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Strategic Responses of Hospitals in Hungary to the Changing Environment in the Early 21st Century

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Ph.D. Thesis

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Definitions

Acute care hospitals	Hospitals that provide short-term care
Accreditation	Quality assurance system based on process quality indicators and other parameters
Bailout	In case of financial (liquidity) crisis and huge deficit of an organization, an external organization gives financial help.
Budget impact	Analysis of effect on public spending due to the introduction of certain health technology
CDM	Chronic Disease Management programme
CMI	Case Mix Index – This index is widely used to measure the composition of short-term care hospitals' performance based on DRGs system.
Continuum of Care	Management of patient care, patient path throughout the different levels of health care system that results the continuity of care
Core competence	Factors, key characteristics and knowledge that define the competitiveness of organizations
DEA	Data Envelopment Analysis, nonparametric statistical method that compares the effectiveness of organizations. It is based on benchmark data as a percentage of the data of most effective organizations.
DRGs	Diagnosis-Related Groups – It is a grouping system of hospital cases based on the homogeneity of patient's diagnoses and received treatments considering the relative costs of these groups to the average of cases.
EBM	Evidence Based Medicine
EB Health Policy	Evidence Based Health Policy
Economies of scale	Economies of scale refers to the decreased per unit cost as output increases. The initial investment of capital is diffused over an increasing number of units of output, and therefore, the marginal cost of producing a good or service is less than the average total cost per unit.
Economies of scope	Economies of scope are changes in average costs because of changes in the mix of output between two or more products. This refers to the potential cost savings from joint production – even if the products are not directly related to each other.
Rule of guaranty	The rule of guarantee is applied in the DRG (HDG) based hospital financing to encourage the effective and definitive care. According to the rule of guarantee within a certain period after the discharge of the patient the hospital costs are not reimbursed by the insurance fund in case of readmission. The guarantee period is different for different DRGs (HDGs).
German score system	Activity based financing (reimbursement) system that is widely used for outpatient secondary care, for specialists. Each activity or treatment has an announced point/score that is multiplied by the point/score value defined by the insurance. The origin of the Hungarian activity based outpatient financing model came from Germany.
HDG	Homogenous Disease Groups – This is an adapted DRG version to Hungarian environment that has been used for measuring financing and performance of short-term hospitals since 1993.
HR	Human Resources of an institution, health care provider
HRD	Human Resource Development
Health Impact	Health Impact analysis – that is widely used before the public financing of a new health technology to measure the expected health impact, effect on the population to be served.
HTA	Health Technology Assessment
IPUs	Integrated Care Units – These integrated care units put the patients in the focus of care.

