classifications. Salaries are partly based on office-classification and partly on remunerations connected to the title. The continuous evaluation of scientific performance is lacking and has no effect on salaries.

#### **d.) The management and the organisation**

The organisation of the Humboldt-type of university is characterised by the high level of self-determination of faculties; in practice the university is a co-operation between faculties. The independence of faculties is ensured by self-regulating bodies (the faculty council). Within the faculty, departments have a significant level of independence (and departments have self-regulating bodies). Leaders are mainly elected on the basis of academic attributes by the 'citizens' (faculties, departments) of the university. The financial management leadership tasks are of secondary importance. Leadership assignments are fixed term contracts and rotate.

In the next stage the independence of both faculties and departments is reduced, and alternative organisational units emerge. The self-regulating bodies of faculties and departments disappear, and the leaders of faculties and departments are appointed by the university leadership through tenders. The university leadership is still elected on the basis of

academic qualifications by the citizens of the university. In the beginning, alongside faculties or within faculties, more flexible, project-type educational and research organisations appear. Parallel to the traditional university leadership, organisational units emerge, fulfilling management functions. Tasks related to the financial leadership of the university become more important, but financial and academic leadership are not yet separated.

The next stage of development is when more flexible, educational and research project organisations replace faculties. Departments also lose importance, but some of the disciplines, educational and research fields have an ad-hoc, or project-type cooperation, led by the person in charge of the research topic or subject. The university is led by a professional management. Academic and financial leadership functions are separated, the university is transferred into a rational business organisation, practically into an enterprise. Besides education, research, development, services and related activities gain more importance in fundraising.

The leadership of Hungarian higher education is basically on the level of the Humboldt-type university.<sup>95</sup> Even those parts of the Higher Education Act of 2005 which – among other things - aimed to modernise the leadership of higher education, failed. While the budgeting of higher education institutions moved significantly towards the autonomous, enterprise type of budgeting, in the meantime in the new Higher Education Act, the leadership reform of higher education institutions did not occur, following a famous decision of The Constitutional Court of Hungary. The separation of financial and academic decisions did not happen, and the divided leadership (rector, senate) remained as well. The originally intended significant role of the Financial Committee in institutions involving financial decision-making finally became insignificant after objections from the Constitutional Court. Therefore besides the fact that the universities are not led by financial professionals, they are not even fully responsible decision makers, as their decisions can be shared with the senate (operating as a voting machine with 30-60 voters).<sup>96</sup>

The historic development of universities is accompanied by radical changes in their organisational, operational and employment characteristics.

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<sup>95</sup> See: Polónyi (2006)

<sup>96</sup> See detailed analysis: Polónyi (2009d)

	<b>Humboldt</b>	<b>Post-Humboldt</b>	<b>Service Provider University</b>
<b>Topic definition</b>	Individual or by the Professor	Based on own- or faculty initiated tenders and assignments	Central, top-down
<b>Research resources</b>	Institutional	Institutional assignments or tenders	Assignments, cooperation, mega-tenders
<b>Remuneration</b>	Public servant	Public servant type and additional revenue based on tenders and assignments	Market-based
<b>Performance evaluation</b>	None – or based on assignment of titles	Dependent on gaining titles and sometimes collective	Regular - management
<b>Organisation</b>	Rigid – faculty, department	Faculty and department organisations weaken, emergence of institutes	Flexible – departments, project organisations
<b>Management</b>	Academic type – divided (body and individual)  Researches guided by professors	Financial supervision is separated – management appears – but the academic is still dominant  Research guided by qualified lecturers	Academic and financial affairs separated – Management and Research Management is dominant

**Development stages of universities and universities' organisational, operational and employment characteristics**

Source: Polónyi (2011)

#### ***4. Latest Approaches in Understanding the Innovation Effects of the University***

In recent years emphasising the regional role of universities has come to the fore in understanding the innovation role of universities.

The expression “glocalisation” (globalisation + localisation) is attributed to Robertson (Robertson 1992), according to which globalisation is accompanied by the regionalisation process. ‘The regions will become more and more important innovation arenas. This interpretation has given direction to the formulation of regional policy.’ (Arbo – Benneworth 2007: 15)

‘The contribution of higher education institutions to regional development is a theme that has attracted growing attention in recent years. Knowledge institutions are increasingly expected not only to conduct education and research, but also to play an active role in the economic, social and cultural development of their regions. The extent to which higher education institutions are able to play this role depends on a number of circumstances: the characteristics of the institutions, the regions in which they are located and the policy frameworks are all significant.’ (Arbo – Benneworth 2007: 7) When it comes to the question of regional demarcation two concepts can be differentiated, - one is the concept of ‘industrial clusters’ and the other is the concept of ‘regional innovation systems’, - where both assign education and research institutions a somewhat different place. Cluster theory is based on the complex system of value chains linking together the different steps in the economic process, where each step adds new value to the whole process. While higher education institutions play a significant role in many areas, companies that create value are dominant. With clusters the focus is on the companies and their connections (Porter 1990, 1998, 2003 – as referred by Arbo – Benneworth 2007, pp. 16).

The theory of regional innovation systems views these systems as scaled-down versions of national innovation systems. In the regional innovation systems universities and research institutions are seen as the core components. In addition to the formal and informal institutions, the emphasis is on knowledge bases, communication channels and mechanisms for learning and sharing knowledge (Tödling – Tripll 2005 – as referred by Arbo – Benneworth 2007, pp. 16).

Lundvall (1988) in his impactful article highlighted that each countries' national innovation system (NIS) is systematically connected and clearly influences the way national economies have developed. He also pointed out that universities were key players and key determinants of national innovation systems. At the same time, a number of studies have noted that the contribution of universities to the structure of regional economies and to national innovation systems has been markedly uneven (Arbo – Benneworth 2007, pp. 31-32). Analysing the NIS concept in understanding territorially differentiated outcomes has led to the extension of the concept to regions, thereby articulating around the notion of the regional innovation system (RIS) (Cooke et al., 1998 – as referred to by Arbo – Benneworth 2007, pp. 33). Within the RIS perspective, universities can be regarded as more active actors who are able to shape regional outcomes and network topologies (ibid).

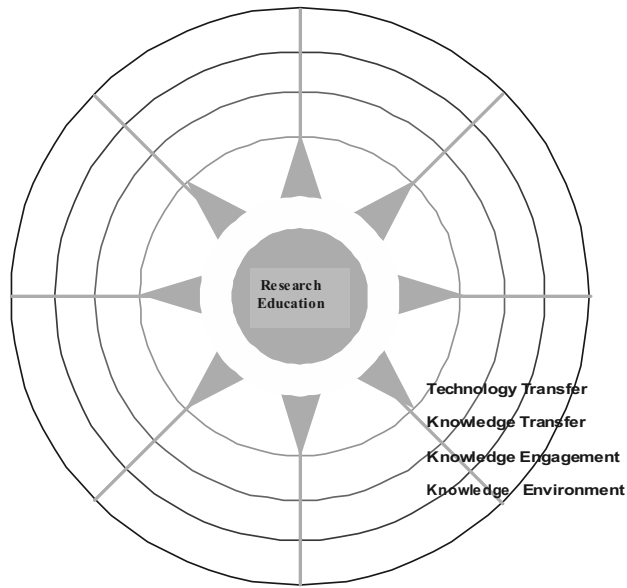
The link between higher education and the economy is multi-layered and complex, while this relationship is realised in the interactions between the university and the region (wider-closer). The best known model of this relationship has been described by Goddard.

The most important elements of the Goddard model are the following (Goddard (1999):

- Teaching – the professional knowledge of graduates, employment perspectives, economic fit
- Research – the innovation, the utilisation/usefulness of research and development conducted in higher education
- Community Service – the realisation of the economic, community, and cultural services provided by higher education







**The new relevance of the university: An enlarged realm of expected impact<sup>97</sup>**

Source: Reichert 2006 pp. 19.

According to a Hungarian study of the topic: 'The university is able to influence the region's economy fundamentally in two ways ....: through the multiplicative effect of employee and student consumption (the so-called expenditure effect) and through (academic, technical, technological and economic) knowledge flow (the knowledge effect) from the university into the business sphere. .... University knowledge transfer ... can be defined as a process in the course of which fundamental contexts, information and innovation flow from the university to the private sector. Four wider categories of knowledge transfer mechanisms can be classified:

1. knowledge transfer through published research results, patent documents;
2. knowledge transfer through the (formal or informal) networks of university and corporate experts (which functions on the basis of common research, the graduate labour market or provisional employment of university students in the industry, but personal, informal contacts are included here as well);

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<sup>97</sup> Original title: The new relevance of the university: an enlarged realm of expected impact

3. knowledge diffusion through formal business relationships (spin-off firms, technology sales);
4. knowledge transfer as the result of industrial enterprises using the physical establishments of the university (for example libraries, scientific research laboratories).' (Varga 2004)

The above classifications are in line with the summary of the conclusions in the OECD 'Higher Education and Regions: Globally Competitive, Locally Engaged' publication of 2007. 'It considers the regional engagement of higher education in several dimensions, notably: knowledge creation through research and technology transfer; knowledge transfer through education and human resources development and cultural and community development, which can, among other things, create the conditions in which innovation thrives.' (OECD 2007. pp. 11)

There are nine areas where OECD made recommendations for member governments.<sup>98</sup> One of the areas is the role of higher education in the field of research and innovation, with the following elements:

- Instead of strengthening knowledge commercialisation, strengthen knowledge diffusion
- Strengthening interactions and institutional cooperation between higher education and other institutes of the R+D+I system
- Improvement of the research and technology developments' HR base, support for intra-country and international mobility, improvement of researcher career opportunities
- Improvement of the diverse skills required by innovation, expanding elements of evaluation in the case of research and researchers
- A shift towards project financing and mixed financing models, the continuous monitoring of financing mechanisms, the development of policy instruments applied to influence the research and innovation system

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<sup>98</sup> The nine areas are the following: a) National higher education strategy formulation; b) Financing of higher education; c) Academic careers; d) Quality assurance and development; e) Providing equal opportunities and fairness; f) The role of higher education in research and innovations; g) Strengthening connections with the labour market; h) The internalisation strategy of higher education; i) Implementation of higher education policy. Source: Halász (2009)

These approaches highlight the fact that quality education is of key importance in higher education's innovation role in national and regional terms. As Ardo and his co-author point out: the role of universities in the human capital system is primarily to supply graduates with the highest skill-set, postgraduates and PhDs having a major importance for the national economy (Arbo – Benneworth 2007: pp. 40).

The research by Massachusetts Institute of Technology analysing the competitiveness of local economies in relation to universities and innovations (Lester 2005) made notable findings in terms of the areas where universities can contribute to the development of local innovation capabilities.

One form of co-operation is **direct contribution** to local innovation processes. In addition to their own research and patents universities can help to adapt knowledge originating elsewhere to local conditions, to integrate previously separate areas of technological activity, and to unlock knowledge that is already present in the region but not being put to productive use.

The document highlights that in most cases, the **indirect support** provided by universities for local innovation processes is likely to be more important. The most important of these indirect contributions is education. But the university can also play an important role as a professional forum, and create a public space for on-going conversations, involving local industry experts, and topics such as the future direction of technologies, markets and local industrial development. This public space can be manifest in many forms, including meetings, conferences, entrepreneur/investor forums, visiting committee discussions of departmental curricula, and so on. The document stresses that the role and contribution of such indirect support to local innovation performance is frequently underestimated.

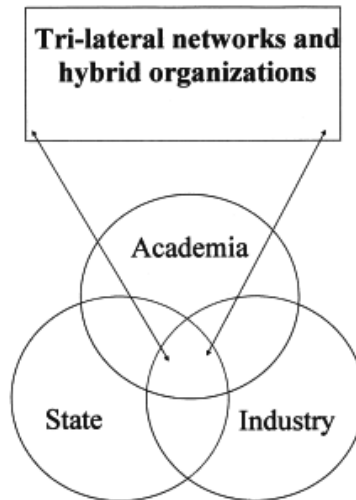
The conclusion points out that the universities should approach their role in local innovation processes strategically. This means that they have to discover the particular circumstances and needs of local industries and their strengths and weaknesses, and should develop university capabilities to fit local the local industry needs. According to the document universities should discard the one-size-fits-all approach to technology transfer in favour of a more comprehensive, more differentiated view of the university's role in local economic development.

Finally the document highlights that a strategic approach to the local economic development role is in line with the pursuit of excellence in the university's traditional primary missions in education and research. Indeed, success in these primary missions is an inevitable condition for contributing effectively to innovation and growth in the local economy. The fear that these missions will somehow be harmed is not a good reason for universities not to embrace their role in local innovation processes. Lester (2005:30-31)

France differs significantly from the MIT study's conditions (as Verdier notes: "France often resists the categorisation proposed by international studies aiming at the comparison of developed economies" Verdier 2006:256). An important predecessor of the current French situation is that between 1985 and 1995 French higher education went through an expansion supported by the state, aimed at narrowing their significant lag in relation to developed countries.<sup>99</sup> It is also among the preconditions that the French higher education and research system was considered very inefficient by the end of the 90's, according to many studies. (Verdier 2006:257). The French development operated through the transfer of initially strictly state-controlled large research regions which created a bridge through the integration of university and industry research structures. In short hybrid industry and state organisations have been formed among the universities, as Etkowitz and Leydersdorff highlight in their well-known study. (Etkowitz – Leydersdorff 2000)

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<sup>99</sup> It is necessary to add that Verdier also stresses that the development of higher education is accompanied by a "vocationalization" process in the course of which (technical) higher education has striven to get industry to accept its degrees. (Verdier 2006)



### **The Triple Helix Model of University – Industry – Government Relations.**

*Source: Etzkowitz – Leydesdorff, 2000*

Conditions in Hungary are definitely closer to this latter model as domestic regions are not very likely to set innovation policies individually; it is more the central government which has a regional policy. At the same time the question remains as to whether this central regional policy can transfer effects to the university that strengthen its regional role.

However the common conclusion of both the MIT and Verdier studies is that teaching and knowledge transfer is a decisive factor in higher education's innovation role.

### **5. In Conclusion**

The role of higher education in innovations is indeed diverse. This role is mainly related to the priorities of the central educational policy and its area of effect, the level of economic development of the economy and the region, the initiatives undertaken by the institute's management and – related to this – the organisational specifics of the institution, as well as the employment conditions of researchers and their motivational characteristics.

To sum up the factors involved in the innovation relationship between higher education and the region (broader, closer) we can identify the following:

- education – which, on the one hand satisfies the needs of the region's young people to take part in higher education, and on the other hand supplies professionals required in the region and ensures the applicability of these professional's skills
- knowledge takeover – curriculum development in accordance with the region's needs and with the pace of development
- human resource development – improvement of skills required by innovation, student and tutor mobility, student career path tracking
- knowledge transfer – for local or regional industrial and economic experts, professional forums, creating professional public space, formal and informal networking
- knowledge creation – primary research, developments, operating an up-to-date library
- knowledge diffusion – sales of technology and patents, business relations with the economy, involvement in the economy (“spin-off” companies, the foundation of technology offices etc.), taking part in hybrid organisations, having a role in clusters and networks
- knowledge diffusion – publication of research results, patents and transfer of intellectual products
- cultural and social role – a deliberate role in the life of the closer region, cultural events, operating social spaces, computer networks etc.
- deliberate alignment of regional, national and international roles
- institutional strategic planning and management

In our research we reveal the innovation characteristics, regional connection specifics and some elements of the factors influencing Hungarian higher education.

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## **Orsolya Szabó – Máté Vona: The factors behind the innovative performance and economic integration of higher education (Introduction to the case studies)**

Both the Hungarian and the international micro and macroeconomic environment of higher education are undergoing rapid change. The traditional funding sources are drying up everywhere in Europe, and in Hungary, too. Furthermore the expectations higher education has to satisfy are also being transformed. Higher education can be no longer considered as an elite educational phenomenon, but rather a mass phenomenon. The expectations of the human resource market are trending towards a demand for practical skills rather than high level theoretical knowledge. Setting up this kind of education is very expensive. With that said, the use of existing knowledge centres and the construction of new ones rely mostly on funding provision. The road to scientific innovation becomes longer and longer, which entails higher costs. Institutions have reacted to this by building new networks and developing organizational innovations.

The challenges mentioned above increase the value of any opportunity that promises outside liquidity. Some of these opportunities come from relations with industry. Our case studies introduce us to the system of relations with industry in two large Hungarian universities. One of the case studies introduces the Budapest University of Technology and Economics (BME), especially the Faculty of Electrical Engineering and Informatics (VIK); the other gives an insight into the Bioengineering Department of the University of Debrecen. Although the two institutions differ in many ways, one can find a significant amount of common features. In both institutions education is closely related to industrial activities. This provides tremendous opportunities to involve companies. University-industry relations have common challenges and opportunities, despite the different scientific fields involved. The departments have central roles; however the faculties or centres can play catalyst roles. The higher the degree of freedom is on a departmental level, the more efficient the relationship is. One key feature appears to be how well the participants can communicate. It is crucial that industrial experts participate in shaping the curricula. This eases communication because both sides know what to expect from each other in the context of a project relationship.

