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WHY SHOULD COMPANIES AND UNIVERSITIES CO-OPERATE IN R&D? – THE MARKETING FUNDAMENTALS

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Abstract

In our rapidly changing technological environment, universities of technology have been playing a different game from roughly the second half of the 20th century. Innovation policies of the developed countries assign special importance to university–industry relations, because both the scientific and the industrial domain can profit of such co-operation. Although the marketing tools are not yet integral parts of the Hungarian universities' management, a marketing approach to university R&D can support successful university–industry links. If we focus on the university's knowledge product (i.e. marketable university R&D), taking the marketing point of view it can provide an insight to understand why companies and universities should co-operate and harmonise their R&D actions. Market for the university's knowledge product is somewhat different as compared with ordinary product markets or the industrial market in general. Adopting customer orientation and using the tools provided by integrated marketing, the companies and the universities can equally harvest the fruits of co-operation. Findings of the present study are supported by empirical evidence from the Budapest University of Technology and Economics, but the conclusions are relevant and useful for facilitating any change management, which is now very important in Central and Eastern Europe.

Keywords: innovation, university–industry relations, marketing of R&D.

1. Increased Role of Universities in the Innovation Process

In the developed economies that follow a 'knowledge-based' development path, National Innovation Systems (NIS, see e.g. INZELT (1998)), which support knowledge production and diffusion accelerating technical-technological development, are being built. Universities are integral components in the NIS as they have an enhanced role in the following fields:

- *Education*: creative and highly qualified labour force is needed for the creation, dissemination and utilisation of innovation results,
- *Knowledge production*: universities have a substantive contribution as far as national R&D performance is concerned,
- *Knowledge flow*: by today, higher education institutions have become a 'multiplying factor' in technical-technological development due to their increasing portion in knowledge production.

2. Innovation Policy: a Different Focus

As a result of globalisation, fierce competition brought about different emphases in the Hungarian innovation policy as well. In innovation, university–industry links eventually started to become co-operative relationships along spontaneous processes (earlier, these relations were determined by the nature of the research and development activity: basic and applied research meant this determination). In the corporate sector, closer relations were stimulated by economic transition as well as the pressure of globalisation, shortening product life cycles, increasing risk of product development, etc. did not leave the small and open Hungarian economy untouched.

The company's advantage of using the university's knowledge product can be summarised as follows:

- providing sound information basis for technological and business decisions,
- providing scientific fundamentals for corporate developments,
- realising market and/or cost advantages by utilising the university's research results,
- outsourcing the first stage of research activity since this is the most critical phase as far as planning, financial and risk management are concerned.

3. The Role of Marketing in Knowledge Flow: the Example of TUB[1]

In Hungary, almost three-fourth of the research units are higher education institutions and forecast a further increase in their number.

The TUB is the largest technical research and development unit in Hungary: it has substantial R&D capacities as compared with other higher education institutions. In 1996, TUB was contracted for R&D by several business organisations (HUF 296 million), and international organisations (HUF 262 million) ranking first in Hungary as far as R&D contracts for higher education organisations are concerned (DÉVAI et al. (2000)).

Nowadays, according to corporate experience, business activity organised on a marketing philosophy basis is the key to market success. Marketing philosophy starts with a well-defined market, it concentrates on customer needs, it integrates all the activities that influence the customer, finally it makes profit by satisfying the customer needs (KOTLER (1998)). In the case of the university's knowledge product, successful presence on the market is also achieved by asserting the marketing approach: R&D activities should be organised in line with the marketing principles.

[1]Previously, the university had been termed Budapesti Műszaki Egyetem (Technical University of Budapest) or BME (TUB). Despite the new name, the old Hungarian and English abbreviations are still in use.

Table 1. Research units in higher education institutions (Hungary)

Year	Research units in higher education		Employees in higher education research units		Researchers in higher education research units	
	Total	*As a % of all research units*	Total[a)]	*As a % of all employees at research units*	Total[a)]	*As a % of all researchers at research units*
1990	940	*74.8*	8 843	*24.3*	5 204	*29.7*
1991	1 000	*79.6*	8 458	*28.8*	4 926	*34.0*
1192	1 071	*83.2*	7 917	*32.7*	4 754	*38.6*
1993	1 078	*78.1*	7 776	*34.4*	4 546	*38.5*
1994	1 106	*78.9*	7 611	*34.6*	4 589	*39.0*
1995	1 109	*76.9*	6 310	*32.2*	4 044	*38.5*
1996	1 120	*76.7*	6 558	*33.2*	3 857	*37.1*
1997	1 302	*77.5*	7 210	*34.7*	4 194	*37.6*
1998	1 335	*77.4*	7 561	*37.2*	4 398	*37.4*

a.) FTE: Full-Time Equivalent
Source: Felsőoktatás és felsőoktatási kutatás. Időszaki Közlemények. (Higher education and higher education research. Periodical publication.) Hungarian Central Statistical Office, 1999. Budapest, p. 15.