Long term care	In Hungarian environment it includes the chronic in-patient care, rehabilitation and nursing homes.
LOS **ALOS**	Length of Stay – the duration of hospitalization from the admission to the discharge. Average Length of Stay
NHIFA	Ministry of Health in Hungary
Normative day	National Health Insurance Fund Administration was established in 1993 to handle the budget of the Health Insurance Fund in Hungary.
Lower trimpoint	Normative day – Each DRG or HDG has a published length of stay that is formulated by the generally accepted protocols by relevant health professionals and/or traditionally calculated hospital duration.
Upper trimpoint	Maximal length of stay, maximum number of nursing days in short term care. Above this limit the NHIFA reimburses a minimal daily fee, in the international literature this type of long hospital cases are called day-outliers.
Relative weight	In the DRGs or HDGs system the relative weights expresses the relative resource needs for each diagnoses groups to the average.
Base rate	The average financial fee for hospital discharged cases. The final reimbursement of hospital cost equals base rate is multiplied by relative weight of a certain DRG in the Hungarian health care system.
Managed care	Management of different level of health services, it can be different types of health care organizations. Main types are Health Maintenance Organization, Preferred Provider Organizations, Point of Service in USA.
PPS	Prospective Payment System - This is a financial scheme (reimbursement method) based on defined financial fees in advance. This terminology comes from the US Medicare DRG system.
Priority setting	Creating an order or a rank among the possible interventions in health policy
PVL	Performance Volume Limit – PVL was introduced to limit the reimbursed weights numbers and cases in short-term hospital care. In PVL system each hospital has a yearly PVL divided into seasonally adjusted monthly parts. Above the defined limit by the Health Insurance Fund the
Risk adjusted capitation	Capitation payment adjusted by different demographic, epidemiological, socio-economic factors or diagnostic characteristic of the population.
Risk sharing	The share of financial risk between purchasers and providers of health care.
Soft budget constraint - SBC	Refinancing if loss-making organizations, An organization's budget constraint can be said to be soft if the organization expects that financial difficulties will lead to bail out rather than liquidation or closure.
Stakeholders	Important organizations, influential persons who can affect the planning and the implementation of organizational strategy.
Strategic choice	Theory of John Child that observes the possible strategic responses to changing environmental factors.
Strategic map	Special figure of organizational strategic plan that shows the main strategic objectives and options and the relationship between them.
SWOT	A strategic planning method used to evaluate the strengths, weaknesses, opportunities, and threats involved in a project or in a business venture.
Teaching hospital	Secondary or tertiary level hospitals that have accreditation to participate in practical training of the medical professionals.
Technical efficiency	The organization is said to be technical efficient, if an increase in an output requires a decrease in at least one other output, or an increase in at least one input. Alternatively, a reduction in any input must require an increase in at least one other input or a decrease in at least one output.
Yardstick competition	Yardstick competition is a regulatory scheme that rewards regulated firms on the basis of their performance as compared with the performance of similar firms in the same sector.
Vertical integration	The integration of different levels of health care organizations, in-patient, outpatient, primary care, home health care, etc.
Reduction of relative weights	The reduction of relative weights of all DRGS or HDGs by the NHIFA so that the average CMI is 1.

1 Introduction

1.1 Subject matter

The subject matter under examination in this dissertation draft is centred on the hospital as a complex organisation. The range of hospitals examined is limited to public institutions which provide acute and short-term care (for a list of hospitals under examination, see Appendix 1.1). In case institutions of other types are discussed, these are indicated and named differently, such as long-term or chronic care hospitals, rehabilitation hospitals, hospices, private clinics providing one-day surgery, or private hospitals.

The hospital sector occupies a central place in Hungarian health care system. University hospitals and major hospitals function as technological centres where modern technology and the predominant part of medical specialists are concentrated. Their economic significance is well demonstrated by the fact that year by year the hospital sector in Hungary uses 33 to 35 per cent of public health care expenditure (OEP Évkönyv, 2006) and 1.8 to 2.2 per cent of the GDP (Appendix 1.2). In several country towns, the hospital is the largest employer with a staff of 600 to 1500.

Hungarian hospitals are examined in the dissertation draft with the methods of strategic management and health economics. The title refers to the theory of strategic choice, a part of contingency theory, which emerged as a major trend in the literature on strategic management and in scientific research owing to the activity of John Child (Child, 1972, 1997). Researches in contingency theory, including strategic choice, are focused on interconnections between the external environment and the internal conditions of the organisation as a context, as well as on the structural and functional attributes of the organisation. The basic assertion of the theory is that optimal organisational performance can only be achieved by choosing the right environment and the organisational and functional models consistent to it.

The examination of environmental factors is basically aimed to establish the changeable (turbulent or dynamic) or else stable character of the environment in which institutions operate; to take stock of the existing determinant factors; and to measure the speed and extent of changes that take place in them. The spheres of internal attributes of institutions under examination are: (1) ownership, (2) organisational size and

geographic area of operation, (3) character of technology employed, and (4) diversity of the service portfolio.

In my examinations, the protagonist of strategic choice is the hospital management (and ownership) at the mezzo level. In the circumstances of the hospital ownership structure in Hungary it is possible to find significant discrepancies between the owners and the hospital management about the delegation of decision making competences. As the delegation of decision making competences does not form part of the present thesis, I will not distinguish between owner or management in the analysis. I handle hospitals as separate entities and I aim to examine what responses the hospital sector in Hungary gives or can give to changes in determinant external and internal environmental factors, such as changes in demography, technology, regulation and financing. In the course of my analysis I explore possible options of managerial responses, typical environmental responses, profile and structural changes. As part of structural adaptations, beyond organisational structural changes in the narrow sense I also examine changes in the managerial toolbox. I conduct my examination by a comprehensive analysis of major tendencies in the entire sector, complementing it with detailed case studies of particular institutions. The application of the theory of strategic choice in the public hospital sector in Hungary differs in several aspects from that in the business sector, as the former comprises health-care institutions which provide public services and operate within a central regulatory and financing framework. The scope for strategic decision-making for hospital managements and owners is limited; they mostly adopt reactive strategies, and proactive strategies which may significantly influence regulation are rare.