Our case studies highlight the importance of intermediary institutions as essential features of the relationship. These can be tech-transfer offices, spin-off companies, companies owned

by the university or incubation houses. Companies have certain abilities that universities lack because of their core activities. The primal function of the faculties and departments is to educate, so they do not need to be good at marketing the knowledge amassed within their walls, nor should they need to be. It is more efficient when only some institutes specialize in this task. However, education centres should be open and connectable. If bureaucratic games are rewarded more than the relations with industry, then the latter will be undermined by the former.

Both case studies reflect the fact that the university can help industry with fundamental research. This derives from the core competences of the university and its resources. This is not bound by the openness of human resources or knowledge to applied sciences, but by, for example, the lack of an up-to-date and expensive infrastructure. The willingness is there. However the universities have to consider other issues as well. Companies are asking for human resources specialized within their given profile, but universities have to provide more general knowledge, because they have to consider the needs of students as well. Students have a key role in the process, because the compulsory traineeship programme opens a new channel of relations. However, for industry it has become easier and faster to take on talent, which leaves the university with recruitment difficulties. This calls for organizational innovations.

The main message of our studies is that the main field of university-industry relations are those faculties and departments of the university that have educational portfolios close to industry, such as informatics, health and life sciences, engineering and business. If the university structure has rules that encourage and motivate outside relations, than these relations will flourish and develop, but will lead to inner tensions because of the uneven distribution of financial opportunities. However, the motivation for these relations will be brought about by the external changes we discussed above, so perhaps the new challenge facing higher education management will be to handle the tensions we have described.

# **Orsolya Szabó – László Kóródi: The Economic Integration and Innovation Performance of Higher Education and their Defining Factors – Department of Biochemical Engineering Case Study**

## ***1. Introduction***

***Aim of the case study: the economic integration of higher education and research in a regional analysis***

The higher education institution examined is one of the three centres of the University of Debrecen: the Centre of Arts, Humanities and Sciences (TEK), within which we emphasise the Department of Biochemical Engineering as a unit where innovation plays a particularly important role.

The levels and their structure examined in this study are as follows:

- macro level – TEK (Centre of Arts, Humanities and Sciences)

Through the opinions of management we examined the economic, legal and institutional environment of the institution from the perspectives of higher education and economic integration.

**Interviewee: István Gaál, Prof. Dr. TEK President**

- institutional and top management level – TEK Finance Office

The institution management, organisational and motivational characteristics, from the perspectives of relationships with participants in the economy.

**Interviewee: Zoltán Pozsonyi, TEK CFO**

- faculty level - TTK Faculty of Science and Technology

Faculty management level.

**Interviewee: Kornél Sailer, Dr. Dean (TTK)**

- University of Debrecen Knowledge and Technology Transfer Office (DE TTI)

Office assignments and operation.

**Interviewee: Tamás Bene, Law Specialist (DE TTI)**

- departmental level – Department of Biochemical Engineering

Management, organisational and motivational characteristics, from the perspectives of relations with participants in the economy.

**Interviewee: Levente Karaffa, Associate Professor, Head of Department**

- individual level – a lecturer and an MsC student of Biochemical Engineering

Individual motivation and its influencing characteristics, from the perspectives of relationships with participants of the economy.

**Interviewee: Szilvia Jager (lecturer)**

**Boglárka Rizó (student)**

- firms – Richter Gedeon Plc. pharmaceutical manufacturing (Debrecen Department Head)

Through the opinions of higher education participants we aim to formulate a picture of the organisational/economic characteristics in terms of the department's collaboration activities, while we also aim to get to know the opinion of an outside partner on the innovation capability of the Department of Biochemical Engineering.

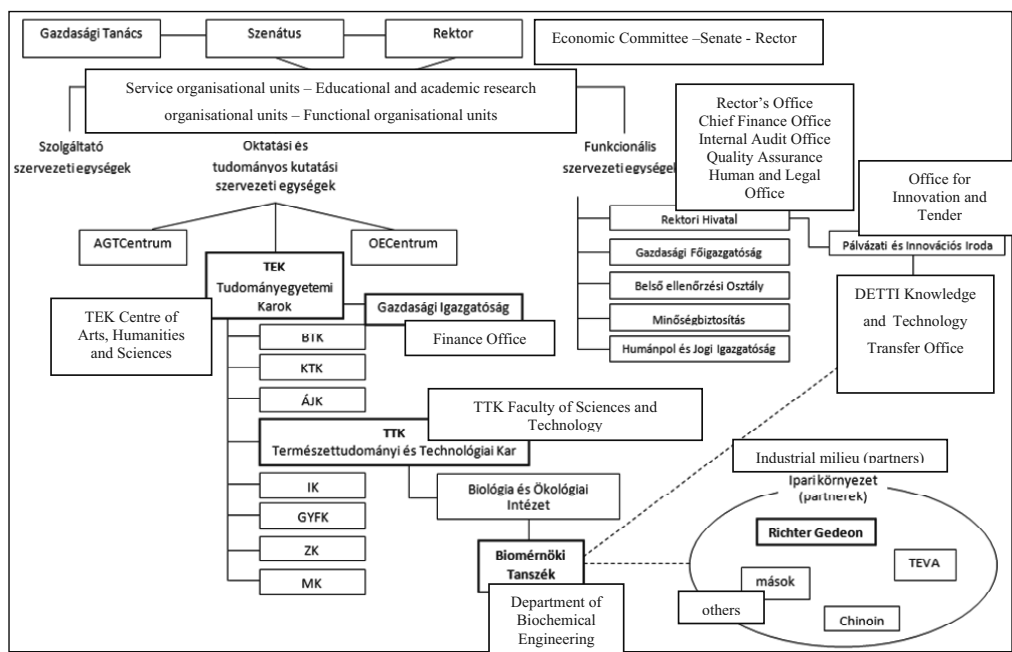
**Interviewee: Dávid Domonkos (Richter Gedeon Plc. pharmaceutical manufacturing Debrecen Factory Manager)**

In the preparation of this study we aimed to describe all organisational innovations which occurred on the levels mentioned above, and develop them. We looked for examples to follow that can serve as a lesson to similar institutions. Not surprisingly, we found the greatest number of organisational innovations on the departmental level. The Department of Biochemical Engineering is a young department, its establishment in itself is an organisational innovation; however, as they noted, it was the result of spontaneous



development rather than a deliberate step. Biochemical engineers are in a fortunate position as their occupational field can be well integrated into the industry. In order to strengthen their industrial relations they set up the Bioincubator Centre, which plays a key role in innovation and in the life of the department.

**Figure 1. DE Organogram highlighting the various levels examined and the organisational relationships of the Department of Biochemical Engineering**



Source: based on the DE organogram, author's own adaptation

## 2. Centre of Arts, Humanities and Sciences (TEK)

### 2.1 Macro Environment

The highest level of the institution examined is the Centre of Arts, Humanities and Sciences (TEK), where, commenting on innovation activities the President, István Gaál, said that due to the limited resources available to higher education the university is forced to come up with innovative solutions on all levels, and the awarding of marketable degrees can be a key to survival.

They aim to maintain and develop existing relationships with industry as well as developing new ones, and shape training according to their needs so that graduates can easily find employment at firms.

Their relationships are often given a framework by departmental work placements. To date, there are seven department work placements operating within the framework of TEK partnerships.

Departmental work placements have been operating for two decades within the DE framework. The practice has multiple functions, including research, applied research and practice: the firm welcomes trainees and sends lecturers to the university as in the case of the biochemical engineering course. Another important advantage of this type of institutional partnership is that the firm includes the university as its partner in tenders, and vice versa.

As this does not require additional human resources from the university, it does not incur expenditure as such.

The departmental work placement is the highest level of collaboration and it is the closest one. This type of partnership comes with the advantage of continuously maintaining contact, as one nominated individual handles the department work placement from the partner side and one from the university side.

The advantages are mutual as the university sends students for training to the partner company which is able to employ staff ideally tailored to its needs. The university opens out to the industry in several ways, asking for opinions regarding the curriculum and subjects, whereas the firms delegate employees to classes in the interests of achieving a well-established and well-grounded preparation of students.

Education is not the sole area for co-operation with partners, all interviewees reported joint tendering - on various levels - between the university and industrial partners. Several EU-tenders require a similar partnership in which, by strengthening each other and deepening their relationships, the partners obtain tender resources. Besides the biochemical engineers' incubator centre, a good example is the information technology incubator centre which was also accomplished through tendering. This facility was established in one of the university buildings that needed renovation; the university received part of the money and the firms won the other part so that in return the firms operate at this location for the duration of the tender. It is beneficial for the firms as they get access to state of the art infrastructure, whereas the university benefits from the closeness of the firms, and research-educational relations become more intense.

According to the President, the experiences of the existing two incubator centres are clearly positive.

In most cases the university takes the initiative, the partners are sought out; it is not the private sector which looks for the university. The ratio is 20% - 80%, and in almost all cases firms take the lead in accordance with tenders, which is not typical in the case of other services.

The President highlighted the fact that co-operation with industry is highly dependent on the nature of the specialities; some departments, such as the arts department, cannot benefit at all from industry relationships, whereas others close to innovation, for example biochemical engineers and information technology specialists, can gain major advantages thanks to their industry connections. The difference is substantial. Industry connections have a great effect on total university innovation; if they did not exist, it is likely the university would not be able to produce marketable degrees and sustain itself in the long-run.

Another innovation with substantial potential is the spin-off company. These are legal entities that provide services to industry using the university infrastructure. Analab Kft. is mentioned as an example that provides chemical industry services.

Additionally, thanks to its partnerships, the university accesses vocational training through firms, although this is not available from this year, due to changes in the law. Partner companies financially supported a faculty or a department and, although a small portion of the total budget, this sum of money had a significant effect. It was money spent on innovation, research and development. It was the sole resource available for the renewal of labs and infrastructure.

They will be left out of some substantial tenders as a result of their limited resources since they cannot secure the required equity.

Innovation can be a way out of the resource limited crisis.

Within TEK and TTK, and within this faculty, the biochemical engineering specialty has great significance in realising opportunities for innovation; the TEK promotes the training of engineers, and the biochemical engineering specialty is particularly successful.

## 2.2 Innovation from an Economic Perspective

We were able to better observe the economic situation of the centre during the interview with Zoltán Pozsonyi TEK CFO. The major topic of the discussion was financial resources and here the important role of co-operation with industry was also mentioned.

Firstly we asked him about resources: government subsidy makes up one element of the resources, which covers administration costs, leaving no capital for innovation. If a given tender allows for it, income from tenders is available to spend on innovation purposes. Tenders, however, require equity, for which the university has increasingly fewer funds due to the limited resources available. This is where business connections enter the picture since firms often engage in tenders as partners of the university and, at the end of the day; they provide the equity which enables the university to participate in the tender. This fortunate situation only occurs in those specialities where relations with industry exist. This results in an uneven development among various departments and faculties.

Those companies with which a relationship has been established commonly merge into partner companies to whom services can also be successfully provided after the tender, and therefore this gives a chance for the establishment of spin-off companies.

In order to enable companies that were established at the university to operate on a firm basis, inventions or know-how are required. Primary research rarely turns into applicable and practically expedient results. The big question, as Mr. Pozsonyi puts it, is whether the gap between science and adaptability can be bridged. Only specialities with active connections to industry have a chance; where there is no connection, it is impossible. The contribution of the private sector is crucial, since pressure is required for innovation to take place. There are great examples of the two spheres' co-operation in both Western European countries and Asia. In our case this is hindered by limited resources, and the appropriate culture is not adequately developed. However, the potential does exist. Areas with potential include distance measurement, smart marketing etc.

Another income resource is dependent on business partnerships as well, namely income from providing services to these firms generating a far smaller amount than tendering. This does, however, have the advantage that owners have control over the income: after subtracting 2% central contingency, 2% handling fee and 18% overheads, the rest is passed on to the provider.

The surplus income is devoted to the operation of the institution, and developments are financed solely from tendering funds.

As tenders are the key to the development of the university, we learned from Zoltán Pozsonyi that a project group works within the Finance Office, and is responsible for the financial aspects of tenders, as does a strategic director who also engages in overseeing tenders.

### **3. Faculty of Sciences**

Dean Kornél Sailer and his colleague, Katalin Csománé Tóth, were at our disposal on the faculty level, and amongst other things we were interested in the role of the faculty in establishing relationship which contribute to innovation for the departments. They said that the faculty lends all necessary assistance to the departments to allow them to establish and maintain relationships with firms. A specially assigned individual, the Tendering Counsellor to the Dean, deals with business connections. Besides, an external tendering counsellor engages in the provision of education, and also keeps in touch with the company representatives.

We discovered an innovation in the student recruitment process as described by the Dean: the representatives of the partner companies often accompany students at the university as the visit is much more credible than it would be if only university lecturers were represented. In this way prospective students become more informed about the opportunities awaiting them at the university.

Moreover, relation exists with several SME-s which are not institutionalised as department work placements but are equally important. Often students look up companies where they themselves would gladly train, and later this evolves into a partnership. Katalin Csománé Tóth noted that the experience of the last few years shows that firms often initiate contact-making with the university.

Two years ago National Instruments called upon the faculty to organise an electrical engineering course that was held successfully.

Partner firms took part in the professional events they organised, where their HR departments presented the company's requirements to graduates, so helping their preparation. Katalin Csománé Tóth listed the companies that attended: NI (National

Instruments), Richter, TEVA and the Chamber of Engineers. They maintain good relationships with the various chambers and gladly attend all events. This helps students to better understand the set of general engineering requirements that is crucial in this profession. Firms have a say in the structure and synthesis of the training, and the process assists lecturers in passing on an industrial approach.

Professional relations within the faculty are highly flexible; partner companies/institutions develop connections with the various departments, depending on their field of interest and their current demand. These network-based connections occur at a TTK level, therefore the TTK issues invitations to attend events as well.

In the past few years, as we already learned from István Gaál, TTK has focused on the training of engineers, since they recognise the shortfall in the region and in the entire country too. This is a significant step forward in the life of the faculty and involves development opportunities. This awareness has been present for 13-15 years in the long-run strategy of the faculty.

The provision of lecturers is a major issue in the life of the department.

We were told that the infrastructure of the department is the result of tender opportunities, and at the same time partnerships have also contributed both to vocational training and to the provision of equipment in need of replacement. In the absence of these vital company partnerships neither infrastructure nor external applied research would exist. It would be not possible to maintain a high-class course for engineers.

The department motivates the centres to innovate; however as financial resources are not available, it does so through awards issued at various intervals; for example, the innovative skills of lecturers/researchers are rewarded annually. Various professional awards can also be won, which may have incentive effects, too. Patents, the most obvious form of innovation, are unfortunately very rare in the department, although minor indications of innovative have appeared.

## **4. Department of Biochemical Engineering**

### **4.1 Background and Foundation**

The topic of the case study is the Department of Biochemical Engineering which was formed on 1 July 2011, before which the course was organised by the Department of Genetics and Applied Biology as a separate group. However, the story goes back much further than this. The Department of Microbiology and Biotechnology was established in 1985 under the supervision of Prof. Attila Szentirmai, the Departmental Head of Microbiology at the Pharmaceutical Industry Research Institution in Budapest and also the lead lecturer and organiser of the Institute of Continuing Engineering Education in Budapest. The establishment, installation and commencement of the educational and research work of the department was supported by the national pharmaceutical industry, including companies such as Chinoïn (today: Sanofi-Aventis), Biogal (today: TEVA) and the Manufactory of Pharmaceutics in Kőbánya (today: Richter Gedeon) through the handover of equipment and instruments, as well as by the ministries and other governmental bodies through the provision of financial support. The other educational division that took part in industrial biotechnology work was the Department of Genetics which held lectures on gene technology and industrial plant breeding under the supervision of Prof. Mátyás Sipiczki. Built on these professional foundations, together with a recognition of the increasing shortfall in technical engineers, the Faculty of Sciences and Technology at the University of Debrecen decided to launch a biochemical engineering course. Following the approval of the Hungarian Accreditation Committee in October 2005, the first bachelor class with 14 students started their studies in September 2006. Today, the BSc in Biochemical Engineering has grown into the course requiring the highest admission score in the faculty, and is oversubscribed by 50 applications.

At the beginning of 2009 the MSc programme was launched as the sole MSc in Biochemical Engineering programme in the country, besides the Budapest based training.