3.1. Market for the Knowledge Product

3.1.1. The Target Market Features

Given by its technological profile, the TUB's natural target market is 'the industry', within which, however, relationships of the faculties and departments are markedly sub-branch related. Its targeted market also explains the substantial role of TUB in Hungarian R&D: industry (especially the manufacturing industry) is a very important sector of the Hungarian economy as far as technological development and diffusion of scientific-technological achievements are concerned.

The potential market of the university knowledge product shows growth and restructuring:

- Hungarian industrial performance reached its nadir in 1993: since then it has been boosting, making its way in catching up to the level of developed economies,
- After the change of the regime, which accelerated structural changes in industry, market opportunities for the knowledge product of the different departments also turned to be different in line with the changes in the targeted user areas. While traditional R&D markets were being dismantled, new branches emerged and the researchers had to face new challenges (e.g. in telecommunication, especially mobile telecommunication).

For the sake of handling future market challenges of the university's R&D results, the traditional industry orientation should change and knowledge flow should intensify in the service domain as well. This slight market re-orientation can be justified by the substantial weight of the service sector in GDP (and this weight is expected to increase further).

3.1.2. Product/Market Strategies for Knowledge Flow

As it is well-known, marketing-oriented organisations do not simply approach the market from the product side, but they follow product/market strategies. Due to the changes in the economic environment, the potential development paths should also be analysed from the product/market strategy point of view in case of the university's R&D performance as well. The following market strategies are possible for university R&D:

- *Market exploitation*. The strategy of market exploitation means that the departments and university research units intensify their existing corporate relations based on the existing knowledge base and on the earlier successful R&D co-operations. When the sales of routine technical services (measurement, testing, quality control), consulting, further training, etc. increase, it refers to the existence of the market exploitation strategy.
- *Product development*. The strategy of product development means the purposeful dissemination of new knowledge elements and research results whereby the university–industry relation will follow an evolutionary development path.
- *Market development*. The market development strategy implies that researchers establish relationships with new market actors – Hungarian companies and multinational firms – and research results are channelled towards new areas and branches (e.g. services).
- *Diversification*. The risky strategy of diversification opens up the possibility also for the university to channel its R&D capacities to new directions and to new and so far unknown market actors. New challenges, however, can be tackled by the researchers only if they are adaptive and ready and able to deal with new topics that had not necessarily been close to their domain (i.e. their scientific-research activities) before.

3.2. Customer Orientation in Knowledge Production

3.2.1. Potential Customers: Demand Side of the Knowledge Product

After the change of the regime, traditional industrial relationships of the university were still linked to the large companies formerly owned by the state. Most of the industrial R&D contracts were taken to the university by the 'mature' generation.

Nevertheless, after economic restructuring and a shift in the researcher generation, the market of university R&D could not but had to face the changes as well. Nowadays, important actors of this market include:

- *Hungarian companies*. Most of the university's innovations pertaining to companies are related to the R&D activity of large firms, typically as a carry over of the co-operations with the companies formerly owned by the state. A weak point, however, is the sphere of small and medium sized enterprises (SMEs), which could not yet been reached by university R&D in a large enough amount.
- *Foreign companies, multinationals.* R&D related business policy of the multinational companies impose limitations on the relationship building possibilities of the university. Strategic co-operation based on mutual advantages becomes a reality only if the foreign company invests in R&D facilities in Hungary. If it is not possible, the university's R&D capacities are contracted to save costs or to avoid substantial risks while most of the time the university does not take its share from the profits and the researchers do not receive information on the foreign market career of the R&D results.