1.2 The structure of the dissertation

After the Introduction, major external environmental factors bearing down on the operation of hospitals, trends in demography, regulation, financing and human resources are discussed in detail in Chapter 2.

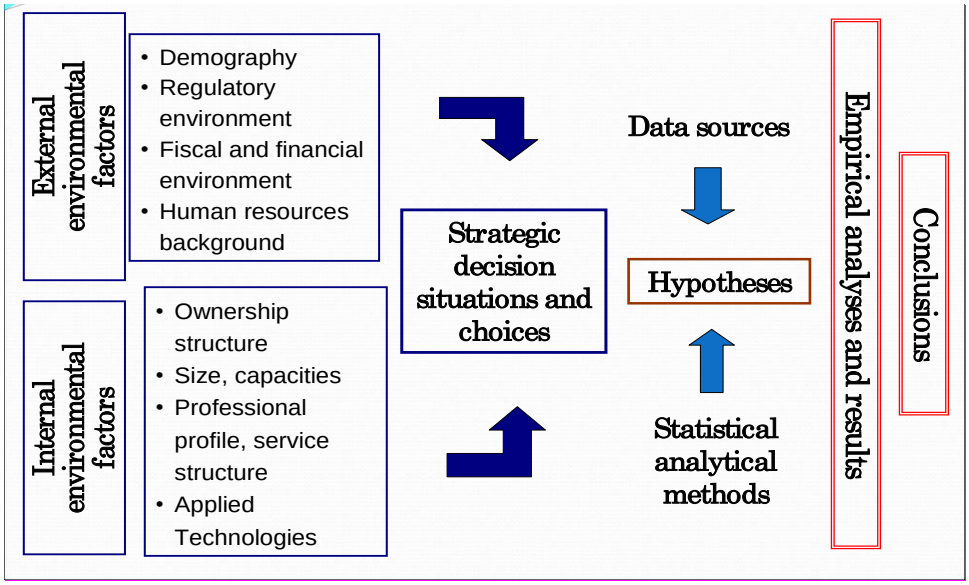
In Chapter 3, the internal factors at work in the operation of in-patient medical institutions, such as ownership, size and structure, technology and activity content, professional profile and forms of provision are surveyed. In Chapter 4, major dimensions of decision alternatives for hospital managements and owners as well as their typical responses are described.

In the first part of Chapter 5, I propose my hypotheses and describe dependent and independent variables which make up the basis for an empirical data analysis.

Indicators of the operational efficiency of hospitals and relevant variables (number of admissions, CMI, average length of stay, bed occupancy) are assessed. In the second part I take stock of the statistical analysis methods, firstly quantitative, which are used to explore aspects of hospital efficiency, the extent of soft budget constraint, the classification of hospitals and the prevalence of strategic options. In statistical analyses, simple descriptive methods, cluster analyses and non-parametric non-linear analysis (Data Envelopment Analysis - DEA) are used.

The structure of the thesis is illustrated by Chart 1.1.

1.1. Figure: The structure of the dissertation



In exploring the strategic adaptation practice of health-care institutions, I employ qualitative analysis methods by conducting and processing extensive interviews with managements and analysing data derived from institution development documents.

1.3 Limitations of the analysis of the hospital sector

The dissertation draft has several limitations. I test statistical analysis methods used internationally for the hospital sector in other countries (trend analysis, cluster analysis, multiple linear regression analysis, SBC calculus of probabilities, strategic maps).

A detailed analysis of the effect strategic responses given by hospital managements make on performance is outside the scope of this work. Although in connection with the adaptative measures taken, I broach changes in the managerial toolbox, I do not examine their content elements in detail (e.g. controlling, HR, project management).