Due to the success of the programme, as well as the increasing number of students, the idea of the establishment of a 'parent-department' within the management of the Biology and Ecology Institution came up. The decision of the Institution was supported by the Faculty and later by the Faculty Board of Science, and the Senate of the University of Debrecen had the final say in December 2010. Consequently, the Department of Biochemical Engineering started its independent operations on 1 July 2011 with four full-time lecturers under the

supervision of Levente Karaffa, Associate Professor. The task of the department is the supervision and representation of the biochemical engineering programme (BSc and MSc), and the instruction of programme-specific courses, as well as the spread and promotion of industrial biotechnology science, including maintaining contact with Hungarian biotechnology companies and co-ordinating professional partnerships with them.

We learned from the interview with Levente Karaffa that in fact the industry called for the launch of the programme, so a close partnership has existed from the beginning, as is shown on several levels: summer internships, factory field-work, various fellowships and, moreover, the joint development of the curriculum, since who would know better what the industry needs than those who work in it?

The curriculum of the MSc, as we learned from the Head of Department, was put together on the basis of professional partnerships in order to better match industry requirements. What is even more important is that industry experts instruct the courses they have requested. One-third of the lecturers are external. The partnership is based on both confidentiality and joint interests. According to the Department Head none of the external lecturers ask for remuneration for instructing. The motto of their partnership is: 'As long as you take it seriously, we take it seriously.' A good majority of these are written in factories with the help of an external consultant so that half of the state exam committee also consists of external experts.

Many students get 'stuck' in the factory during the preparation of their thesis, and are often already earning as students.

According to the Department Head the drop-out rate is high; they do not focus on the quantity but rather on the quality of knowledge of the graduated students. There is a great interest from the factory side in keeping tabs on the best students and as soon as possible they 'pounce' on them, often asking for Karaffa's opinion and asking him to recommend students for a specific job. The professor is careful to send or delegate only the most suitable person. The department tries hard to nurture its reputation.

Due to the small size of the department they have time during the BSc course to get to know the students as people as well as professionally, so that personal relationships are easily formed by the time the programme is over.

Due to their open-mindedness the programme is increasingly recognised; the Department Head hinted that Sanofi-Aventis sought them out recently and offered a vocational training



contribution without the department asking for it. The promotion of the programme is not necessary as they are already known and increasingly recognised.

## **4.2 Organisational Innovation at the Department of Biochemical Engineering: the Bioincubator Centre**

It emerged from the interviews that the establishment of the Bioincubator Centre in 2005 was a very important milestone in the history of the programme, as this structure provides the opportunity for the department to leverage its knowledge in an economic field as well.

The precedent for the establishment of the Bioincubator Centre was Analab Ltd., which operated as a chemical services laboratory and also served university functions - field-work was held here for students. In order to carry out complex services a fermentation laboratory was necessary for the biology section, for which the incubator tender provided the opportunity. It also significantly facilitates the organisation of fundamental research in the department, which fosters the professional advancement of lecturers as well as students.

Despite the fact that the incubator tender was submitted on a university level rather than on a department level, its actual operation is in the hands of the departments. The function of the establishment is triple: the laboratory is rented out to companies and industry requirements are fulfilled, and at the same time it serves as the centre of the biochemical engineering programme in the region. The up-to-date lab facilities continuously promote a quality engineering course and on top of this the existence of the remarkably well-equipped laboratory also made a great impact on the Hungarian Chamber of Engineers during their accreditation visit. Thanks to this, the opportunity was provided to launch the MSc programme, and the Chamber of Engineers ensured the accreditation of the MSc.

The support of the pharmaceutical manufacturers included equipment provision; the incubator centre occasionally obtains 6 months' worth of equipment on favourable terms as a result of the regular modernisation requirements of the factories. Besides equipment, the procurement of chemicals and other consumables are often supported by the factories.

Before the existence of the opportunities raised by the incubator centre they were mainly engaged in primary research which was randomly utilised in practice, but since the existence of the laboratory the scale has been increasingly biased towards industrial offers. The incubator centre is the organisational innovation that has made the economic integration of the faculty's knowledge possible.

Since its launch in 2007 the establishment has developed by a great deal, so much so that today the investment registers a 50% rate of return. There were hardly any orders in the first year, which was a learning period for those who work here, during which they got to know the equipment and installations, and worked out the internal system of operation. Thanks to the university publicity, the quality and the thoughtful work, more orders came in later, so much so that now orders are already received from abroad as well. The turnover is increasing year on year. The balance currently is as follows: 5-6 industry orders yearly which bring in 8-10 million (HUF) to the university, which, if we add the sums from EU tendering means a turnover of 20-30 million.

The knowledge base present in the university is thus utilised. The Head of Department stressed several times that there are a number of other fields present within the university: the Chemistry Institute and the Medical and Health Science Centre can provide services in several science sectors to important business entities.

The multiplying effect of the laboratory is shown through the support for lecturer and student development, and also by the fact that the project team hires staff along with the permanent employees for similar level projects, i.e. it creates jobs. Its equipment is continuously used for university purposes, for student field-work required in primary research and training, and it also allows large tenders to be undertaken. An example is the latest success of the lab and the employees, which will result in a patent. They found the solution to one of the problems faced by TEVA, the pharmaceutical manufacturer. The invented process is going through patent procedures. They were able to apply for this tender due to their existing equipment. The patent to be introduced is the joint property of the university and TEVA.

The dynamics of the sector is shown by the fact that the patent procedure is not even finished yet and still there are already applicants for use, which means extra income for the owners of the patent.

The Department Head said that the difficulty of lecturer provision is a typical phenomenon in their profession. This problem occurs because the pharmaceutical industry has a strong absorption power and the university cannot compete with industry conditions. On the one hand, in terms of finance the salaries of the pharmaceutical industry are often more than double those at the university. Also, equipment-wise, as the sector is one of the most dynamically developing, they work with ultramodern equipment and methods. The university cannot compete career-wise either, as industry professional advancement is more flexible and operates under different conditions than university advancement which is tied to clear,

pre-defined conditions. The Head of Department sees project income supplements and the equipment at the incubator centre as a solution to this.

The incubator centre is a significant source of income on a department level as well as on a faculty level, which, under the current circumstances, is essential. As Levente Karaffa puts it: '... the old perception that universities are for research only is not valid anymore these days, there is no money for it; these innovations are forced by necessity.'

With respect to what has been said so far we can state that the programme would be nowhere without the incubator centre, there would be no MSc programme, in the absence of which the independent existence of the department would make no sense, as students stay in Debrecen because of the existence of the MSc course, since pharmaceutical manufacturers cannot do anything with BSc graduates. Company connections would have been wasted without the incubator centre; there would have been no basis to build on partnerships, given the lack of infrastructure. Moreover, one-off equipment provision would not have been sufficient in this domain, where developments are so dynamic and where continuous development and improvement is crucial. Co-operation is only possible if the two partners are compatible in terms of knowledge, equipment and infrastructure. This condition is provided by the joint equipment of the incubator centre and Analab Ltd. Besides, the background chemical knowledge is available on the spot and the combination of these factors is successful.

### **4.3 Future Industrial Connections and Innovation Activities**

Levente Karaffa revealed some of their future plans as they would like to deploy data processing software that would provide a high level of services. The installation of the software is provided by Siemens to the TEVA and Richter pharmaceutical factories, and similarly to the University. In this way the University of Debrecen will be the first university possessing such a system.

Besides pharmaceutical factories they accept assignments from other areas, as they work in any topic related to microbiology problems. As an example, Mr. Karaffa noted a request where they found contamination in a certain type of alcohol and they were asked to identify the source. With respect to the fact that they are highly oriented to the pharmaceutical industry, there are financial motives in the background: although the number of requests from pharmaceutical companies makes up one-third of the total and the rest two-thirds, the income share is 80% to 20%. The other reason for this strong pharmaceutical relationship is its decades-long background.

They provide consultancy for companies, often free of charge and they do not reject any specific type of request, but help where they can.

Sometimes it is an issue that companies fear for their innovations and do not dare to take them outside the factory and consequently they do not ask help from the lab.

When asked about the innovative nature of the primary research of the department Mr. Karaffa proudly mentions the Publication Prize of the University of Debrecen won in 2009 for an article appearing in PNAS<sup>100</sup>, which is scientifically recognised internationally as well. Primary research means having a higher degree as a prerequisite, although lecturers have less time to fulfil industrial assignments due to this, and it is very demanding to perform well in both areas, according to lecturer Szilvia Jager.

The working method of the department and the industrial services running parallel with primary research is more similar to those in Western-European universities than to traditional Hungarian habits, so other faculties have a strange view of them, envy their extra income and are suspicious of their industrial relationships. This small department should be treated as a good example, one that has been able to use its knowledge and develop constantly, providing real career prospects to students and continuously increasing the income of the University. Based on the results achieved they should have been an example for other faculties.

On a University level it can be stated that the Bioincubator centre is a good example of how the university knowledge base can be integrated into the economy; what is necessary is to find the appropriate framework. The Department of Biochemical Engineering and the Bioincubator centre controlled by the former found a market niche where they could enter with their professional knowledge and equipment, and utilise their industrial connections.

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<sup>100</sup> Proceedings of the National Academy of Sciences of the United States of America, the journal of the American Academy

## ***5. Knowledge and Transfer Office, University Level Organisational Innovation***

### **5.1 DETTI History and Functions**

The University of Debrecen Knowledge and Technology Transfer Office (DE TTI) was established in 2006 as part of the Genomnanotech University Knowledge Centre. Initially DE TTI managed the research results of Genomnanotech University Knowledge Centre. Since May 2008 the Office has operated under the supervision of the Dean and utilises the R+D results and developed technologies of the University of Debrecen. As a non-profit transfer organisation DE TTI aims to fulfil an intermediary role among universities (research institutes), companies and investors. The DE TTI provides technology transfer services for the Hungarian Academy of Sciences Atomic Energy Research Institute as well. The DE TTI has the necessary infrastructure, expert background and network relations.

From the Transfer Office we talked with Tamás Bene the office's legal expert who started by highlighting the mission statement of the Transfer Office: facilitating the commercial and industrial use of the university's research findings and the promotion of innovation culture among all those working or studying at the University of Debrecen.

The office provides the following services:

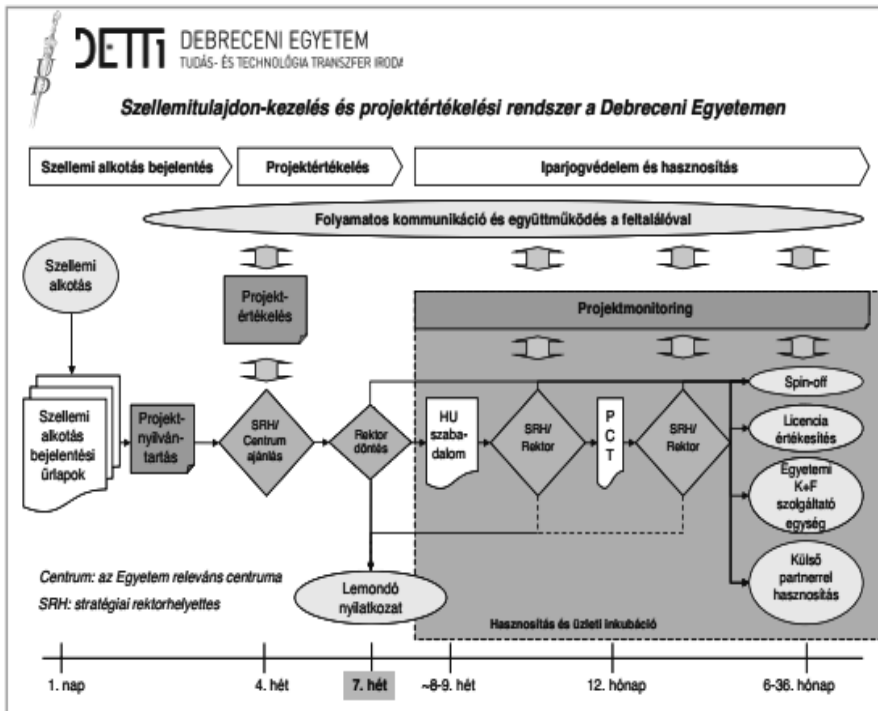
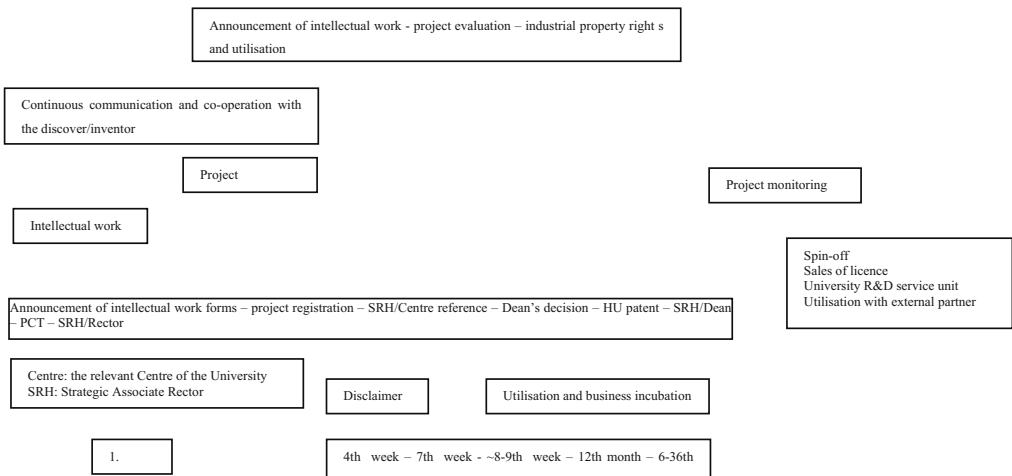
- Project development from innovative ideas and technologies
- Networking among researchers and enterprises
- Management of the University's Knowledge Map
- Provision of the online technology-search service
- Full-scale management of intellectual property
- Facilitating the commercial and industrial use of research findings
- R+D financing consultancy
- Supporting the establishment of spin-off companies
- Investment promotion and business development consultancy
- Organising innovation training and promoting innovation culture

## 5.2 Intellectual Property-rights Management and Project Evaluation

In November 2007 the Senate of the University of Debrecen adopted the University of Debrecen's new Intellectual property rights management regulations. According to the provisions of the new regulations the announcement, filing and handling of any new intellectual property emerging from the University will subsequently be done by the DE TTI Office. The announcements are catalogued by the DE TTI and this ensures protection of intellectual property-rights as required and aims to utilise intellectual property.

The catalogued announcements are tracked until utilisation. The DE TTI analyses announcements from professional and commercial areas with the involvement of the inventors, and afterwards sends the results to the involved centre's Associate President for Scientific Affairs and the Deputy Strategy Dean. Following the provision of the necessary actionable information the Dean decides on whether to approve or reject the intellectual property request. The innovation flowchart of the University of Debrecen shows the process clearly (see figure attached). If the University accepts the intellectual property, the DE TTI immediately takes the necessary measures to provide the circumstances for protection and utilisation. The DE TTI continuously keeps in touch with inventors and researchers, both during the project evaluation and the project monitoring phase. At the University of Debrecen 60% of income resulting from the utilisation of intellectual property returns to the inventors. The University's 40% share is divided on the following basis: one third goes to the Innovation Found, one third to the central budget of the institution involved (Centre for Agricultural and Technical Sciences / Medical and Health Science Centre / University Faculties) and one third to the organisational unit of the researcher's place of work.

The handling of intellectual assets and the project evaluation system at the University of Debrecen



*Szellemitulajdon-kezelés és projektértékelési rendszer a Debreceni Egyetemen*

(Source: Innovációs szolgáltatások elemzése, 2010, 11p)

### 5.3 Sources of Financing

Until 2008 the operations of DE TTI were financed by the Genomnanotech Regional Knowledge Centre project. Until the end of 2008 the profile of DE TTI was clearly detached from the project management of the Knowledge Centre and focused on the fact that from 2009 a new financing solution had to be found to continue the project. In the mid-term the DE TTI will finance its operations from its own resources, although in the current local innovation climate and based on international experience, this is difficult to achieve. Based on studies by AUTM, technology transfer organisations with less than 10 employees do not make any net profit and need at least 10 years experience. To reach economies of scale in operations, DE TTI signed a co-operation contract with governmental educational institutions in the region. In accordance with the New Hungary Development Plan the initiative is supported by the National Development Agency as they launched a programme to support the start-up of seven Hungarian regional technology-transfer centres. The DE TTI 2 year project supported by this initiative extends the operations of DE TTI to the full Northern Great Plains region.

Despite the complicated financing background, the DE TTI's major problem is the labour shortage connected to the increasing number of tasks; therefore they can only react more slowly than they would wish to.

According to Tamás Bene DE TTI currently handles 35 property rights branches. Most were received from the Medical Science Centre, in addition to this the TEK (Faculty of Science) and within that the TTK (Faculty of Science and Technology) are also active.

To our question referring to the emergence of innovation activity, Tamás Bene replied: a good example, i.e. a really successful invention, patent, innovation that has spectacular results is a financial and status success. The barrier – not surprisingly - is the lack of funds. Money would be necessary to put primary research into practice. The industry is only interested in innovations if they are tested and are proven to work, therefore a bridging financing programme that could solve this problem is missing.

