



**The role of universities:
from ICT research to successful
product innovation, a benchmark of
university research and innovation
policies**

Prof. Dr. László Pap

Department of Telecommunications, Faculty
of Electrical Engineering and Informatics,
BUTE

Budapest

21. October 2005

Traditional mission of a university

- **Based on strong primary training**
 - High quality education on wide-base professional areas
 - High level research and development
 - Elite-training
 - Flexible curricula based on the demand of the industry and the society
- **Harmony between the theory and practice**
 - Practical education based on high level theoretical background and industrial relationships

Global change of the role of the traditional universities

- **New effects in the development of the traditional universities**

Increasing number of students

Diversification of the content of the curricula

Life-long education

Competition of the universities

New information technologies

New quality measures

New cooperation methods with the industry

Fast changes in the content of the curricula

New directions in the development of the universities

- **New directions**

- Professional management

- New financing strategies

- The diversification of the financing resources

- General change of the evaluation system

- New measures of the quality

- New role of the public strategy of the universities

- New structure of the industrial cooperation

- Professional business plans of the universities

Recommendation of the OECD

- **The new strategy must cover the following items:**
 - Regional development of the industry
 - Cooperation strategy with the local industry
 - Incubation program
 - Fund raising program
 - Participation in local and national economical development
 - Innovation strategy
- **The OECD recommends to increase the role of the high education in the regional development**

The importance of utilization of the R&D results

- **Obtaining new financial resources by using the intellectual products, raising the prestige of the University**
- **Large value added content of the products: increasing the competitiveness of the economy**
- **Developing qualified new jobs at the industry**

Historical background in Hungary

- **Traditions, existing up to now**

Prestige of the scientific research (Nobel price winners)

Separation of the basic and applied research, low level of practical applications

Dominant state budget financial support or obligatory financial support of the companies

- **Special situation of the Hungarian industry before 1990**

No high-tech circumstances (COCOM-COMECON)

No demand of the innovation and research

The research is the hobby of the research fellows

The Hungarian results were published and used in international forums

Historical background in Hungary

- **Basic model before 1990**

The Hungarian research fellow was competing with the international colleges

A basic research fellow was isolated (one research theme-one person)

An applied research fellow was working on routine industrial development

- **No culture of entrepreneurial skill**
- **No venture capital**
- **The majority of the Hungarian patents were used for compensating the employees of a company**

Heritage and changes

- **High prestige of the scientific research**
- **Global research world**
- **The separation of the basic and applied research**
- **Centralized financial support of the research**
- **Special situation of the Hungarian industry after 1990**

Few foreign innovative investment in Hungary

Few local innovative investment in Hungary

Small local demand for research

The Hungarian results are published and used in international forums

Heritage and changes

- **Basic model after 1990**

The Hungarian research fellow is competing with the international colleges

Few local application of the local research results, but increasing

Increasing the value added intellectual results

Weak legal background for the intellectual property rights

- **No culture of entrepreneurial skill**

- **Few patient venture capital**

- **The majority of the Hungarian patents are used abroad**

Actual situation at the Budapest University of Technology and Economics

- **Traditional functions**

- Good cooperation with the local industry
- High level research and technological development
- Harmony between the theoretical and practical education, laboratory-oriented education programs
- Internationally accepted diploma
- Increasing number of students
- Strong scientific schools and PhD programs
- Project-oriented industrial cooperation
- Financial outsourcing

Actual situation at the Budapest University of Technology and Economics

- **New functions**

Good cooperation with the local and international subsidiaries of the multinational companies

Common research and developing laboratories supported by the local and international companies

Being attractive for new investment in the country by producing well qualified engineers

Participation in national and international research programs

New education program in the management science

New tasks and goals of the BUTE

- **New tasks and goals:**

Supporting the innovation by new organization structure:

Incubation and intellectual resources office

Technology transfer office

Fund raising office

Marketing office

Technological implementation (industrial park)

Strategy plans of industrial cooperation and development

General problems at the BUTE

- **Venture “patient” capital**
- **Limited human resource of the university**
 - Low salaries
 - Slowly developing carrier
 - Uncertain future
 - Strong concurrency of the industry
- **Weak traditions in developing spin-off companies**

New impacts on the University

- **Decline of the normative financing system**
- **Decrease of the number of students (demographic problem), competition of the high education institutions for the students (new BSc-MSc system)**
- **New balance between education and R&D activity: free intellectual capacity for innovation and research**
- **Mutual interest of the high education and the industry**
- **Increasing the attractiveness of the jobs at the University, hiring young staff members**

The characteristics of the R&D in recent years

- **Financing mainly on public funds**
- **Weak market demand, few industrial contracts**
- **More supplementary development and adaptation, than real R&D**
- **Unpracticed research fellows in marketing and innovation**
- **Mistrust against the innovation management**
- **Conflict between the academic and innovation values**
- **Unregulated ownership of the intellectual properties developed by the staff members of the University**

Methods in organization of research and development

- **Resources of the research projects**

- Personal initiatives

- National tenders (OTKA, NKFP, FKFP, IKTA, OMFB, etc.)

- Project-based industrial cooperation

- Research funds supported by the industry (ETIK, MIK, new innovation fund)

- Common laboratories with industrial companies (HSN, RTD, NOKIA, etc.)

- EU research and developing tenders (INCO-Copernicus, framework programs, center of excellencies, etc.)

- Bilateral international cooperation (TÉT, etc.)