Evidence-based medicine is discussed only insofar as it is a substantiating method for evidence-based health policy.

Mainly because of limited sources of data, I do not deal with quality, quality indicators or the analysis of quality parameters in the dissertation, such as post-operative mortality rate, post-operative 30-day mortality rate, complications, revascularisation and re-admittance.

Human resources development is an important area of changes in the strategic environment, but for reasons of scope, only a sketchy description of its techniques and methods is included in this work. Problems of the human resources sector are indicated by describing certain basic tendencies, but no detailed exploration of health political and organisational solutions is undertaken.

In the analysis of strategic scope for action, some health care technologies as structure and some factors that have a bearing on the health care system (invasive cardiology, biological therapies in oncological care, ICT based services, tele-medicine) are merely listed. At the same time, this dissertation will not qualify as a health economic evaluation, since no itemised examination of the cost efficiency of the given health technologies is carried out.

1.4 Survey of literature, databases

An additional benefit of my research, I surveyed the literature and analyses on the efficiency, economies of scale, budgetary constraints and financial incentives of hospitals. I also examined the literature on strategic planning and management in hospitals (health-care institutions) and the practice and potential of their application in Hungary. I processed a wide range of international and domestic literature and relevant publications on the changes in the Hungarian hospital sector, on the operation of hospitals, and on changes in the financing mechanism of hospitals.

I carried out searches for trade literature in the data bases of EBSCO and Google Scholar from July to December, 2009. Both data bases provide fairly complex and wide-ranging searches. EBSCO data basis are: CINAHL, MEDLINE, Health Source: Nursing/Academic Edition. In Google Scholar, main keywords entered were: hospital, efficiency, strategy. Searches were limited by the fact that no systematic searches in literature are possible in these subjects (as opposed to searches in subjects related to health economics [disease, technology]).

My searches in literature were grouped around the following four main subject targets:

1. systems of incentives to increase hospital efficiency in use in various countries;

2. measurements of economies of scale and choice in the hospital sector (the search was restricted to studies using DEA analysis in efficiency measurement);
3. soft budget constraint; ways of examinations for the analysis of soft budget constraints in hospitals;
4. the role of management in hospital efficiency; measures taken by managements for the purpose of long-term, successful accommodation to changing environment.

The search entries, their combinations, and the number of search results are shown in the table below. In certain search combinations, the number of 'raw' results significantly surpassed the number of studies relevant to the dissertation, as often the range of studies in the list of results did not overlap the narrowed subject matter of my dissertation.

1.1. Table Strategy of searches in literature

Data bases	Entries	Relevant literature
Ebsco **Google Scholar**	hospital AND efficiency AND incentives	47
Ebsco **Google Scholar**	hospital AND efficiency AND (economic OR economics) AND scope AND („data envelopment analysis" OR DEA)	32
Ebsco **Google Scholar**	„Soft budget constrain" AND hospital	8
Ebsco **Google Scholar**	hospital AND efficiency AND economics AND strategic AND management	28

Processing the full range of international literature on hospital sectors and the analysis of their operation and efficiency would naturally have posed an impossible task in the scope of a dissertation. Therefore, in processing relevant studies and analyses, I concentrated on collecting and systematizing essential information on the following topics:

- theories on which data analyses are based;
- data bases used;
- groups of data under analysis and variables derived from them;
- size (and period) of samples processed;
- statistical method(s) employed in data analysis.

By a systematic processing of the information gained, I aimed to establish which theories offer an adequate background to, and what kinds of data are needed for, an

analysis of the efficiency of Hungarian hospitals and changes in the Hungarian hospital sector.

Parallel to that, I examined what kinds of data best characterize the hospital sector in Hungary; what kinds of data bases and other sources on the capacity, professional structure and financing of hospitals are available for conducting a scientific research, for analysing domestic statistical data, for empirical analyses and for the domestic adaptation of models used elsewhere in the world (see Subchapter 5.2). I made a systematic survey of the potential variables which can be derived from domestic financing and statistical data and put to use in economical analysis. The information and data sources of the dissertation draft also include the results of researches and professional studies I have conducted at an institutional level, together with their background materials.