The announcement of the patent from the Biochemical Engineering department also arrived here, and is being handled by TTI. According to Head of Department Karaffa, they have received all necessary assistance from TTI.



## **6. A Third-party Perspective: Partnership with Richter Gedeon**

To ensure that we can provide a complex and more objective point-of-view we aimed to interview all involved parties and so made contact with Dávid Domonkos, Factory Manager of Richter Gedeon at Debrecen. This is the second factory in Hungary after the Budapest location. Reflecting on our question pointing to the effect of the factory's deployment in its relationship with the Biochemical Engineering course in Debrecen, he confirmed that it had an effect as they definitely wanted to enter a region where the required knowledge and expertise base is available.

Obviously his unbiased comments showed a different picture. Their co-operation with the University is still in its infancy, he said.

Both parties opened up; this is not a barrier. The barrier is money. The university does not have the necessary funding to purchase the required equipment to allow co-operation, therefore it is only possible on a basic level; the university carries out benchmarks and tests.

On behalf of the company they try to assist through education and the development of university equipment. Another factor hindering co-operation is the university's lack of experience.

The biggest benefit for the company is the HR recruitment possibility among students with a MSc. Regarding our question on the quality of knowledge possessed by graduate biochemical engineers, it was stated that they are not work-ready but are more work-ready than others. The pharmaceutical industry is an area where knowledge erodes very quickly and changes on a day-to-day basis. Therefore it is important that students gain more and more practical knowledge during the course. As Mr. Domonkos phrased it: '... theoretical knowledge - grade 4', but in practice they are on a lower level, as more labs and computing would be necessary during the course. To overcome these shortcomings they try to provide assistance in the development of the curriculum, such as with the curriculum for the MSc in Biochemical Engineering, which was a result of full co-operation, as we also learned from Levente Karaffa. The quality improvement is already significant. The co-operation with this department is the most intense.

We asked how he saw the innovation capability of the faculty from an external point of view. The potential is visible as they try, and can, progress with time; financial barriers are visible which they try to overcome by forced and supplementary solutions.

In Hungary, co-operation between the industry and the universities is unprecedented, as was noted by Zoltán Pozsonyi previously.

Another compatibility problem is the bureaucracy of the university, which is not acceptable for the industry as it can take 3 months to get a signature.

## **7. Conclusion**

Due to the limited financial resources the role of innovations is much appreciated as is understood realistically by the management, who try to motivate the lower levels of the university. Organisations such as DE TTI are responsible for assisting in all tasks related to the innovation activities of researchers and for diffusing the culture of innovation.

With respect to this, the task of the faculties, specialties and departments is to find the instrument, or method that facilitates the integration of knowledge originating in the university into the economy.

We believe that we found one of the positive examples within the University where a department develops dynamically despite its small size and, while there is still a lot of work ahead of them, they can be a good example for other faculties at the University. This does not mean that they can relax; the direction they represent is positive but, as we heard from several levels, it is not enough.

It is important that the road from invention to innovation can be followed without difficulties and where novelties emerge, these should not be stuck in the invention phase, but all participants have to be motivated and contribute to their success. Often, where motivation on an individual level or from the business sphere is not appropriate, no inventions are made, and these areas are at the greatest risk.

All respondents said that the lack of funding is the biggest issue and therefore a bridging solution should be found, whereby the university has access to more funds; the best solution to this problem is innovation, while to extend innovation requires funds and support.

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# Máté Vona: Innovation in the Service of Quality Higher Education - BME Case Study

## ***1. Introduction***

In this case study we review the external relations of the Budapest University of Technology and Economics as a complex higher educational institute. The case study includes the following sections:

- Introduction to the organizational structure of the university
- Industry relations of the organization; its research, development innovation and education
- Industry relations through the traineeship program; advantages and disadvantages
- Innovative methods of industry relations, the Technology transfer process, the Demola-concept, and BME Viking Ltd.

After these sections there is a conclusion summarizing the main remarks made in the study.

These sections attempts to answer different questions and try to divide the external relations of the university into typical channels. In the conclusion we try to distinguish the general elements; those equally true for every - or at least most of the - Hungarian higher educational institutes, and those specific elements, which are only valid for the Budapest University of Technology and Economics. This is necessary, because as we explain why we have chosen this university, it will be clear that in many ways it is a special university in the Hungarian context. In broad terms the uniqueness of this university derives from its success in corporate relations. We attempt to find the origins of this success and point out which elements could be transferred to other universities and which not.

In the second section we will see that the organizational structure of this university is the outcome of an organizational innovation. It's an innovation in the sense that they structure their organization unlike any other higher education institute. They follow a textbook divisional structure, where the operational tasks are delegated to faculties and departments, and the head of the organization only deals with strategic decision-making. The questions that this section answers are the following: What motivated this organizational restructuring?

What kind of incentives does this structure create in the context of external relations? How have the organizational participants reacted to this organizational innovation? What is the future of this innovation?

Sections 3 to 5 focus on the different channels of external relations. The third section closely introduces the mechanics of the external relations at a given department of the university. This department has very active relations, which results in relatively high non-state revenue. How has this faculty been able to build such fruitful relations? What are the elements of success? What can be adopted?

The fourth section concerns the traineeship program, as a channel of external relations. Traineeship as part of the universities education program is an externally required innovation in the course. In consequence of the organizational structure it is also organized at a departmental level. As we will see, the department matched the traineeship program to the individual research program of the students. The questions in these sections are the following. How could the faculty adopt this outside the institute? What are the incentives for the participants? What factors act against the success of this program? What can the students gain from it?

The fifth section deals with the attempts of the university to fully take advantage of opportunities in external relations. These attempts are innovative organizational bodies that create incentives for cooperation among departments to create synergic effects.

For the case study we conducted interviews with individuals from all the different levels of the university hierarchy. We asked the head secretary of the institution, Tibor Szabó, about the organizational structure of the university, and the distribution of tasks such as the compulsory traineeship program. BME has a textbook divisional structure so the faculty management has major role in the operational tasks, so we discussed the faculties' opinion about traineeship with the dean of the Faculty of Electrical Engineering and Informatics (VIK), László Vajta. We learned that the traineeship is organized on a departmental level, so we conducted an interview with the head of the Department of Telecommunications and Media Informatics, Tamas Henk. We learnt about various interesting innovative approaches from the interview with the leader of the Technological Transfer Office, Laszlo Bacsa. We also had an interview with Gábor Felső, the chairman of BME Viking Ltd., which helps to create spin-off companies and facilitate connections between companies and the university. We also represented the opinion of the students, as expressed by a typical student Gábor Makrai.

## ***2. Introduction of the organizational structure of the Budapest University of Technology and Economics (BME)***

### **2.1. Budapest University of Technology and Economics (BME)**

In the case study that we have prepared, we introduce the basic model of the organizational structure of the Budapest University of Technology, which we will refer to as the BME because those are the initial letters of the traditional Hungarian name of the institute (Budapesti Műszaki Egyetem). It is situated in the capital city of Hungary, as is clear from its name, on the bank of the Danube. Its highlight academic fields are the various types of engineering, the chemical and biotechnological sciences, natural sciences and social and economical sciences.

The reason we are reviewing this university in particular is that this is one of the leading Hungarian Universities, with over 23 000 students, 110 departments and over 1500 lectures and researchers. Not only does BME lead in numbers, but it has a history stretching back over 200 years. It is the center of the Hungarian engineering and mechanical sciences. It has central role in Hungarian research and development achievements related to the higher education system. It has received the most patents, with 16 between 2007 and 2010 (Polónyi 2010), and with this record BME is head to head with the University of Szeged in innovative technologies.

BME is also a leader in introducing new systems into the Hungarian education system. It was among the first universities to introduce the ECTS, the European Credit Transfer System, which made the university accessible to foreign students on student transfer programs like Erasmus. In 2006 the BSC-MSC system was also introduced first in the field of information technology which is among the core strengths of the educational provision of BME. These are not only interesting facts, but make BME an ideal target for review.

### **2.2. Organizational restructuring**

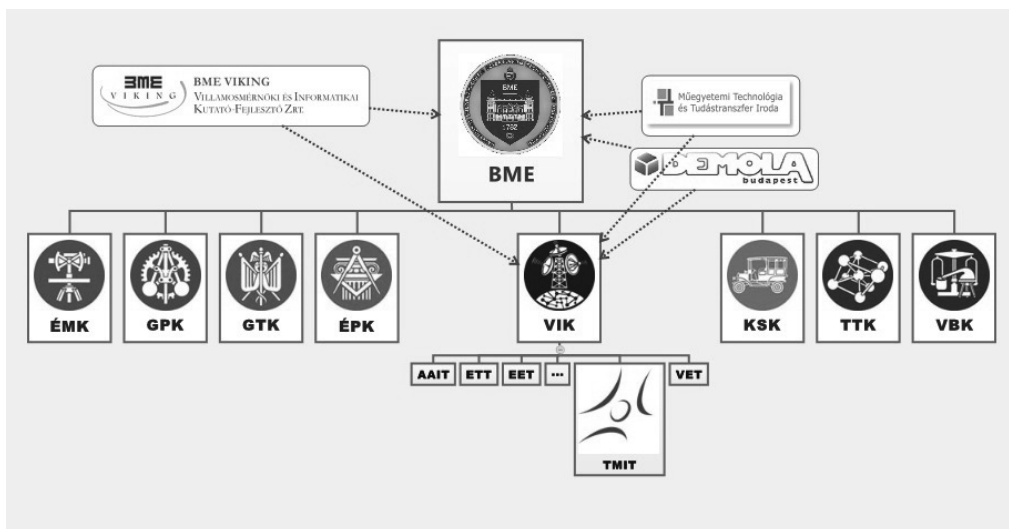
“...changing the direction of more than 3000 employees, 22 000 students and a 3000 billion Ft budget is an enormous task”

Tibor Szabó, Head of secretary

Between 2008 and 2010 the whole university was being restructured. This meant that from the previous very bureaucratic format it was changed to a new division-based organizational

format. Graph 1 shows the simplified structure of the organization. Those organizational bodies that are important in our study are highlighted. The goal of the graph was to be easily understandable, so some otherwise important bodies have been left out. As Tibor Szabó, one of the main architects of this restructuring told us, the main reason behind the changes was the poor financial state of the university. It is not the goal of a university to be financially profitable, but it is very difficult to operate under constant financial pressure. It was time to cut costs wherever possible, and they thought that running such a large institute under bureaucratic conditions produces high extra costs, which in the university's condition at that time was not permissible. The idea was to create an environment where the basic units within the university can act as responsible enterprises, which at least break even. The rest of the university bodies were rationalized, and multiple services supplying the same needs were cut if it was possible. This meant downsizing in human resources on administrative fields. The financial planning of the organization uses technocratic tools, in the sense that some expenses such as salaries for a given position are not up for negotiation, but are the output of a very transparent financial system. In part of this restructuring some crucial elements of bureaucratic incentives were cut, such as bonuses for high-ranking staff. The leaders of the university come from the lower ends of the hierarchy, having achieved a high level of social capital; it is a non-productive system to allow these leaders to vote bonuses for themselves.

**Graph 1. The organizational structure of BME with the most important bodies involved in this case study**



Resource: BME organizational data

This divisional system, which places financial liabilities on the basic units of the organization in exchange for leaving the main element of the income on the same level, is unheard of in the Hungarian higher education system. This system gives huge freedom to faculties and departments to plan their own strategies, allocate their income, and create new innovative ideas. Of course, this system has encountered some opposition, but as soon as they realized the advantages of this system they were able to adapt.

This is not a perfectly working system without flaws, as Tibor Szabó explained. A well-functioning divisional system needs professional leaders and experts. This is what BME lacks. This is natural because the traditional Hungarian university employs scientific experts and administrative background staff. To be a leader is a complex task, as Tamás Henk told us, and some of the professors do not think in this way. They are interested in, for example, a departmental head position because it gives some extra financial benefits, but they see it as nothing more than an administrative job.

### **2.3. Restructuring and the new incentives**

“The reason behind the choice was that in this way during one rector cycle approximately a billion Ft could have been saved in management costs by downsizing a complete level of leadership. It might be an interesting feature of this organizational structure that the goal of the hierarchy structure here is not to stream down the decisions made on the top level, but to channel the needs from the bottom level upwards.”

Tibor Szabó Head of secretary

The faculties have to account for every use of university property. They have to pay for this from their resources; such company-like internal accounting is unusual, but this provides a possibility for the faculties to hold on to what is left over. They only contribute 5% of their income to the central budget to pay for such common services as accounting; the remaining 95% is theirs to spend the way they want.

Such fiscal freedom gives a tremendous amount of motivation to accumulate revenue. One possible source of this is external income from research and development with industrial partners. The effort no longer focuses on outsourcing these connections to spin-off or satellite companies. It is always motivating if one does not have to share the fruits of one's work with other parties that have nothing to do with it.

In a bureaucratic structure internal politics is very important. If being successful in negotiating budgets is not the way to financial success, but to be involved in as many projects as possible, then researchers are more interested in winning tenders or being awarded patents.

### ***3. Industry relations of the organization; research, development innovation and education***

#### **3.1. Industry relations - an example**

“The reason why this faculty is strong is because the philosophy of the head of the faculty in the 90s was to bring more people with industrial experience to the faculty, including me, among others; I previously worked over 10 years in the industry; so we knew how to talk with the guys in practice.”

Tamás Henk, Head of the faculty

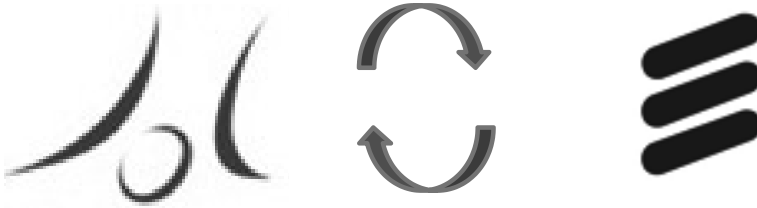
In this section we introduce the mechanics of a university-industry partnership through the example of the Faculty of Electrical Engineering and Informatics and Ericsson the well-known Swedish telecommunication company. The relationship, as Tamás Henk told us, dates back to early 90s when the national tender for the building of the Hungarian telecommunication system was won by Siemens and Ericsson. The then head of the department and a local Ericsson manager met at a conference. The head of the department invited the manager to visit the department, and when he did he liked what he saw. He passed the Swedish connection to the faculty to talk about an R+D partnership, because at that time there was no research and development in Hungary, only production plants. In 1992 a framework deal was signed by Ericsson and the department, and cooperation between them has been continuing ever since.

The interesting question is what the conditions of this relationship are (they are modelled in Graph 2). As Tamás Henk, the head of the department told us, Ericsson expects well-qualified labour and innovation capability from the department. Education is the main strength of the department. In the beginning the engineers educated at BME found jobs in Sweden, but after a while they were so many, that Ericsson decided to establish a research and development centre in Hungary, and now it has another centre, and most of the scientists working there are from the BME. In return for this labour supply Ericsson gives money in the form of an educational supplement to the department or sometimes machinery that is too expensive or not possible to get on the market.



## Graph 2

### The model of the relationship between TMIT and Ericsson



- Financial support
- Research infrastructure support
- Basic research projects

- Well-trained engineers
- Conference appearances
- Research successes

Source: Based on the interviews

The department shows its educational strength by publishing and by participating in conferences. Some of these conferences are such high prestige conferences that only one tenth of the papers are invited. It is a strategic relationship, so Ericsson understands and accepts that some of the graduates must stay at the university, because the department must keep up its recruitment.

In addition to Ericsson, many other companies have connections with the department. The current projects are posted on a notice board to raise the attention of students to join the projects. These projects are usually not the kind of strategic development for companies which must be a company secret. As Tamás Henk states, everything has to be public, there is no room for secrets.

### 3.2. Why is there a need to widen the resources devoted to external relations

As was mentioned earlier the departments are very self-sufficient, but they cannot take every project themselves. They have to cooperate with each other sometimes. To coordinate this cooperation might require some help. Sometimes the faculty has better connections or is able to create synergic values.

Another important field is the nurturing of new knowledge developed on a departmental level. This is also a complex question. Sometimes the department does not have enough resources for this process, which is understandable as the main task of a department is to educate.

We will give examples in the 5th section of faculty level attempts to solve these issues and benefit from these opportunities.