Positive examples at the BUTE

- **Common laboratories with the industry**
- **Research and developing activity in cooperation with**
 - The telecommunication developing companies and service providers
 - IT developing and service provider companies
 - Software developing companies
 - Small and medium size enterprises
- **Close contact with the new innovation parks**
- **New innovation centers at the University**

Methods in organization of research and development

- **Good examples**

HSN Laboratory

The initiative the Ericsson in Hungary

Developing a common laboratory at the BUTE

Organizing a research and developing center in Hungary

Bridge between the Ericsson Hungary and the University
(research task for the University, human resource for the Ericsson)

Relative large financial support for the University

Many Ph.D. students, scholarships

Strong scientific research groups, high level presentations

International respect

Stability during the recession

Flexible change of the strategic conception

Methods in organization of research and development

- **Good examples**

ETIK-KKK

A legal personality founded by industrial partners

Two universities, more departments and scientific research groups are involved

Membership fee from the industrial partners and governmental support via tender

Research problems from the industrial partners

Inner tender system to obtain the research fund

Publications, presentations, centralized qualification, virtual laboratory system

Common use of the results, pre-competitive research

Inner rules for the every day activity, board of the leaders, legally precise organization

Methods in organization of research and development

- **Good examples**

Mobile Innovation Center

Supports **research and development** of beyond third generation mobile systems

Supports **introduction** of 3G/4G **mobile technologies and services, testing** in an independent environment

Stimulates development and application on the field, will be developing start-up companies

Provides experimental field to universities and industrial companies, small- and medium size enterprises for close research-development co-operation

Methods in organization of research and development

- **BME – Department of Telecommunications (coordination)**
- **BME – Department of Automation and Applied Informatics**
- **BME – Department of Broadband Infocommunications and Electromagnetic Theory**
- **BME – Department of Sociology and Communication**
- **BME – Department of Telecommunication and Mediainformatics**
- **ELTE – Department of Operations Research**
- **Ericsson Hungary Ltd.**
- **Hewlett-Packard Hungary Ltd.**
- **Magyar Telekom, Hungarian Telecommunications Company Co.**
- **Nokia Hungary Ltd.**
- **Pannon GSM Távközlési Rt.**
- **PPKE – Faculty of Information Technology**
- **Siemens PSE Program and System Developing Ltd.**
- **Siemens Rt.**
- **Sun Microsystems Ltd.**
- **Research Institute of Computer Techniques and Automation**
- **T-Mobile Hungary Co**

Methods in organization of research and development

- The Mobile Innovation Center is an institution built up on the **basis on university knowledge and the existing industrial background**
 - Dealing with research and development of wireless communication technology of the future (3G/4G) and
 - Has up-to-date wireless communication environment and testbed for development and testing of the newest mobile applications.
 - Strives for becoming a regional research and development center in Hungary in its field of profession, and to stimulate settling of international “high-tech” companies to invest capital in our country.
 - Thus, the Center contributes to general improvement of technology level of the country, creation of new jobs and in general to development of economy of Hungary.

Methods in organization of research and development

- **Good examples**

Research centers founded by the University

INNOTECH, innovation park (common ownership of the University and the state, incubation tasks, project based activity)

Center of Information Technology (governmental and industrial resources, large projects, good industrial relationships)

Information Society Research Institute (national research network)

Center for Cognitive Science (large international financial resources)

Biomechanical Research Center (concentration of the inner human resources of the University)

Different levels of the innovation chain

- **Pre-incubation: search for marketable ideas**
- **Preparation of the innovation: patenting R&D results, market research, business plan**
- **Technology transfer:**
 - Selling the patents
 - Supporting the establishment of spin-off companies
 - Involving the venture capital, founding joint venture companies

New requirements and new approach

- **Deep, strong and stable relationship between the industry and the University**
- **New financial interest of the researchers in the R&D activity**
- **Increasing the trust in the innovation management**
- **Better sharing of the responsibilities between researchers and managers**
- **Exact and transparent handling of the financial funds (between researchers, University and the innovation management)**
- **New performance measures of the researcher and professors in the innovation activity**
- **Developing an innovation-friendly environment at the University**

Tasks of the innovation management

- **Monitoring of the R&D capacity of the University**
- **Database on the new marketable ideas, research results of the departments**
- **Marketing**
- **Demand assessment, creating new industrial relationships**
- **Supporting the whole innovation process**

Activities of the innovation organization

- **Direct activities:**

- Ideas, database of the results

- Creating new industrial relationships

- Marketing

- Supporting the disposal

- **Indirect activities, support, coordination:**

- Patenting

- Establishment of spin-off companies

- Disposal alternatives, business planning

Structure of the innovation organization

- **Permanent management of 6-8 members**
- **Dynamic human resource allocation:**
 - Innovation agent of the department
 - Outsourcing some innovation expertise (business, legal, marketing)
- **Innovation-supporting circumstances**
- **Strong control of financing**
- **Requirements, prestige and transparent interest system**

Role of the professors and the students

- **Role of the professors**

- Management of the project

- Consulting of the students

- Common publications with the students

- Organization

- **Role of the students**

- Active participation in the research work

- Activity in the scientific publication (TDK)

- Special tasks for the Ph.D. students (research, publication, consultation of the undergraduate students, participation in the project, etc.)

- Part-time job in industrial companies

Financing and indicators

- **In the first 3-5 years, 200-500 MHUF/year, public resource**
- **After 3-5 years (gradually) this decreases to 50%**
- **Later: EU resources, own incomes, private resources**
- **Measures of efficiency, indicators:**
 - Number of patents/year
 - Number of sold results/year
 - Number of spin-off companies/year

Financing of the research work

- **Types of the financial resources**

Inner resources of the University

National science foundation

National industrial support

Industrial projects

Financial resources of the Hungarian Academy of Sciences

EU tenders

Projects supported by international companies

Resources of the bilateral cooperation

Other resources (state budget, tenders, etc.)



Thank you for your attention