2 Analysis of External Environmental Factors

Any analysis of the strategic scope for action available to particular hospitals must be preceded by a wide-ranging analysis of the strategic environment of the entire hospital sector in Hungary. The analysis of external environment is aimed to diagnose determinative macro-economical and social trends and to explore the potential and the threats posed by a competitive environment, which bears down on how institutions function. In their book *Strategic and Competitive Analysis* (Craig and Babette, 2004), Craig and Babette devote a separate chapter to sector analysis, while López and Martín deal with the general, specific and internal environment of enterprises in three chapters in their textbook for enterprises on strategic management (López and Martín, 2006).

In strategic analysis, two segments of the external environment are generally differentiated – general and specific environments (López and Martín, 2006). The analysis of the **general external environment** of enterprises is usually carried out in four areas – social, political–legislative (regulatory), financial–economic, and technological environments (Porter, 1980). Economic analysts account for the (competitive) market, the clientele and competitors as **specific environmental factors** (Mauri i Saunté, 1998). In the literature on strategic management, Porter points to five determinative factors (5 forces) which bear down on business and company strategy implementation: threat of existing competitors and new entrants, bargaining skills of suppliers and consumers, and threat of substitute products (Porter, 1980). Jakab and co-authors analyse four external environmental factors at work in the structural transformation of hospitals in Central and East European countries: owners, purchaser(s), government (regulation), and consumers (patients) (Jakab, Preker, Harding, 2002, p. 180).

Competitive environment is less determinative in the Hungarian hospital sector, as competition is limited (targeting mostly funding and investment resources). Therefore I treat such factors as part of the general environmental dimensions, rather than examining the specific competitive environment (see Table 2.1).

Changes in the general environmental factors in the last ten years can be identified as

- demographic changes; economic situation of the country; changes in GDP: years of growth, stagnation and recession;
- political course; changes in governments and local governments;

– frequent changes in taxes and para-fiscal contributions (VAT, personal income tax, social insurance contribution);
– changes in labour; impact of manpower directives; labour migration within Europe;
– EU accession; EU law harmonisation; development potential gained from EU Structural Funds; and lastly a 'dampener' – the convergence programme;
– fast development and partial spread of technology in diagnostics, laser, biological, IT and communication technologies.

Among specific environmental factor changes for public hospitals are changes in mortality and morbidity rates, disease patterns, public health expenditure, capacity and admittance regulation, frequent changes in the funding mechanism, regulation of duty hours, regulation of minimum conditions and procedures, and the fast development of health-care technologies and their spread in Hungary (e.g. non-invasive and minimal invasive therapies, biology-based medicinal therapies).

2.1. Table Collation of the environmental factors of business organisations with specific factors in the hospital sector

Environmental factors of business organisations	Collation of specific environmental factors in hospital sector
social, demand, clientele	demographic trends, proportion of old-age population, mortality rate, leading causes of death, morbidity rate (incidence), number and prevalence of chronic patients
political, regulatory–legislative environment	range of hospital owners (ministries, municipal and county local governments) and their political affiliations; regulation of capacity and minimum conditions, accreditation, liability insurance, eligibility; regulation of insurant legal relations, specifications of insurance package, medical professional rules, protocols, directives)
economic, financial environment	rate of public financing, change in its real value, character of social security financing and frequency of changes in it, rate and character of private financing
technological environment	development of health-care technology, possibilities of diagnostics and therapy, development of procedure techniques, pharmaceuticals – new active substances
human resources conditions	number and age structure of consultants, character of specialist qualifications (shortage of specialists), number, qualification and resources of other graduate and ancillary workers

In analysing the strategic operational environment of public hospitals, in this chapter I examine dimensions which partly differ from above factors of the market environment; namely, the environment of:

a) demography (changes in supply and demand, tendencies);
b) regulation (capacity, labour and professional protocols);
c) finance, (social insurance) financing, investments;

d) human resources and tendencies in them.