## ***4. Industry relations of the organizations; research, development innovation and education***

### **4.1. Compulsory Traineeship during the BA course**

As was mentioned earlier, the BME went through a great organizational restructuring between 2008 and 2010. As Tibor Szabó told us, the organization now has a textbook divisional structure. In this structure the university's upper management, which is made up of the president and the faculty deans, deals strictly with strategic matters, and other matters, such as questions relating to traineeship organization are faculty responsibility. In this section of the case study we present the system of traineeship at the Faculty of Electrical Engineering and Informatics as an example. The traineeship requirements of the study programs provided by this faculty are regulated on a national level by the Ministry of National Resources<sup>101</sup>. These requirements are practiced on faculty and department level. This faculty educates electrical engineers and IT engineers. For these professions the provisions require at least 6 weeks of compulsory traineeship outside of the university at the BSC level, while at the MSC level 4 weeks is compulsory but does not necessarily have to be done outside the university. The BSC traineeship is usually completed during the last summer before the 7th semester of the program. The departments have to fulfil this obligation, and they do so through a position known as the traineeship coordinator. This coordinator deals with getting the companies to accept trainees, and doing the necessary administration following the traineeship program. The departmental coordinators are supervised by a faculty coordinator.

The individual research project starts with separate laboratory training. To do this, students have to choose a faculty consultant, who mentors them throughout the laboratory practice. The student's thesis must be based on this laboratory practice. During the masters course there are two more semesters of this laboratory-, quasi-industrial environment practice.

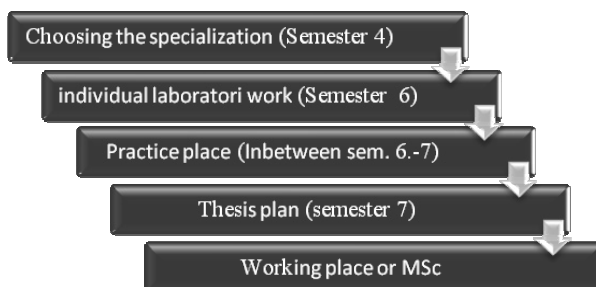
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<sup>101</sup> The provision is called Training and Outcome Requirements (Magyarul: Képzési és Kimeneti Követelmények)

These practices can follow a common scientific problem, or can research different problems. Any research arising out of these practices belongs to the university; the faculty owns the property rights. The students' research programs frequently attract companies, and help the students' career, as well as determining the traineeship location.

The ideal student career path (Graph 3) starts with finding the field one wants to specialize in. On this basis the student chooses the department at the faculty that offers the kind of a specialization the student is interested in. The specialization includes mainly practical subjects, such as the above mentioned individual laboratory practice and thesis. During the individual laboratory practice the student sometimes encounters an industrial program. In fact, the department has a notice board featuring the many current scientific projects already running at the department. The students must join these projects and contribute to them through their laboratory work. Many, but not all of them, are industry related projects connected to a certain company. The student can continue his or her work at the university during the summer 6 week traineeship program at the same company. After the practice he or she returns to the university to conclude the thesis work, and when this is successfully completed and the degree has been awarded, he or she can return to the company or continue to study at the MSc level.

**Graph 3. The path of individual research activity**



Source: Based on the interviews

Laboratory – in between – Work place

Before the last semester of the BA program, there is a 6 week compulsory traineeship program. If the student could not find a place the faculty offers a place at a company. Tamás Henk told us that approximately 90% of the students choose from the list of company places offered by the department. Usually they will go to a small or medium sized company, but sometimes they go to a bigger company with whom the department already have strategic

connections. As the head of the department told us, the companies' most frequent complaint refers to this type of traineeship, because it is too short. They cannot provide a range of activities with responsibilities to the trainees because they will leave in a few weeks, so they cannot depend on them. Sometimes this leads to wasteful activities, and if the students feel that they are doing bogus jobs, they will not take the practice seriously.

In an attempt to avoid this, the trainee has to have two consultants. There is a department consultant who oversees the trainee's activity to ensure it matches the academic requirements of the study program; and an on-the-job tutor, who supervises the trainee's job at the working place, and gives tasks which will benefit him or her. The trainee must conclude his/her 6 week program with a report that covers all 6 weeks' work as previously detailed, so both consultants can accept it. An advantage of the specific field of study is that it includes a lot of individual laboratory work, so there is a detailed system of how activities must be reported, and how this can be translated to working hours and subsequently to credits.

The clear benefit of such a traineeship program is that the student has an opportunity to participate in a working environment and also acquire social capital.

#### **4.2. The corporate traineeship programs; their benefits and disadvantages**

It is possible to complete the compulsory traineeship program by participating in a traineeship at a company, as part of its hiring process. In this case the student, who is in the final semester of his or her BSC studies, is already a possible employee of the company. This means the company expects him/her to stay after the traineeship period, but usually the trainee is also interested in this, since this is the main reason for this type of the traineeship anyway. In this case the student not only voluntarily chooses his/her place of practice, but actively searches for it.

During company traineeships the students must face genuine company expectations, because they are not expected to leave after one and a half months. They have to work hard on jobs which are equal to those done by other employees, and they are more likely to be a part of the company community. It is also a great motivator to be paid for their job, which is not necessary for the 6 weeks traineeship. If both the company and the student plans for the long term, it could lead to a more fruitful relationship.

**Table 1. Comparison of the compulsory and corporate traineeships**

	Compulsory 6 week traineeship	Corporate recruitment traineeship
Financial benefits	Usually none	Usually some
Length	Usually 6 weeks	Usually a longer period, with opportunity for advancement
Responsibility	Lower	Higher
Loyalty	Lower	Higher
Difficulty of completion	Lower	Higher

The Department accepts these kinds of quasi jobs, and also real jobs, when the student is an employee at the same time. The same conditions apply as with the traineeship organized by the university. There have to be two consultants, there has to be a report on the 6 weeks of work and it has to be accepted by both of the consultants. But there is one additional requirement, as Tamás Henk informed us. The report must not contain any confidential company information that would make it necessary to classify it. The reason for this is simply that it is a state university where everything is public; there is no place for secrets.

## ***5. Innovative methods of industry relations; the Technology transfer process, the Demola-concept, and Viking Ltd.***

### **5.1. The Technology Transfer Office**

One of the credos of the BME is that they train professional experts, who can not only find, but also create jobs. This is a complex statement, since it means, as László Bacsa explained, that BME graduates should be capable of standing on their own feet. Not only must they be excellent employees, but they should be able to start and run their own enterprises. This is part of entrepreneurial thinking. As was mentioned in several places above, students at BME are engaged in various activities that produce valuable products in an industrial sense, making it a valid possibility to run with these ideas and start their own company. This can produce high added economic value.

In the framework of a state tender a technological transfer office has been established to enhance and support the attempts mentioned above, among other goals. The way technological transfer process works is that first they make an inventory of the knowledge, ideas and innovations the university has. Second they try to categorize it according to the stage of development they are at, and the market value they represent. Basically, there are categories such as ideas that needs further research to be marketable, or research that is near to publication, and a possible subject for a patent. A patent protects the right of an inventor for a given time period so that he/she can reap the financial benefits of his or her invention. It is very important for the utilization of an invention, but to acquire a patent for something is a fairly long and expensive process. This office takes these burdens from the shoulders of the young researchers.

This is more difficult than it sounds. When asked what the main obstacle to such a process is, László Bacsa told us that it is the academic mindset. These people are researchers and engineers and they invest in the technical problem, and the main part of the process mentioned above starts when the technical problem is solved, so the researchers and engineers start to lose interest in it and want to move on to something else. But sometimes even the best products take a long time and hard work to give real benefit. So it is firmly on the office's agenda to change this mindset, and focus more attention on the economic utilization of a great idea.

According to this agenda they organize entrepreneurial seminars, where students and young scientists can meet with industrial players, such as legal experts, venture capitalists and practicing entrepreneurs. Not only do they give lectures on market opportunities, but they are also open to discussions where students can ask their questions. According to László Bacsa the seminars have been welcomed beyond expectations, and a real dialogue has begun among the participants.

There were other events where these parties can meet, like the idea contest where 58 teams competed for the first prize. The winner of this contest did not receive the usual money prize, but was awarded a complete package of incubation help. This means the best idea in terms of marketability received an opportunity to be realized with the help of legal, marketing, financial, investment and strategic management services. The office tries to follow up this project until is fully developed.

These projects are in their early stages, so it is possible that some students have not even heard about them, as was the case with our student interviewee.

## 5.2. Demola-project

The idea came from a Finnish project with the same name. The university encountered this project in Tampere, Finland, where the university and the local economy are closely linked through this concept. They have over one and a half years experience in running this project. This concept works in Finland, but throughout Europe one can also find evidence of its success.

The core idea of the program is that companies tell the university their research problems, the university compiles a team of researchers and students from various fields, and when they come up with a solution, the company has the option to buy the new technology, so the research team has the option to sell it or to create a spin-off company. The process can also work in reverse, when the research group come up with an idea, and the industrial company can decide whether it sees an opportunity in it or not.

In Finland this concept is based upon information technology, and it creates information technology solutions for companies in this field.

As László Bacsa told us, when they met this concept, they decided to implement it in the Hungarian environment, which was the beginning of Demola Budapest. This project is only in its pilot stage, but the expectations are high. As has been mentioned, the Finnish example operates in the field of information technology, but the Hungarian implementation tries to open up its accessibility by involving all 8 faculties of the university. The main idea is that the industry needs multi-disciplinary solutions. A real-life industrial problem does not have one technical aspect which exactly matches the knowledge-base of a specific field of engineering, but has multiple aspects which require contributions from various fields of science. It would be a mistake to forget about the economic side of the problem, because a good solution in an industrial sense means a solution that not only solves the technical and scientific issues, but at the same time can be implemented economically and is successfully marketable. This kind of viewpoint is what the outside partners usually find lacking in the university. As László Vajta told us, it is not completely true that the university lacks this kind of horizontal thinking, but programs such as Demola could reinforce the links between multiple disciplines and create the teamwork among various experts which the companies usually misses in regular education. In the words of Tamás Henk it could widen the range of resources with which the University can satisfy industrial needs, and it might attract more investment.

The concept is the following. The industrial issue is introduced, and is brought by the company participant into the laboratory especially built for the Demola concept. Various experts of the Demola program examine what kinds of competences are necessary to achieve a complex solution of the problem. Then they assemble a 3-5 member team which includes students from different departments, or even faculties, of the university. The students gathered for the project are from a group of students who have previously indicated that they would like to participate in such projects. These students could be short-listed according to their competences and fields of interest and this makes it easy to match the right researcher to the specific projects. After the assembly of the team, the deadlines must be set, and the work begins.

The work is controlled by a company tutor. This means it is not only the students but also the company who are responsible for some kind of solution. After the program is evaluated as successful and completed the company has the option to buy the project outcome. The students also have the right to ask for a patent for the solution, or to sell it on the market, or to start a spin-off company with it.

This is only the expected outcome of the Demola-concept. The ideas for a given project could come from within. If a researcher meets with an issue demanding the kind of competences that are spread over multiple departments and faculties the researcher could turn to the Demola lab and ask for help in concept of a project. After the researcher's project is evaluated as one that is worth investing laboratory resources in, then the same path mentioned above could be followed. For a student, in a financial sense it is less attractive to participate in a project like this, because the probability of selling it is less than with a project like the one mentioned earlier. The reason for this is simple; although the company has an optional right to buy it, it is very likely that they will buy a solution for a program they themselves have brought in and tutored.

As was hinted earlier, a huge motivator for a student could be the possibility of a cash return on their research activity. Besides the monetary aspect of the project, there are many possibilities for personal development. Students with different expertise must co-operate with each other. This means, for example, that an IT student, a mechanical engineering student and a student of management disciplines all have to find a common language, team work routines, and solutions to conflicts in an everyday working environment. In itself this is not much, but the huge advance of Demola is that unlike compulsory company traineeship programs, students meet these learning and knowledge expectations in their own environment in their own field of interest. Learning for self-interest in a familiar environment is



far more beneficial than a compulsory traineeship with low expectations and an even lower payout.

As Laszlo Vajta, the dean of VIK, the home of the Demola project, stated, it is a win-win situation for the companies and the students. The companies' interest in it is that they do not have to take on the financial cost and risks of the research and development. Such a project would demand great financial commitment from a company, but the Demola laboratory gives the university a huge size-efficiency advantage, so it can take on this risk. After the research is done the company can decide whether it likes what it gets or not. In practice this could mean that in a multinational company a senior manager of a Hungarian office does not have to make a cost plan and a risk analysis of an R+D project, but has an already made solution to the problem and price, which could be very attractive. Laszlo Bacsa, one of the Demola staff members, told us that interest came not only from tech-based industries but from traditional industry and also from small and medium sized companies. It could be especially attractive for them, because usually they are not familiar with the academic environment and what they can expect and what they have to pay for it; this kind of detailed partnership would resolve their doubts.

Initially, the above mentioned concept sounds fine on paper, but it is only in the pilot stage. This means the actual implementation could be very different from the concept in the early stage. There is a huge gap between the thinking of a researcher, a student and a corporate manager. Finding the common denominator is a huge task. Another issue is how this project can be compatible with the university's legislative background.

It could be also an issue - as Gábor Felső pointed out - that financial or research benefits are not necessary the top priorities of a student. They can act unreliably and miss deadlines, which can damage the company-university relationship and also the BME brand.

Another issue that previously was not clear is that we do not yet know how the participants can exploit this system. All these issues make the project an interesting one to follow in the future.

The previously mentioned two innovative approaches to training and the transition of young adults to the working environment are in their initial stages and even in the future will concern only the most talented students; however, the most talented students will produce most economic value in the 21st century knowledge economy, so how a higher educational institute utilizes this talent and helps them to broaden and develop the whole society is a crucial issue.

### **5.3. BME Viking Ltd.**

Viking Ltd. was founded in 2006, when the government passed an act allowing universities to create profit-orientated spin-off companies. Viking was established to represent the Faculty of Electrical Engineering and Informatics (VIK). It is 100% owned by BME, and the property rights are managed by the dean of VIK. The experience of this establishment process suggested that it is very difficult for universities to establish companies. There is great deal of administrative liability. It took approximately one year to start this company; at first the idea was to create a company like this for every faculty of the university, but after this experience no more have been created. Now BME Viking represents the whole university, but mainly VIK.

One of the main advantages of such a company is that it facilitates the links between the university and industry partners. There are many things that a company could do more easily than an educational institute in an administrative sense. For example, it could ease the cooperation between the various departments if Viking organizes a project and gives invoices for the different departments. This is why Viking's main task is project management.

## **6. Conclusion**

As promised in the introduction we will summarize the main findings of the work here and also in this section give our opinion regarding what can be adopted from the more successful of the BME projects.

Our case study introduced 3 main channels of external relations for BME. The first channel is the faculty relations with the industry, focused on the fulfilment of the demand for trained engineers, and basic research. The success of the faculty lies in its educational core competence. As long as it is capable of producing the proper level of students and researchers who are able to prove by their excellent conference appearances and publications, there is a future for university-industry relations. For these kinds of achievements a high level of experience is necessary, as well as high quality student capital and a valuable, industry-wise knowledge base.

Another important channel is the obligatory traineeship system, in which the university finds training places for students where they can gain experience during a 6 week period. The faculties have successfully built these traineeships into their curriculum. However this system is not a really motivational one, neither for the students nor for the receiving institute, because usually it is incapable of building a long term relationship between the student and

the recipient. It is more motivating if the students find a place for themselves where they can work in hope of real rewards, and the employer can invest in the trainee over a longer term.

There is a grand scheme of relations, which can reach a higher level of opportunity than the faculty toolbox can. One way the technology transfer office tries to utilize industry relations is with the help of the young researchers in founding small enterprises. The Demola-project tries to implement an internationally successful concept by using synergic effects and an option-based research and development scheme. The BME's Viking Company helps co-operation among the partners.

It is important in all three channels that the university has the type of knowledge that is easy to transfer to industry. If the university trains talent that is capable of dealing with the challenges of the working environment, then companies will have an interest in supporting the university. However if a university teaches knowledge that is more difficult to translate into everyday corporate business, then it will be more difficult to convince corporations to support the courses.

**Table 2. Some of the keys to success in industry relations and their adaptability**

Key to success	Is it adaptable?
Research and education of the institute is strongly related to industry	With certain conditions
Competition fuelled by scarcity of students	Only by outside intervention
Entrepreneurial environment within the institute	Adaptable at a high cost
Size and history (brand)	Not adaptable

Source: The conclusion of the case study

The shaping of the different channels is expensive. The faculty relations need certain communication skills which are necessary in order for the researchers and industry players to understand each other. The research infrastructure demands a high level of investment. Selling the product requires a brand name like BME, backed by 100 years of achievement.

These factors are not adaptable. There is only a narrow range of Hungarian universities that have a similar R + D profile. The health care sciences, and partially business studies and information sciences have similar field specifics to engineering.

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## **Chapter 3.**

### **Innovative Regional Co-operations**

## Miklós Szanyi: Introduction to the Cluster Case Studies

„The mysteries of the trade become no mystery, but are, as it were, in the air.” wrote once long time ago Alfred Marshall in his seminal book: “Principles of Economics” (Marshall, 1890 p. 271). This sentence has been cited very frequently, and in fact, has also been considered by policy makers and influential institutions like the World Bank or the European Commission (see: Krugman, 1991; Venables, 2002). The sentence is commonly used in arguments describing that new information and communication technologies do not mean an end or death of distance in business (that would follow from neoclassical economic theories), hence, factors of spatial choice continue to matter, albeit in modified ways. This sentence describes a factor that has played significant role in the emergence and development of cities and other hot spots of business: knowledge spillovers.