Building relations with Hungarian and foreign companies have impact on both company segments. Knowledge flow towards Hungarian companies strengthens the national innovation profile and it also stimulates the R&D investment of foreign companies. The reason is that the multinational companies often express their will to have a critical mass of intellectual capacity in the host country. Foreign investments in R&D affect the subcontractor positions of SMEs: such investments intensify local innovative pressures increasing the ability to adopt and domesticate external R&D results.

3.2.2. Customer Value in Knowledge Production: Supply Side of the Knowledge Product

Customer orientation means that the R&D activity originates from the company's innovation demand; and this is the case for university R&D as well. The starting point must be that the companies do not want to buy R&D results but they look for problem solving. Supply of the knowledge product is also considered by the companies from this viewpoint. There are many cases when important research results face indifference of the companies, because the potential customer firms do not observe or recognise the advantages pertaining to use or utilisation.

From a marketing approach, customer value comprises all the advantages that are expected by the customers from a given product or service. The customer sums up the total customer value from different components: product, services, personnel, image, etc. The university's knowledge product has the following components of customer value:

- *R&D results*. Chance and room for asserting customer orientation differ in the different types of research activities (which often have impact on one another):

  a.) *Basic research*: it is difficult to reveal the companies' direct interest. In the case of basic research customer orientation means that the research objectives should harmonise with the companies' strategic development plans, and the corporate sector should receive substantive information on the university's basic research and research results.

  b) *Applied research and experimental development*: customer orientation equals flexible and direct reaction to the company's problem. Alignment to the customer's requests in each and every stage of the innovation process.

- *Technical services*. There are different technical services of great importance in the knowledge product portfolio of TUB offered for the companies. These are activities that contribute to the quality or efficiency improvement of the company's product, service or technology. Examples of such services include education, further training, different control procedures (e.g. testing), advisory and consultation activities, quality control.

- *The researchers themselves*. An interesting attribute of university R&D is that the personality, expertise, acknowledgement and relations of a principal researcher play a decisive role in the innovative actions of a given department or research unit of the university. In many corporate relations of the university the 'capital of confidence' linked to individuals is the main component of customer value. This capital comprises wide scope of comprehension, professional experience, strategic approach, knowledge of the company, and as a result, informative-scientific reasoning for the development and expansion decisions.

- *University image*. The prestigious name of the university ('alma mater effect') and the university image are important factors of the customer value of the university knowledge product. For the other external relations of the company it sounds prestigious to refer to the university and this argument alone may increase the interest safeguarding ability of the company by enabling better bargaining positions.

- *Education*. Education is a non-profit use of the university's R&D results. Customer orientation makes its way if the university and the industry mutually enrich and positively influence each other: fundamentals of developing the methodology and content of training relate to real company practices whereas the business sector absorbs highly qualified labour force, which have been sufficiently and efficiently trained and which is open to solve practical problems. The customer value creation may also be directly manifested in education when PhD students choose their field of research in a domain that is useful for solving a problem at the company.

3.2.3. Building Mutually Advantageous Relations: Demand Meets Supply

The university professors share the view that the relationship of research and practice has come over the most critical period and there is a growing interest by the companies. Points of intersection for the renewing relations built along mutual interests are as follows:

- *Providing a scientific basis for company developments*. With the help of the university's knowledge base, product development can obtain a more sound base and competitiveness may improve by increasing the intellectual value added.
- *Helping the buying procedures*. By involving the university's knowledge product, the purchases of the company can be added a substantial technical and economic assistance. The companies obtain support to formulate expectations towards manufacturers while the scientific research base and reference to the university improve the bargaining positions against capital abundant companies.
- *Coming up to expectations towards suppliers*. Multinational companies have higher and higher development expectations from their partners and instead of small value added products they tend to request complex problem solving. Meeting this new type of demand requires complex knowledge on the suppliers' part so it appreciates building relations with universities.
- *Increasing the range of services for product support*. Quality of additional services (consulting, servicing) pertaining to products can rise and so can the company's competitiveness if it makes use of the university knowledge base (this has more relevance on industrial markets).
- *Providing sound information for decisions on development/growth*. University researchers collect targeted information in their domain and can also explore the development directions, the technological-scientific trends, new market opportunities, etc. Therefore, for development and growth plans, important supportive information can come from the university (this may have more relevance in the SME – university relations). With the help of information provision and consultation services, important links and strategic relationships may be built.
- *Influencing attitude and spreading knowledge*. University research often has an interdisciplinary approach, so the researchers can transfer integrated approach and complex knowledge to the companies ('opening the companies' mind'). If departments of more practical sciences are involved in the co-operation, market orientation may also be important beside technical parameters: the departments might have the chance of studying and interacting in the innovation process (from idea to commercialisation).
- *Outsourcing corporate R&D*. The first – and most critical from the point of view of risk management, financing and planning – stage of research activities is often outsourced to external research units: this seems to be a more and more important strategy of the (mostly) multinational companies. Recent

effort of the companies, which aim at building a background of researcher units, expands the potential market for university R&D. By establishing experimental labs, developing new procedures (e.g. simulation methods), etc. the university can become a complex external R&D facility for the mentioned companies.