Recently the aspect of supporting the exchange of ideas and innovation became priority in economic analysis and policy alike. In many cases this element is separated from other components of the “mystery” and treated with some kind of obsession as panacea to spur economic growth. This is expressed in policies supporting innovation and regional economic growth, like EC’s Lisbon Strategy and the new Europe 2020 plan. The obvious failure of the Lisbon Agenda raises the question whether policies adequately set the target, or the complexity of increasing return’s nature and background has not been properly understood and addressed. This chapter is about the issue of positive spillover effects of spatial concentration and related policies in the framework of the cluster concept.

Classical growth theory addressed several alternative sources of growth. In imperfectly competitive markets and in the presence of both positive and negative externalities, economic activity is likely to be spatially distributed in an uneven fashion. Marshall (1890) argued that spatial concentrations (cities) develop as a consequence of three distinct factors, the Marshallian triad (Krugman, 1998). These include market-size effect, thick labour markets and pure external economies. These are the so called centripetal forces of spatial concentration that stimulate the co-location of business. Centripetal forces contribute to some forms of increasing returns that cause cumulative causation mechanisms. Opposing to the centripetal forces, centrifugal forces are also at work. They involve some form of costly transportation or congestion costs. Krugman (1998) suggests the following classification of centrifugal forces: immobile factors, land rents and pure external diseconomies.

Clustering is generally defined after Porter's first description (Porter, 1990) as a process of firms and other actors co-locating within concentrated geographical area, cooperating around a certain functional niche (competing elsewhere), and establishing close linkages and working alliances to improve their collective competitiveness. This concept is related to but goes beyond that of agglomeration of related activities. Whereas simple co-location may be associated with favourable external effects that are not intended but rather incidental, joint strategies and actions motivated by the anticipation of mutual benefits are fundamental to clustering.

Clusters may form a support institution for the promotion and coordination of cluster activities. This institution is called cluster organization or cluster initiative. The idea of establishing such support organizations comes from the fact that most clusters develop in a top-down manner. This is in contrast with the development of the archetypes of famous clusters like Silicon Valley, Third Italy or the Baden-Württemberg automotive cluster. In fact, the spectacular success in regional development that made these clusters world famous gave the idea to some business developers and policy makers to try to understand and copy them.

Cluster development has increasingly been regarded by time as a primary tool for innovation policy; clusters themselves have been regarded as sources of innovation. Innovative features of cluster cooperation became highlighted. Our point in this regard is that mutually beneficial cooperation with innovative content may be present in clusters. For example, MNEs may play important role in delivering new technologies and knowledge to cluster participants. Innovative cooperation of firms, universities and research institutes is also plausible in clusters.

However, cooperative innovation projects are bound to various preconditions. It is not only technical facilities like effective communication platforms and devices, promoting institutions. It is much more the existence of mutual interests in cooperation, and high level of social capital that enables interested parties engaging in innovative cooperation. Transition economies are from all these aspects lagged behind. Technical facilities have improved substantially through massive investments also supported by various EU projects. Nevertheless, knowledge sources are relatively scarce. Large multinationals, the primary sources of technology are rather reluctant to transfer knowledge. Knowledge spillovers are not strong also because TNC activity is usually reduced to narrow fragments of the value chain, and in most cases local R&D activity if any concentrates on product and technology adaptation. Universities as potential knowledge source have other weaknesses, most

importantly their low interest in commercializing research results, and institutional weaknesses of knowledge transfers. The low level of trust effectively paralyzes cooperation. Widespread rent seeking, ineffective law enforcement (incl. property rights) do not allow many companies entering into cooperation programs on strategic issues. Thus, cooperation in the framework of clusters has to concentrate on establishing adequate level of social capital base among participants first. Only in the second step is cooperation on strategic issues like innovation plausible.

The concept of the most current cluster promotion program of Hungary, the Polus Program was based on the existence of local knowledge base in 7 cities of Hungary, where higher education and possibly also industry has had traditions. This knowledge base had to be connected with business with the moderation of state agencies in order to produce commercialized output, innovations. The two case studies were selected from Debrecen region, one of the Polus cities, where research and higher education had traditions especially in life sciences, natural sciences (especially physics, chemistry mathematics) and agriculture. On the industrial side of the triple helix model a large pharmaceutical company has worked in the city for the past 60 years, and the city's fairly diversified industry also included companies in machinery and equipment, medical instruments (non-electronic), tinning, and many other, rather traditional industries. During the transition period much of the industrial base has eroded, however, new investments of multinational companies replaced them in electronics and business services. Hence, obvious fit of the knowledge base and business could be found in three major areas: pharmaceuticals, electronics/software development and food.

There were a few cluster initiatives prior to the Polus Program, but they could not grow to the size envisaged by the government, they remained only locally visible. Nevertheless, the new program promised substantial financial support for collaboration, including opportunities of large-scale investments in R&D infrastructure, which woke up the awareness of both the major of the city and leaders of the university. From the possible areas two were selected in a close cooperation with Szeged (another Polus City with very similar endowments). Food industry in combination with life sciences created a healthy food cluster, and a pharmaceutical cluster was also established, this in cooperation with Szeged University. On the other hand, the software cluster was established in Szeged, with cooperation of Debrecen University. As is seen, decisions on the establishment were taken by politicians and university leaders, also adjusted to other polus hubs of the country. In an earlier interview, the vice rector for science of Debrecen University declared that faculties were not interested in developing cooperation links with business. This comes from the traditions of German-type universities, which set up tasks only in research and education, not in



innovation/commercialization of research results. He also declared that he expected as potential benefit of establishing clusters also developing skills in commercialization and cooperation with business. Nevertheless, polus clusters were not initiated by business. This is also expressed by the fact, that the local player, one of the largest generic drug producers, TEVA does not participate in the Debrecen pharma cluster. It is rather a Budapest-based company, Richter, who took the lead from business side in this cluster. As is seen, both clusters were established as response to the incentives created by the Polus Program.

Earlier research on clusters already revealed the fact that many of the new establishment did not survive the grant period, that is, they existed only until outside finance was guaranteed. In most of the cases this meant that no substantial cooperation was ever carried out, only “virtual” clusters were established. The obvious rent seeking behaviour was criticised, and also discussed by one of the authors with government officials. The accreditation procedure was included in the Polus Program in order to limit chances of rent seeking. Another criticism was raised concerning the process of cluster development and the need for strengthening social capital base. This seemed to be neglected in the program, the accreditation already assumed the existence of the necessary social capital base and cooperation records (it was checked in the evaluation only rather formally). No explicit efforts were required from IFCs or cluster members in this area. Hence, the strong focus on formal R&D cooperation seemed to suppress general cluster development tasks, the need for which is also clearly expressed in the literature. Therefore, in the case studies we concentrated on these two issues:

1. if the cluster integrates the majority of participants in joint programs or the whole project is an exclusive playing field of a few,
2. if basic general practices of cluster development (e.g. for strengthening social capital base via communication platforms, shared services, etc.) are exercised or neglected.

We certainly also measured the innovative output, which was the main target of the whole Polus Program.

Summing up the most important lessons of the two case studies, we may say that the Polus Program achieved the main goals, nevertheless, these goals served more S+T+I policy than cluster policy. The pharma cluster was especially successful in innovation, and this may give a good platform for further cooperation of the cluster members. However, this network also could be improved and expanded, the attractiveness of the cluster for new entrants strengthened if more professional cluster management would work. The food cluster on the other hand does not have the significant results that would make staying in the cluster

rational when grants cease to arrive. Both clusters, but especially the food cluster should improve work on social capital building, and introduce such services for cluster members, that pay-off quickly and convince members about the usefulness of cluster membership. Without the necessary cohesion the clusters, even large, influential ones like PANAC will break up.

# **János Molnár: Case Study 1.: The Pharmapolis Innovative Food Industry Cluster**

## ***1. Introduction to the cluster***

In 2007, as a result of a joint initiative between companies in the food industry and Debrecen University the Pharmapolis Innovative Food Industry Cluster was formed. Its objective was to develop health-preserving, functional foods, the consumption of which would make a demonstrable contribution to safeguarding health.

The Pharmapolis Innovative Food Industry Cluster was created with a starting capital of 500,000 HUF and operates with the support of Debrecen University. The company is 40% owned by Debrecen University, while the Hajdú-Bihar County Chamber of Commerce and the Hajdú-Bihar County Regional Agricultural Chamber both have 30% stakes in the company. The managing directors are Dr. József Prokisch and Péter Tóth.

The Innovative Food Industry Cluster is the management body of the cluster. Its main task since its foundation in 2009 has been the professional representation of cluster members, in relation to the generating, applying for tenders and operating of the innovative projects brought about through the participation of cluster members, as well as helping co-operation between members. The cluster is the first accredited food industry cluster in the country. In 2009 its main task was the preparation and submission of the cluster's application for accreditation, which was successfully accomplished. The cluster received its certificate of accredited status on 9th April 2010, and the Innovative Food Industry Cluster won the title of 'accredited cluster', and the opportunity to submit further tenders.

The cluster programme's intention is to create an internationally recognised market-led innovation co-operation network which is capable of attracting domestic and foreign capital, as well as highly qualified researchers and experts in bio-technology, agricultural sciences, and especially agricultural bio-technology. The cluster is a knowledge-based specialised innovation system based on the knowledge base provided by Debrecen and Kaposvár Universities. In addition to the Universities, the Metropolitan County of Debrecen City Council, the Hajdú-Bihar County Chamber of Commerce and Industry and numerous

enterprises are also involved. Richter Gedeon Chemicals NYRt and the pharmaceutical companies created by Debrecen University's accredited pharmaceutical cluster programme are also organically linked to the objectives of the cluster. The cluster – together with its domestic and international partners – can be joined by researchers and developers in the "Food, Health and Wellness" sector, whether they come from Hungary, or from inside or outside the EU, including those who develop health foods and testing and equipment related to functional food research.

The basic objective is to create high value-added research results, products and services which can be used in industry, which form part of the cluster's intellectual property and are a directly useable element of its knowledge base. The created cluster will, on the one hand, try to revitalise the network of the region's food-industry related small and medium-sized business, and through co-operation with Debrecen University's Agricultural and Medical Centres, with the region's food-industry related agricultural sector. To develop a "medical claim" based food industry would otherwise be impossible for this sector without the close co-operation of Debrecen University. In addition to all this, at the regional level the project is supported by the commercial system of the university knowledge base, other industrial concerns, as well as the city council, and consequently already has a triple helix innovation structure with backing from government and financial institutions, as well as providing a fully operational cluster system through its establishment of a cluster management structure.

The cluster has its own logo and website, through which it provides information about the cluster (e.g. members, industrial tribunal cases, Organisational and Operational Regulations, Ethical Code). The English language pages are not operational, and in addition to this, we cannot access relevant, up-to-date information; the link only leads the reader to material in English from a 2009 website.

The cluster's Organisational and Operational Regulations specifically lay down the following aims, basic activities and areas of operation:

- Tasks related to development of foodstuffs
- Organising, executing and evaluating the necessary chemical, microbiological and genetic analysis, and organising and conducting the preclinical, clinical and public health analysis of the products and the evaluation of the results;

- Manufacture of the necessary material and equipment for food industry research, and the creation and supply of the necessary machines for the members of the cluster;
- Research into foodstuffs and nutritional science;
- Provision and quality control of the working environment in accordance with the appropriate domestic and international regulations;
- Mutual participation in innovative research;
- Development of the software related to and supporting the cluster;
- Preparation of the joint tender applications and projects serving the aims of the cluster, which conform to Hungarian preparation guidelines as well as following the recommendations in the European Union framework programme;
- Joint PR and Marketing activities
- Cooperation with other food-, pharmaceutical- and mechanical engineering and biotechnology clusters.

## ***2. The operational regulations of the cluster***

According to the cluster's operational system the cluster is a network of legal and natural entities which, on a profit- or non-profit basis, operating through the food industry and the functional foodstuff distribution chain attempt to increase value-added, or undertake activities which are closely connected to, or supplement, the activities of this sector. The details of the grouping, operations and competences of the cooperating and mutually contracting cluster members who enjoy equal rank, are not laid down by the cluster.

The legal or financial liabilities of the cluster's members are not prescribed, but its official position does deal with the maintenance and upkeep of the moral principles, management direction and principle lines of activity. The cluster community decides for itself, on the basis of democratic rules, what should be its common objectives, operational regulations and who it should accept into the community and who is considered an appropriate member.

## 2.1 The organisational system of the cluster

Members of the cluster:

- Agrárgazdaság Mezőgazdasági és Kereskedelmi Kft. (Agribusiness Agriculture and Commercial Ltd.)
- Agri-Corn Kft.
- Állattenyésztési és Takarmányozási Kutatóintézet (Institute of Animal Breeding and Nutrition)
- Biomi Kft.
- Bionanoferm Kft.
- Bonitas
- Debreceni Agrárcentrum Kft. (Debrecen Agricultural Centre Ltd.)
- Debreceni Egyetem (University of Debrecen)
- Detki Keksz és Édesipari Kft. (Detki Biscuit and Sweet Foods Ltd.)
- Dr.Aliment Kft.
- Egerfood Kft.
- Egertej Tejipari Korlátolt Felelősségű Társaság (Eger Dairies Ltd.)
- Fino-Food Kft.
- Gyermely Zrt.
- Hajdú Gabona Zrt. (Hajdú Grains Ltd.)
- HAVITA-Tész Szövetkezet (HAVITA Farming Cooperative)
- Instantpack Kft.
- Jászkiséri Halas Haltermelő Szolgáltató Kft. (Jászkisér Fish and Fisheries Services Ltd.)
- Kaposvári Egyetem (Kaposvár University)
- Központi Élelmiszer-tudományi Kutatóintézet (Central Food Science Research Institute)
- Laser Consult Kft.
- Magyar Tejgazdasági Kísérleti Intézet Kft. (Hungarian Experimental Dairy Institute Ltd.)
- Master Good Kft.
- Mezőgazdasági Biotechnológiai Kutatóközpont (Agricultural Biotechnology Research Centre)
- Olmos és Tóth Kft.
- Pick Szeged Zrt.
- Rauch Hungária Kft.
- Wessling Hungary Kft.

The highest decision-making body of the cluster is the Cluster General Meeting which meets twice a year to discuss any issue affecting the cluster raised by the cluster founders. All members may participate in the meeting, express their opinions and influence the cluster's official position statement(s). Participation in the cluster General Meeting may take place in person or through electronic means. In between two General Meetings the running of the cluster is undertaken by the president of the cluster, who is elected by the members of the cluster General Meeting. The cluster president is allowed to personally coordinate the strategic affairs of the cluster, and his/her tasks – where necessary in cooperation with the Management Board which sits quarterly – include any necessary decisions falling between the two General Meetings.

The members of the Management Board are: the president of the cluster, and seven members representing the SMEs and the research institutes. The Management Board, with the authority of the Cluster General Meeting and within the limits of this authority, carries out the functions and expresses the opinions of the General Meeting in the period between the Meetings. On the basis of the organisational structure of the cluster, each of the managerial members of the cluster has one vote. Where votes are equal the president has a casting vote.

The Innovative Food Industry Cluster Kft. organises and supports the operative work of the cluster under the direction of the cluster manager. The cluster manager is responsible for safeguarding and holding the cluster's contracts of cooperation (and for copying them). The handling of all documents which can affect the operation of the cluster, and any changes to them, are also among his tasks. The documents must be issued with the authority of the Cluster President (with his/her signature) and must be examined every two years and, if necessary, modified.

During their work the members of the cluster follow the requirements and principles of the Cluster Code of Ethics. In order to enforce the norms of the Cluster Code of Ethics and to establish if ethical norms have been breached the cluster forms an ad hoc Ethics Committee, whose members are elected by the cluster members.

Since 2008 all old and newly joining members – with the exception of non-profit organisations – are obliged to pay the membership fee of the Innovative Food Industry Cluster Kft., which is fixed at the beginning of each year by the General Meeting. This sum must be transferred by the members by November 30<sup>th</sup> of each year. Any cluster member who fails to pay the compulsory membership fee in 3 consecutive years, and who does not

pay the outstanding fee when requested, will be expelled from the cluster with immediate effect, just as in a case of breach of confidentiality.

The management of the cluster is reviewed by the three-member Supervisory Committee and their report is presented to the General Meeting. The members of the Supervisory Committee are elected for two years by the Cluster General Meeting.

## **2.2 Property ownership issues in the cluster**

Members of the cluster retain property rights to all their own assets which they used to achieve the aims of the project and which they acquired from their own resources. Assets acquired by a budgetary organ as part of state-supported tender contract qualify as treasury assets and the asset manager of these is the supported organisation; in the case of other supports the assets become the possession of the supported organisation according to the conditions laid down in the tender contract.

According to the operational regulations, all research results and developments, reported discoveries, patents pending or awarded, know-how and industrial models created as a result of Research and Development or other products whose value has been increased through joint innovation, which can enjoy patent or copyright protection, and are saleable or useable, are considered as intellectual products.

In the case of discoveries resulting from a genuine and credibly documented co-operation process and/or from resources arising from joint tenders the Cluster members will collectively decide in questions regarding the reporting of the discoveries and will share proportionally the costs and property rights of creating and sustaining new intellectual products (patent partners).

The transfer, use or sale of the cluster members' reported discoveries and acquired patent rights will be decided collectively by those members affected by the patent. Those Cluster members without patent rights do not take part in decisions relating to intellectual products and do not share the subsequent costs nor share in any future profits.

Rights related to the common intellectual products of Cluster members can be transferred singly or together, in part or wholly, to each other or to a third party. The transfer can only occur in the form of a written contract. Rights can also be transferred to start-up or spin-off companies created for purposes of development, adding value and use, and sales. In



questions of transfer of rights Cluster members with patent rights have the right of first refusal.

The Cluster members agree that in the case of the sale or use of their jointly created intellectual products they are entitled – and the user is required - to enter into a contract with the discoverer of the patent, in which they pay to the discoverer as a discovery fee a fixed percentage of the gross income arising from the use or sale of the product. The discovery fee must be paid to the discoverer(s) on the basis of the obligations laid down in the payment contract they have entered into.

If the Cluster members working in a joint project create an intellectual product for which the members do not wish to enjoy the rights to which they entitled relating to the reporting, sustaining or use or sale of the product, all these rights must be offered in writing to the discoverer. The offer takes the form of a written declaration, which includes the precise name of the intellectual product, the level of costs and conditions associated with the transfer and – if the entitled members agree unanimously – the option of a free transfer.

In the interests of realising the research programme one or more Cluster members may work with external research sites which are not members. Before commencing the external cooperation the conditions must be laid down in written form (e.g. contract of employment, cooperation agreement), and the contracting parties must establish the division or modification of the rights over any potential new or increased value arising from the intellectual product, taking into account the special interests of the whole Cluster as well as its members and the conditions contained in the Cluster contract.

For questions not decided by the operational regulations of the Cluster members can operate according to their own regulations relating to the legal protection of intellectual products.

## **2.3 Issuing official opinions**

A request for a Cluster General Meeting can be made by the Board of Management or by at least ten per cent of the members or by the cluster management company. Those invited to the general meeting must receive the agenda by post or e-mail at least 8 calendar days before the date set for the meeting. After an open debate on the subject set for discussion the general meeting will take a decision based on a simple majority of those present in an open vote. The general meeting is conducted by the president or by another cluster member elected by the majority of those participating. The organisation of the meeting, the taking of

the minutes and the technical operation of the meeting are all the tasks of the cluster manager.

A Management Board meeting on a specific subject may be called by the president, any member of the board, by ten per cent of the cluster members or by the cluster manager. The requester of the meeting and any other participant is entitled to submit their opinion in writing to the board at the beginning of the meeting. Participation in the board meeting may occur in person, or electronically via an electronically transmitted vote. After an open debate on the subject set for discussion the general meeting will take a decision based on a simple majority of those present in an open vote. The general meeting is conducted by the president or by another cluster member elected by the majority of those participating. The organisation of the meeting, the taking of the minutes and the technical operation of the meeting are all the tasks of the cluster manager.

The Cluster General Meeting is called twice a year. Every second year the Management Board is reconstituted. The president of the Management Board may call for a General Meeting to elect new officials. The general meeting is quorate regardless of the number of those present. Its decisions may be reached via written- or internet-linked voting such that all members receive an e-mail concerning the proposal for decision at the same time on the day following the general meeting and are required to respond in writing within two working days.

During the voting opinion is expressed through a vote 'for', 'against' or an abstention, with the understanding that declining to vote is the equivalent of an abstention. The results of the voting are collected by the Cluster president and the members are informed of the result via email. During the voting it is forbidden to express an opinion or submit a modifying proposal, and in such cases the result of the vote is void.

All position statements of the general meeting or the committee must be communicated openly and immediately to all members. When the position statements are taken those taking them may decide to also make them known to the wider public.

## **2.4 Accepting members and termination of membership**

Any legal or natural individual who, or which, accepts the Declaration of Intention to Join can be a cluster member. The Management Board examines the applicant's request. The membership relationship of the applicant starts with retrospective effect from the signing of the Acceptance Clause of the Declaration of Intention to Join. This means the applicant becomes a member with full rights. Cluster members are required to declare in writing any

changes in information relating to them held in the membership records and the database within one month of the changes.

If a cluster member is in serious breach of the basic values of the clusters or causes damage to a fellow member of the cluster, the Ethical Committee can decide to exclude that member. The exclusion will only be registered within the cluster. An appeal may be made to the general meeting against the exclusion. If excluded, the member will be removed from the membership records. If, after exclusion, any previously excluded member takes advantage of their former membership, then the exclusion will also be made public to the outside world, and the business community will thus be informed. Any cluster member is entitled to withdraw from the cluster with a declaration addressed to the Managing Board.

### ***3. Product types, services, potential target groups and results***

One of the objectives is to create a diversified risk portfolio in the functional food research and development sector. As part of these activities foodstuffs are selected from the range of current Hungarian foodstuffs which can be developed through experimental and clinical analysis into functional foodstuffs. The end point of the development is to reach the clinical phase II/"proof of concept", the objective of which is either a licence contract or that some of the created spin off companies can achieve sales through specialist investment or perhaps a stock market exit, and increased market performance. The R+D services related to the "Health and Wellness" market consist of the assembling of a full pre-clinical functional foodstuff dossier related to health sector services.

In order to develop functional foodstuffs it is necessary to work with the actors in the regional agricultural economy. The products will be functional foodstuffs in the Hungarian specialities category with industrial rights protection. The foodstuffs under development fall into two basic groups. In one group are the so-called health foodstuffs which, according to the current state of science, are suitable for the prevention and cure of epidemiologically significant illnesses; in the other are all foodstuffs which are designed to reduce the side-effects of the unavoidable therapeutic treatments necessary for some groups of illnesses.

In the framework of the cluster the following services are offered, or are planned:

a) Services of the Cluster Cooperation Institute

- Cluster management and regional marketing service
- Innovation management and 'Venture 2 Capital' (V2C) programme

- Project management
  - Biotechnology, economics and management courses
- b) Project level services
- R+D services related to functional foodstuff development (analytical, study of effects, toxicology)
  - Food safety tests
  - Health tourism services (e.g. combined effect food- and medicinal waters therapy)
  - Education in the food development, dietetics and thermal tourism sectors

### **3.1 I-shop: a new tool to show the results of innovation**

To distribute the innovative, healthy foodstuffs developed during the research the Food Industry Cluster Kft. opened the 'I-shop' in 2011, a commercial channel which operates an HACCP system.

The I-shop is a closed electronic commerce system created by Debrecen University and its staff for the new functional foodstuff products, which has both a mobile and a fixed point-of-sale. The aim is to test, analyse and sell new food products with effects proven by clinical experiments, as well as to test their marketing. In the research projects the I-shop services are really important since they provide a genuine environment for the value and the results of the development programme.

The I-shop has a website on which can be found the logo of the cluster and some of the member companies, as well as web links. The special, tasty foods (e.g. goat's cheese with medicinal herbs from the Hortobágy, yoghurt with selenium, mangalica pork sausages, violet sweetcorn, and products made from sorghum and millet) can be ordered by e-mail, internet or telephone. These products are real novelties and are not available elsewhere.

The idea behind the clinically tested products, with their harmonic combination of tradition and science is that they offer the chance of a healthier life, and that illness can be prevented and cured more easily. With the developmental potential of the university foodstuffs are developed which, when consumed as part of an appropriate diet and lifestyle are shown to contribute to the preservation of health.

The I-shop also constitutes the cluster's PR channel - which was shown at the Farmer Expo in 2010 - and the shop regularly takes its products to the St. Michael's Day Fair in Debrecen, as well as to the 100-Wonders exhibition and the traditional Debrecen Christmas Fair. The

Cluster and the I-shop look after their relationship with the community in other ways as well: in 2011 they drew attention to the role of physical exercise and healthy food at the BFRESH day at the Agricultural Sciences Centre; they have also formed the I-club (Science and Innovation Club).

In the following we will introduce one of the Cluster's existing products, the lactomicrosel® family of products.

### **3.2 General description of the product (product family)**

Selenium is an essential, micro-element with an antioxidant effect and a constituent part of many enzymes. In Hungary it is particularly important to raise the selenium level of foodstuffs since the soil, and consequently food, is selenium poor, and a diet rich in selenium can reduce the incidence of tumourous cancers by 30 to 50%.

There are various compounds of selenium, which are effective in different degrees and can be poisonous in larger quantities. So it is important which selenium compound finds its way into food and which compound is produced during the production process. General opinion holds that an overdose of water-soluble inorganic selenium can pose a greater risk, and earlier it was believed that organic selenium, selenomethionine and selenocysteine were the most suitable compounds to raise the selenium content of foodstuffs and animal feed. It was also known that of the different forms of selenium the element selenium was the least poisonous. Experiments were conducted to establish how probiotic yoghurt bacteria transformed inorganic selenium compounds to organic compounds. The curiosity of the researchers also led them to study what effect an overdose of inorganic selenium compounds has on the bacteria. The result of the analysis was that certain bacteria defend themselves against the effects of what is for them a poisonous level of selenium by producing the element selenium within the cell by what was then a largely unknown reaction and storing it in the form of tiny nano-size spheres.

After the disintegration of the cell walls of the nano particles formed in the bacteria the nano-selenium can be extracted and used as food, as animal feed and a raw material for pharmaceuticals. The size of the spheres produced was, depending on the bacteria, between 100 and 500 nanometres; interestingly, and importantly, the form and size of the spheres was very similar for a given bacteria. The basic novelty and the solution offered by the process developed was the production of nano-particles on an industrial scale.

The process was jointly patented by Debrecen University and Dr. Aliment Kft. (also a cluster member) in 2007. The title given was red and grey element selenium nano-spheres and their technological production. As part of the international patent system the patent enjoys protection in the EU and the USA.

The official gazetteer of the EU published the patent on 28<sup>th</sup> April 2010 under the number EP20080789309 20080715. The US Patent Office published it in its official gazetteer on 29<sup>th</sup> July 2010. The number of the announcement was US-2010-0189634-A1. This was the first patent from Debrecen University's Agricultural and Economic Sciences Centre to be registered and awarded in the United States.

### **3.3 The economic and social use of the results**

With the support of the Innovative Food Industry Cluster Kft., Dr. Aliment Kft. and Debrecen University created a spin-off company called Bionanoferm Kft. (also a cluster member) to make use of its patent, with the task of developing production based on the patent. Bionanoferm Kft., using the technology laid down in the patent, produces the selenium-enriched dried yoghurt powder which is sold under the trade name LactoMicroSel<sup>®</sup> and which is registered as a protected name at the Hungarian Patent Office. From the additive thus produced Dr. Aliment Kft. has developed a dietary supplement. So far, three dietary supplements have been prepared: Cardio komplex, Pajzs complex and Lactomicrosel.

To use the additive in foodstuffs the Innovative Food Industries Cluster Kft. needed to develop selenium-enriched dairy products, cheese and yoghurt with its industrial partners. The I-shop played a significant role in the testing of the developed products and their introduction to the market.

The innovation chain developed and operated by the foodstuff industry cluster company (i.e. the connecting network consisting of university research - patent – manufacturer - I-shop – trading company) represented significant help and support for the use of a patent. Getting the product onto the market was greatly helped by the support and marketing experience of some of the cluster members.

To determine the market potential of the products a study was conducted by Péter Szobonya, while Reginald M. Harvey and T. Kennedy prepared a study relating to sales in the United States. To sell the patent a contract was signed with the American company Central European Venture. The Norwegian company Innovativ Thinking agreed a declaration of intention regarding the sale of the products. The introduction of the product to the German

market is currently ongoing. On the basis of the novelty of the product, the patent protection and the demand shown for the product it has great potential, for the realisation of which the Innovative Food Industry Cluster can provide unparalleled support and achieve great success, supported in the marketing work by the I-shop.

#### ***4. Members' experiences, evaluation of the cluster***

The cluster can show clearly visible results, and is in part a successful and operational conglomeration reflecting the triple helix theoretical concept in worthwhile practical results. There is no real fluctuation in the membership, although almost half of the members are inactive. The cluster informs its members through its website, but hardly any of the members provide the website with information about their own membership, their work within the cluster, or the role they play. During the research we tried for more than six months to make contact with the members, but in many cases we were unsuccessful.

There are several reasons for this: one of the members (Instantpack Kft.) is currently in liquidation; in some cases (e.g.: Agri Corn Kft.) the telephone number given on the website is unreachable, even after several attempts; in other cases of companies which have been contacted several times (Agrárgazdaság Kft.) the secretary has finally informed us that the managing director cannot devote any time to discussing this subject. Again, in other cases, the company concerned (Mezőgazdasági Biotechnológiai Kutatóközpont – the Agricultural Biotechnology Research Centre) called back and promised to make contact concerning the research, but did not make any concrete attempt to do this up to the end of the research project.

In many cases (e.g. Hajdú Gabona Zrt., Havita TÉSZ Szövetkezet, Jászkiséri Halas Kft., Egerfood Kft., Laser Consult Kft.) the member of staff with responsibility for cluster affairs informed us that a personal interview including an analytical evaluation and assessment was unnecessary. The reason for this was that they could not provide worthwhile information and experience: although they had entered the cluster to write tenders, to co-operate on projects and develop products, they were not as yet able to show meaningful results. Thus for some of the members the services offered by the cluster were of no importance. As a result of the inactive members it could be said that the cluster had not reached a critical mass; and further, that the operation of the cluster had not influenced members' export performance.

Concrete results related to developments within the cluster could be demonstrated by the cooperation between Debrecen University, Dr. Aliment Kft. and Bionanoferm Kft. as well as Fino-Food Kft., the Dairy Research Institute and Kaposvár University who together developed selenium dairy products and feedstuffs within the cluster, for which they made a concrete investment; they also developed probiotic cheese, which already enjoys trademark status.



## **János Molnár: 2. Case Study: the Pharmapolis Innovative Pharmaceutical Industries Cluster**

### ***1. Introducing the cluster***

The creation of the Pharmapolis Innovative Pharmaceutical Industries Cluster reflects the common intention of the pharmaceutical companies – Debrecen's dominant industrial sector -, the City Council of the Metropolitan County of Debrecen, the members of the Hajdú-Bihar County Chamber of Commerce and Industry and Debrecen University to work together to help the development of the industrial network by using the region's strengths to create a triple helix conception. The name Pharmapolis has been used in the context of cooperation between the city and the university since 2005, when the City Council and Debrecen together with several SMEs jointly formed Pharmapolis Debrecen Kft. This company, together with Richter Gedeon Pharmaceuticals, as the cluster's most significant pharmaceutical concern, carried out harmonised R + D activities - primarily in clinical research areas. The name Debrecen Pólus is also used to identify the programme in addition to the name Pharmapolis.

The original intention was to create a cluster in the pharmaceutical, foodstuffs and thermal spa sectors, but given the different activities and regulatory environment, it was considered more appropriate to create separate clusters. The city council-university-company cooperation started spontaneously, and thanks to the commitment, good communication and trust an exemplary pharmaceutical cluster was founded in Debrecen. As an extension to the triple helix, the cluster turned to a fourth constituent, essential for finance – banks and venture capital to help the companies involved in the project.

The Pharmapolis cluster has multi-level aims: on the one hand to supplement the Hungarian pharmaceutical industry's innovation chain with lesser developed elements in the interest of strengthening the export interests of the companies concerned; on the other hand, it intends to contribute to a increase in the level of European innovation capacity. It intends to achieve its aims by adapting the pharmaceutical industry specific elements of the European Technology Platforms.

The vision of the Pharmapolis pole cluster is to create a pharmaceutical industry cluster which is also significant at an international level, which can contribute significantly to

economic performance and can increase employment. Through the positive external effects the cluster also has an influence on the whole of the domestic economy.

The objectives of the Pharmapolis Innovative Pharmaceutical Industry Cluster as defined in the strategic and action plan are the following:

- To initiate the formation of internationally competitive clusters
- High added value-, innovative activity-based specialisation
- Strong cooperation, primarily between the companies, and secondly of a supplementary nature between the universities and city councils, in the interests of long term competitiveness
- To strengthen the role of the pole cities' regional centres, to help improve the general competitiveness and business environment of the poles, as understood in a wider sense.