- *Education and further training for company employees*. Training the employees and transferring knowledge directed for company needs are very important areas of knowledge flow towards the companies.

Companies go through a learning process and this is the 'common denominator' of potential advantages of incorporating the university's knowledge. Accumulated knowledge is the yield of this learning process, it helps the birth of innovations, makes the companies more responsive to adopting external R&D results and overall, accelerates the process of diffusion.

3.2.4. Factors Influencing the Building of Relations: the Company's View

- *Return on investment*. In Hungarian companies, the demand for knowledge products is focused on research results that offer instant problem solving and fast return on R&D expenditures, whereas on the supply side, R&D solutions often have long-term yields or even they may not coincide with the company's direct interest (e.g. research in environmental protection). Companies forced to attain higher and higher sales turnover emphasise short run profits and they are barely motivated by such advantages of the knowledge product like 'accumulated knowledge' or 'the widening scope of view'.
- *Relations with competitors*. The company's main influential factor – as far as its demand for the knowledge product is concerned – is the relationship with competitors. On markets, where there is a substantial, critical factor (KOTLER), companies have interest in incorporating the R&D results to the extent of their contribution to the factor concerned. The critical factor is often cost efficiency, whereby companies will consider innovation and technological development focusing on material, energy and labour force savings. On markets, where there are several critical factors, there is an opportunity to follow a marketing strategy of diversification.
- *Company performance*. The marked correlation between in-house innovation and company performance also appears in the building of external R&D relations. Flagship companies that focus on innovation for enhancing their competitiveness rely more often on external R&D results and are more active in obtaining the university knowledge product.
- *Resources*. Insufficient capital hampers the building of external R&D relations; especially at SMEs. The possible solution is well beyond the corporate sector itself: it requires the establishment of organisational structures that enable joint market and R&D actions, thus the sharing of development costs for SMEs.

- *The human factor*. Personal relationships have substantial impact on the university knowledge flow (the 'bridging' function). In successful innovation, ex-university researchers or ex-postgraduate students often act on behalf of the industrial partner. These people help the company to discover their interest and consider university R&D as a key factor to long term success. When we examined the projects of the Budapest University of Technology and Economics (TUB), we saw many examples when the researcher and the company expert together have been building a strategic R&D relation. Role of education aligning to the industry needs and doctorate studies pertaining to industry solutions needs to be stressed again.
- *R&D infrastructure*. It is very difficult to find a partner company that has a sufficient development infrastructure and technological background, and this fact is an important obstacle to the market utilisation and mass diffusion of the university R&D results. Even if the research is of great importance and a favourable business climate is anticipated, it happens that the innovation comes to a deadlock due to the absence of a suitable industrial partner (this way manufacturing and sales cannot be continued either).
- *Business culture*. In general, Hungarian companies do not have affiliation to the university knowledge product: there is no tradition and only a few previous examples of focusing corporate behaviour on long term relationship with the university.

3.3. Integrated Marketing

Integrated marketing means that the top management asserts customer orientation as a co-ordinating and integrating principle. In the case of university R&D this principle can be implemented in a two-tier hierarchy: with a 'market-friendly' R&D management that operates at top level in the interest of all faculties and with diverse marketing functions organised at the department's level being active in the supportive environment of the top management. At both levels, customer orientation of R&D should be manifested in being responsive to corporate demand and being able to attract new users for university R&D.

3.3.1. Customer Orientation in University Management

Integrated marketing requires the university management to pursue a proactive asset management as far as human and material factors of R&D are concerned. It is very important because the majority of university professors and researchers lacks affinity with the business world that should make use of the university knowledge product. Thus one cannot expect a breakthrough in the relationship building with the business sector if the relations develop bottom-up; there is a need for operating a supportive and stimulating environment.

Although the university management is committed to support the use of university R&D results in practice, until now there have been only a few measures launched in terms of communication, information provision and organisational development:

- *Information flow*. A comprehensive knowledge management facilitating organised and continuous channelling of R&D information is an inevitable precondition to accelerating knowledge flow between the top university management, the researchers and the companies. Both the underperforming internal university R&D relations and the companies' inadequate perception of the university's innovative performance can justify the necessity of allocating information in an efficient way.
- *Supportive network*. The current practice is that the researchers manage individually the sale of R&D results and they compete with each other for industrial contracts over the fence (this way the researchers consume too much of their time for facilitating something out of their scope of interest). A servicing network that supports enterprises should be established enabling joint efforts to solve problems pertaining to the sale of R&D results. The existence of such a network could convince the researchers to keep the above mentioned activities in-house.
- *Liaison office*. It seems to be reasonable to organise a group, whose members – as 'idea-brokers' – would concentrate on R&D market research and application whereby they would have an integrating function between the departments, research units and the business sector.
- *Strategic development approach*. The organisational forms of integrating the university's R&D activities along strategic targets should be elaborated. The present division of the faculties that also appears in the endowment with infrastructure should be overcome by a complex integrative approach in which the university formulates and supports the university's innovative actions pertaining to the R&D directions of strategic importance. Integrated approach is the clue to yield profit from the most important competitive advantage of the university: the concentrated presence of knowledge from different scientific and technological domains.
- *University image*. Customer orientation requires a new approach in the communication strategy as well. Instead of "welcoming the donations", the university should behave as a self-confident and self-conscious partner in the external relations making the business world aware that knowledge production is a mutual long-term interest.

3.3.2. Customer Oriented Management of the Departments

Customer orientation at the level of departments means the changing of the convenient, slowly reacting 'socialist' behaviour with a proactive manner initiating

actions towards the business sector. In order to facilitate this change, the professors and researchers must unambiguously accept market economic conditions and be able to map user demand better. In addition to the natural means of building relations (publications, conferences), the marketing tools for selling the knowledge product should also be elaborated and used with special focus on communication techniques.

The degree of customer orientation differs from department to department. The two extremes feature (1) departments that have no direct relationships with companies and conduct basic research almost exclusively, and (2) departments that are practice-oriented, have many company relations, and do not have basic research. Empirical studies (DÉVAI et al. (2000)) revealed that the departments' customer orientation is influenced mostly by the scientific domain, composition of subjects taught and existence and attributes of an industry-related atmosphere. Responsiveness to 'industrial' problems increases if industrial experts can be involved in education promoting the commingling of academic and industrial spirit.

4. Profit from Satisfying Customer Needs

4.1. A Break in the Innovation Chain

Marketing oriented companies strive for long term existence and long term yields; not a single, instant profit. When the university knowledge product is sold, there is a break between the following two stages of using the R&D results: users buy the university's R&D then – usually – a manufactured product is sold, but marketability of the research results (and thus obtaining revenues) gets out of the scope and responsibility of the university in the latter, second stage. The researchers do not obtain information on the practical use of the research results, which also implies that usually they do not receive royalty even if there is a market success. Obviously, poor business culture, the lack of affinity to conclude decent enforceable contracts and the missing experience all play an important role in the above phenomenon.

4.2. Customer Relationship Marketing in University R&D

The high level consumer satisfaction is an important prerequisite to the so-called relationship marketing, which is the road to long term profitability. Attracting the client's attention and keeping the customer are the stages of building customer relations.

Based on the general practice of marketing (KOTLER), the following levels of building customer relationships can be identified in the case of the university knowledge product:

- *Basic marketing*. R&D results are sold to the targeted companies.

- *Reactive marketing*. Companies make use of the R&D result and provide feedback on to what extent it has helped problem solving. Company feedback and experience from other industrial segments generate further questions to be solved thus promoting further R&D actions (including basic research if necessary).
- *Creative marketing*. University researchers call the companies' attention to the new R&D results and the new possibilities of solving the problem.

4.2.1. Attracting the Client's Attention

In the process of building customers for the knowledge product, the main direction of attracting attention is building confidence of the potential users, the so-called first customers (nonetheless, promoting interest of existing clients for the new R&D results is also understood here). Efficient communication is the key for attracting any kind of attention.