The cluster, through the relationship between the pharmaceutical industry-biotechnology companies, and the co-operation between the researchers and the university sphere would like to achieve the scale necessary for competitiveness on a European level. Through the strengthening of the high added value, export-oriented activities it would be able to significantly increase the competitiveness of the whole Hungarian economy.

Pharmapolis Debrecen Innovative Pharmaceutical Industry Cluster places great emphasis on the fact that through research and development cooperation new innovative products will be developed and that the member organisations' R+D+I+O activities and their results will be widely distributed. The cluster devotes special attention to the following areas (focus areas):

#### 1. Innovative therapy products

- Formulation of recombinant pharmaceuticals and candidate pharmaceuticals
- Cell- and gene therapy

#### 2. Functional Imaging technologies

- Preclinical functional imaging in the pharmaceutical industry
- Functional imaging, molecular functional imaging

### 3. In vitro technology platforms

- Biomarkers
- Laboratory diagnostics
- Development of stress-protein-based pharmaceuticals

### 4. Education

The objective of the Pharmapolis programme and the Pharmapolis Klaszter Kft. which provides the cluster's management is to strengthen Hungary's pharmaceutical industry innovation chain, the creation and operation of technology platform(s) which are also competitive on a world-level, and the development of the industrial sector cluster.

The unique indicative characteristic of the Debrecen cluster is that it has created a key industry network of national significance, the basis of which is the Debrecen-Szeged pharmaceutical innovation axis which is present in the cluster. In this effort it is unique among Hungarian clusters in uniting the efforts of well-capitalised medium and large companies, innovative university "spin-off" and "start-up" companies, chambers of commerce and industry, local authorities and university industrial developments.

The cluster ensures its necessary operating resources from various sources: an income-related membership fee, tenders and fee-paying services (e.g. organising conferences, education, publishing manuals). The annual income is about 20 million HUF, which comes primarily from membership and tenders.

The cluster has as yet few financial, calculable results. They currently create partner companies for the various tasks; however, at the moment they are still in the research phase and the results can only be expected several years in the future.

The weak point of the cluster is its marketing and PR, and it has not developed an image which it can employ generally. It has a logo and a website (although the website has not be refreshed for some time). The significance of this weakness is recognised within the cluster and in the future they intend to devote more attention to it. At present a publication introducing the cluster is in preparation.

The openness of the cluster is well demonstrated by the fact that they work together with other clusters – e.g. the Pharmagora Cluster; there are many links with several project

companies. One of the results of these fruitful connections is the Grass family of products: natural omega-3 rich unsaturated fatty acid milk and dairy products. There is also cooperation with the Pharmapolis Innovative Foodstuff Industries Cluster: members of the pharmaceutical cluster are able to carry out functional foodstuff clinical tests. The cooperation is reliable, since a clinically tested product is much more marketable and can be sold at a higher price and, what is more, is exportable.

In addition to innovative services, development of links is also feasible in other areas of the product range, for example with the Nagyvárad (Oradea) pharmaceutical industry where there are excellent factories producing basic ingredients. The cluster is also developing international links with Western European clusters, and has even acted as a mentor in some international research projects.

## **2. The structure of the cluster**

The main decision-making body of the cluster is the Cluster General Meeting<sup>102</sup>, set up by the cluster founders, which sits twice a year.

Founder members of the cluster:

- ABIOL Kft.
- Lipid Art Kft.
- BIOMER Kft.
- MEDISO Kft.
- Biosystems International Kft.
- MTA Szegedi Biológiai Kutatóközpont (MTA Szeged Biology Research Centre)
- BRAIN-X Kft.
- MTA ATOMKI
- CERA-MED Kft.
- OMNINVEST Kft.
- Debrecen University

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<sup>102</sup> It is surprising that TEVA, which, through its previous legal predecessor - Biogal Pharmaceuticals – has been operating for decades in Debrecen, did not wish to join the cluster, and so Richter became the flagship company. TEVA, one of the world's largest generic manufacturers of pharmaceuticals does not have a decision-making centre in Hungary, which might in part explain its absence. It might also be because as a global company it is able to make use of the advantages deriving from faster-operating authorities abroad – e.g. in Canada. Since authorisation takes one week in Canada, while it takes two months in Hungary, perhaps TEVA prefers to carry out its innovative R+D activities outside the framework of a Hungarian cluster.

- ONIX Nyomda Kft.
- DEOEC
- Önkormányzati Egészségügyi Holding Zrt. (Local Authority Health Affairs Holding)
- Debreceni Vagyonkezelő Zrt. (Debrecen Property Agency)
- PET-CT Kft.
- Hajdú-Bihar Megyei Kereskedelmi és Iparkamara (Hajdú-Bihar County Chamber of Commerce and Industry)
- Pharmapolis Debrecen Kft.
- HUNIKO Kft.
- PRS Kft.
- JSW Hungary Kft.
- Richter Gedeon Nyrt.
- Labexpert Kft.
- UD-Genomed Kft.
- Laser-Consult Kft.
- Vitadel Kft.

All members may take part in the general meeting, express opinions and have a say in the positions taken by the cluster. The Cluster General Meeting can be attended in person, or by electronic means. In between two meetings the professional direction of the cluster is provided by the cluster president, who is elected by the members of the general meeting. The cluster president is allowed to coordinate the cluster's strategic affairs individually. His or her task – when necessary supported by the Managerial Board sitting every quarter – is to take the necessary decisions between two general meetings. Contacts between the members outside the general meetings are typically maintained by telephone, e-mail or workshops.

The Managerial Board, with the authority of the Cluster General Meeting and within the framework of that authority, carries out the functions of the general meeting and expresses official opinions in between two Cluster General Meetings. The members of the Managerial Board are: the president of the cluster, the two vice presidents and the seven members of the SMEs and research institutes, as shown below:

<b>Name</b>	<b>Position</b>	<b>Company/Institution</b>
Erik Bogsch	cluster president	Richter Gedeon Nyrt.
Lajos Kósa	cluster vice president	Metropolitan County of Debrecen
Prof. Dr. László Vígh	cluster vice president	MTA Szeged Biology Research Centre
Prof. Dr. István Fábián	member	Debrecen University
Dr. János Gyarmati	member	HUNIKO Kft.
Dr. Péter Kovács	member	PRS Kft.
Dr. Zsolt Lampé	member	Pharmapolis Debrecen Kft.
Dr. József Mészáros	member	Debrecen Property Agency Zrt.
Dr. József Molnár	member	ATOMKI
Prof. Dr. Zoltán Szilvássy	member	CERA-MED Kft.
Dr. Tamás Pázmány	standing invited representative	Richter Gedeon Nyrt.

At first glance ATOMKI (Debrecen's Atomic Research Institute) seems the odd one out in the cluster. Why have a nuclear research unit in a pharmaceutical industry cluster? ATOMKI has exceptionally up-to-date imaging equipment, the medicinal uses of which have so far not been fully exploited. Agreement and subsequent cooperation between physicists and doctors have resulted in the establishment of one of the focal points of the cluster: pre-clinical imaging technology in the pharmaceutical industry and functional and molecular imaging.

### **3. Regulations concerning entry to the cluster**

Criteria for entry:

- The area of a potential partner's activities should be closely linked to the focal area of the Pharmapolis Innovative Pharmaceutical Industry Cluster,
- The potential partner should prepare a professional programme showing planned cooperation with cluster members,
- The potential partner's professional-business objectives should be in harmony with those of the cluster,
- Following agreement a declaration of entry to the cluster will be signed.

The process of entry:

1. The intention of joining the Pharmapolis Innovative Pharmaceutical Industry Cluster (PIGYK) and the professional programme should be sent in writing to Pharmapolis Klaszter Kft.
2. The director of Pharmapolis Klaszter Kft. will send to the organisation wishing to join a document entitled "Introductory Form for Those Intending to Join".
3. The organisation wishing to join must collect supporting written recommendations from three current cluster members.
4. The organisation wishing to join sends the document entitled "Introductory Form for Those Intending to Join" together with the written recommendations from the three cluster members.
5. The preparation of the decision concerning the document submitted is the task of the specialist directors – bearing in mind the interests of the cluster. The specialist directors prepare a written summary for the cluster manager so that he/she can present the prospective member's intention to join at the meeting of the ruling specialist body (the Managerial Board).

6. The ruling specialist body of the PIGYK, on the basis of the presentation made by the cluster manager, decides whether the prospective member can initially take part in the work of the Hungarian Pharmaceutical Industry Platform, and should be invited to other 'open' sessions, workshops and events organised by the PIGYK ('live membership').

7. The Managerial Board of the PIGYK cluster will inform itself four times a year regarding the activities of the prospective member and on this basis will decide on whether it should be admitted to the cluster.

8. Companies considered active will become cluster members with full rights following the company signing the so-called signature clause of the PIGYK cluster's contract governing operational regulations.

The cluster manager is also the chief secretary of the Chamber of Commerce and in addition one of the Hungarian members of Enterprise Europe Network, a position which enables the cluster to make excellent use of a network of relationships linking several organisations.

It is thus clear that there are strict entry requirements. It is important that membership is approached from a value-added perspective: the essence is not that the member can bring profit, but that it carries forward the cluster's work, in areas for which the map of competencies has not yet been fully filled out by the cluster's regulatory framework. Since its foundation three companies have been admitted, and one has been forced to leave (as a result of the prohibition on membership of two clusters simultaneously); in sum the numbers are stable, and there is no problem with replacements

Despite its stability it would be hard to say the cluster has reached a critical mass. In Hungary there is no company which, for example, Richter considers an essential supplier, and so these products and services can be sourced from abroad. Domestically there should be these kinds of – typically developing – companies, but because of the serious barriers to entry (above all capital) they have not appeared.

#### ***4. Members' experience and the cluster's results***

First of all we will briefly introduce Cera-Med Kft., a company which deals with the innovative regeneration of generic pharmaceuticals, which was founded in 2005 in Debrecen and has been based in Balatonfüred since 2009. The company is a small pharmaceutical industry-biotechnology firm, whose main R+D activity is developing candidate pharmaceuticals from



endogenous molecules. Its technology is supported by decades of research work carried out by the universities of Szeged, Pécs and Debrecen. The technology it has developed makes it possible to deliver peptide and peptide type candidate pharmaceuticals orally.

The company's leading project is the development of a capsule containing insulin which can be delivered orally, which is currently at clinical phase II/a. The subject of the project is the development of a candidate medicine which has exceptionally high market potential, which is one of the scientific fields of the Debrecen University Regional Knowledge Centre. In this way the results of the project can open the way to a new developmental direction which will result in the development of a medicine which is similar to a currently available orally-taken product, but which is expected to have greater strength. Both in its significance for medical practice and in its price range (taking into account the preliminary analyses of the manufacturing technology involved) it will represent a significant improvement on the currently available product. When the project objectives were declared there was already concrete interest and a declaration of intent to purchase from Richter, one of Hungary's largest pharmaceutical manufacturers.

Within the cluster, and within the project companies, in addition to oral insulin there is another safety-pharmacology project, which is aimed at providing a significant safety improvement by reducing the detrimental effects of candidate pharmaceuticals for heart and circulatory ailments. Another example is the development of a medicine against tinnitus. Some of the research, for example the diagnostics of safety pharmaceuticals, is carried out in the project companies financed by GOP 1.2.1, with a budget of almost 1 billion HUF. The financing of projects does not, however, involve the same scheme: one type is GOP-supported finance, another is a different type of tender, while another is financed without tendering. The research carried out in the cluster is basically not dependent on tender finance, since there is a significant level of commitment to continuing the research and also significant foreign and domestic demand. In this way the main role of the tenders is to help both research and research results to remain in Hungary.

It would also be appropriate to mention the second member, the university, which in its cooperation with the other members and above all, in the context of its work with companies operating in the market, has been forced to concentrate on aspects which previously it did not devote any significant attention to, such as deadlines, and the importance of keeping to them, and accepting the importance of quality control. The university is able to offer directly usable research results to the industry which has led to a closer, multi-level relationship between the pharmaceutical industry and university researchers. Specialists from companies

and the university are located at different positions on the pharmaceutical industry innovation chain and the creation of the vertical network led to the formation of the cluster. One can observe that the tag members build on each other's work, which means that one is not able to advance if the other does not complete their task within the appropriate time and at an appropriate quality. The role of the university consists in its ability to initiate a great amount of research simultaneously to investigate a question of basic importance. In order to make better use of the capacity at their disposal the Szeged-Debrecen innovation axis was created, and indeed, was essential: Szeged's background in the molecular biology, lipidomichia, and protein chemistry required for experiments in developing (candidate)pharmaceuticals was much stronger than Debrecen's. In this way the cluster provides space for the two cities' researchers, (small)businesses and universities to cooperate by providing a structure and network of a complementary character. The leading direction of effective co-operation is the creation of the focal areas already mentioned.

In terms of size the cluster's most active member is Richter. The interest shown by the company was well-founded since they found a systematically organised commercial, university and academic research network unique in Hungary. At the same time Richter offered the other members a significant purchasing market and created a stable supply network. It is a Hungarian company and its decision-making network is also based in Hungary, and as such it can provide a rapid and locally-based response to questions affecting the cluster compared to the other large multinational companies operating in Hungary. One of the most important results of the company's participation in the cluster was that the Pharmopolis Pharmaceutical Industry Park received 3 billion Forints of support, which is supplemented by a further 50% from the successful tender of the Economic Development Operative Programme support for innovation and technology parks.

The creation of a modern research base – a science park with an area of approximately 8,000m<sup>2</sup> – brings with it numerous advantages: incentivising domestic and international research teams, the creation of innovative pharmaceutical industry products and services, developing new research methods and providing an opportunity to adapt to international research and development experience. In addition it also offers scientific developments on a regional, national and international level, the chance to innovate, and to offer R+D products and services which are internationally competitive in the field of pharmaceuticals and biotechnology. The investment also contributes to job-creation and the safeguarding of existing jobs, improves the basic conditions for research and development, strengthens the innovative activities of the higher education sector, makes researchers' work and career structure more attractive, contributes to the reinforcement of the cooperation between

companies and institutions and to the ability to keep the intellectual capital of research and development in the local area and to the involvement of economic organisations directly in the exploitation of R+D results. It also strengthens Debrecen's regional central role as a 'pole city', and significantly contributes to the creation of a knowledge-based economy.

The Park's functions include the development laboratories: the safety-pharmacology laboratory complex, metabolic laboratory, circulatory pharmacology laboratory, and the injection-, pyrogene-free- and quality control operations and testing equipment linked to Richter's biotechnology operations. The ownership structure of the Pharmapolis Science Park Kft., which is the only one of its kind in Hungary consists of Richter, Debrecen Property Agency and, HBMKIK (Hajdú-Bihar Chamber of Commerce and Industry). The company lets out the laboratories, and several cluster members have located here. In effect this is the central infrastructure of the cluster.

In terms of the effect of the cluster on the profitability achieved by members in Richter's case it would be difficult to argue that its profitability could be significantly added to by a cluster which is relatively small compared to the company itself. For the SMEs in the cluster, however, without the cluster they would either not be able to have any access, or would not be able to gain such easy access, to the necessary infrastructure or orders. Another result of the cluster is that in cooperation with Richter, the project company PHARMATOM HUNGARIA Kft. has been created, as company developing medical diagnostic processes.

The pharmaceutical industry cluster can boast concrete grant application results, as detailed below:

Project title	Identifying number of project grant support
Development of anti-diabetic-effect candidate medicines from hidroxim acid	GOP-1.1.2-07/1-2008-0004  The programme is financed in the framework of the GOP-1.1.2 grant, with joint support from the European Union.
Development of short- and long-term-effect orally dosable insulin preparations	1.2.1-08 support for accredited innovation clusters

Project title	Identifying number of project grant support
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	The programme is financed in the framework of the GOP-1.2.1 grant, with joint support from the European Union.
Development of PET test showing HERG 1.2.1-08 support for accredited innovation channel connection for use in the medical clusters trial stage	The programme is financed in the framework of the GOP-1.2.1 grant, with joint support from the European Union.

In summary it can be said that the creation of project companies carrying out serious research work, the establishment of the Pharmapolis Pharmaceutical Industry Science Park, the building up of the Debrecen biotechnology site and numerous other currently operative research projects are undeniably linked to the cluster and would probably not have come to fruition in their present form without it. In addition to the logistical considerations the openness of the local government and the availability of high quality human resources did not only provide a justification for the investments, but gave them a firm footing to build on.

Comparing the two clusters it can be seen that in both cases great emphasis was placed on formalising the operation of the cluster, the regulation of membership, the triple helix cooperation and the research areas into which the project companies could be placed. Both clusters are stable and there has been no notable change in the membership, although in the food industry cluster there are several inactive members. It is also clear that the clusters have not had an effect on their members' export ability or export performance. The new products and patents, however, show that in both clusters worthwhile research and development are being conducted. The food industry cluster devotes more attention to marketing and PR, while the results achieved so far by the pharmaceutical industry cluster – especially regarding the high-value grants won and the investments made - can be considered much more significant.