At the level of top university management, it must be emphasised that external communication should be based on a predetermined university identity promoting the researcher university image instead of spontaneous appearance.

At the level of departments, there is a need for a more marked external PR and efficient communication channels (positive examples include the more and more popular 'industrial days' and the active participation in professional organisations).

4.2.2. Keeping the Customer

Keeping the customer, which is manifested in repeated purchase, is attained via customer satisfaction – this is also the case for university R&D. Market success achieved by the company with the help of the university knowledge product stimulates the company to contract the university for R&D again. Further positive experience promotes higher level collaboration, and the university–industry relationship will eventually develop into a strategic co-operation based on mutual advantages. University researchers and their ideas give the companies further inspiration to make use of new R&D results, while relationship with companies that incorporate substantial external R&D is being transformed into an important constituent of developing university knowledge.

The evolutionary process of selling R&D ranges from attracting the client's attention to strategic co-operation. From this point of view, ad hoc contracts of smaller importance should not be looked down upon either, because they do not only add up to a more substantial amount in the end of the day, but they are also important building bricks of customer satisfaction, the road to strategic relationship.

5. Knowledge Flow at National Level

Having recognised the substantial role played by innovation and R&D in Hungary's competitiveness, the government's Széchenyi Plan targets that the Hungarian R&D expenditures attain 1.5% of GDP by 2002, and this figure remains 2% in the long run (SZEGŐ (2000)). In order to accomplish this objective, the Széchenyi Plan assigns special importance to university–industry relations and to help the development of a supporting infrastructure and institutional framework.

The practice of developed economies offers a wide range of tools that can accelerate knowledge flow. Different financial means, e.g. the tax allowance of R&D purchased from universities or other external research units can be mentioned. Different organisations and institutions or some non-budgetary incentives can also play an important role in integrating research and corporate innovation. From the point of view of employment policy, strengthening the mobility between universities and industry can also enhance knowledge flow.

University researchers can expect that the government's supportive measures may help to increase the companies' will to innovate and responsiveness to new scientific-technological advancements. This anticipated process will enlarge the potential market of the university knowledge product posing new challenge at the researchers. The university must profit from these opportunities: it is now more than reasonable to settle university R&D on marketing fundamentals.

References

[1] A tudásalapú gazdaság felé. . . (Towards a Knowledge-Based Economy. . .), edited by Dévai, K. *Compilation of Lectures Held at TUB on the 27th October*, 2000. Műegyetemi Kiadó, Budapest.

[2] BITTNER, P., Testet öltött tudás, avagy a K+F és a marketing (Embodied Knowledge or R&D and Marketing). *Marketing menedzsment*, **4** (2000).

[3] DÉVAI, K. – KERÉKGYÁRTÓ, GY. – PAPANEK, G. – BORSI, B., *Az egyetemi K+F szerepe az innovációs folyamatokban. A Budapesti Műszaki és Gazdaságtudományi Egyetem példája*. (The Role of University R&D in Innovation Processes. Example of the Budapest University of Technology and Economics) Ministry of Education, 2000.

[4] DRUCKER, P. F., The Discipline of Innovation. *Harvard Business Review*, November-December, 1998.

[5] INZELT, A. (ed.), *Bevezetés az innovációmenedzsmentbe*. (Introductory Innovation Management). Műszaki Könyvkiadó, 1998.

[6] KISS, J., Az innováció szerepe a hazai vállalatok versenyképességében (The Role of Innovation in the Competitiveness of Hungarian Companies). *Vezetéstudomány*, **2** (2001).

[7] KOTLER, P., *Marketing Menedzsment*. Műszaki Könyvkiadó, 1998.

[8] LAJOS, T., Műegyetem 2010 – Egy stratégia alternatívái (Technical University 2001 – Alternatives to a Strategy). *Magyar Felsőoktatás*, **8** (1999).

[9] LEVER, Jr. – WILLIAM, O., Selling and Marketing of R&D. *Research Technology Management*, July-August, 1997.

[10] PAPANEK, G., A gyors fejlődés útja: a tudás fokozott megbecsülése (Road to Faster Development: Raising Public Awareness of Knowledge). *Vezetéstudomány*, **1** (2000).

[11] SZEGŐ, SZ. (ed.), *Innováció – Törvényi keretek – Működési struktúrák* (Innovation, Legal Framework, Operating Structures). STRATEK. December, 2000.