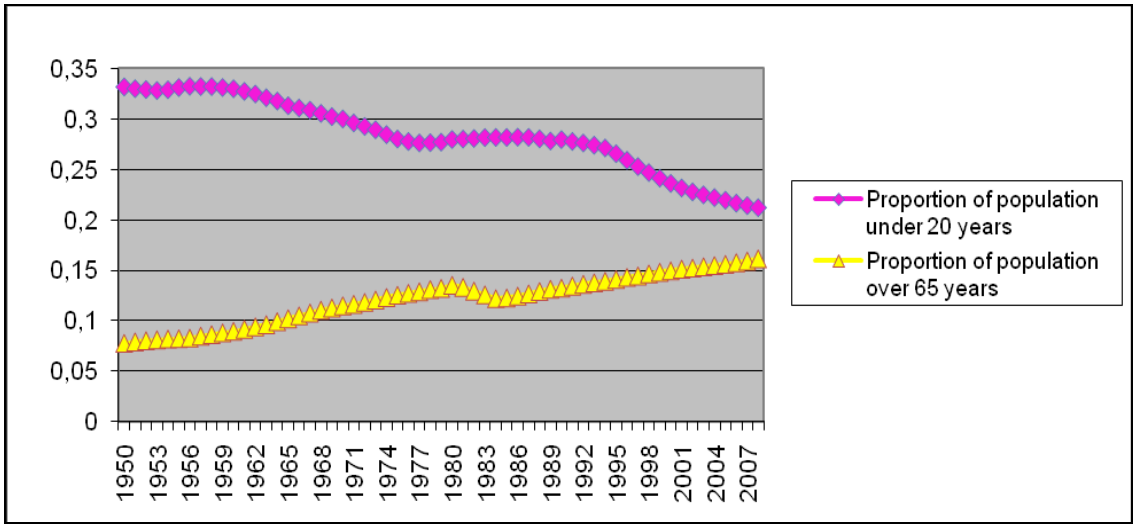
In business environment, Lawrence and Lorsch examine the following aspects: number of environmental factors and speed of changes (Lawrence and Lorsch, 1967). A fast-changing environment with a high number of environmental factors is described as turbulent environment (Grant, 2003), as opposed to a stable environment with few and slow-changing factors. In the business sphere, the decade under examination is considered turbulent in view of the many factors and fast changes (e.g. bio-technologies, communication and IT). After an analysis of environmental factors, in Subchapter 2.5, 'Summary appraisal of the effects of the external environment', I take up the question again of how the environment of the hospital section in the given period is to be characterised from the aspect of complexity and the speed of changes.

2.1 Demographic environment – changes in need and demand factors

Changes in the demographic and epidemiological situation appear as determinant factors of demand in the operation of hospitals. In the changing demographic situation between 1990 and 2010, two tendencies should be highlighted – a significant decrease in proportion of the population aged under 20 (from 28 to 21 per cent) and a significant increase in elderly population aged 65 and above, from 13 to 16 per cent (see Figure 2.1.).

International comparative analyses of demographic data usually examine mortality and life expectancy. Hungarian data in these respects are highly unfavourable. Life expectancy falls behind the average of 15 EU countries by close to 7 years (6.78 years in 2007) (see Appendix 2.1.). High mortality rate (13.4 per thousand) and early mortality pose an especially great problem in the demographic situation in Hungary. As regards loss of life-years caused by tumorous deaths, Hungary is deplorably at the lead in Europe. (For a breakdown of causes of death, see Appendix 2.1.)

2.1. Figure Changes in the proportion of population under 20 and over 65 in Hungary between 1950 and 2008



Source: KSH Statistical Yearbook, 2008.

As regards morbidity, the Cox Report published in February 2009 gives a comprehensive picture of incidence and prevalence in major disease groups in European countries (Cox, 2009).

It appears from the analyses that the Hungarian population is among the first in almost all groups of diseases and behavioural factors deleterious to way of life (smoking, alcoholism), or in the upper middle group in diseases related to diabetes, high blood pressure, cardiac failure, asthma, with the exception of depression symptoms. Owing to the insufficiency of domestic prevention and health promotion programmes, the growing number and percentage of chronic patients are bound to create an increasing 'demand' for the Hungarian health-care scheme, including hospitals.

2.2 Changes in the regulatory environment of hospitals between 1998 and 2008

In analysing the regulatory environment in the given period, I examine changes in hospital-related regulation in the following three areas in particular:

1. regulation of health insurance and funding mechanisms at legislative and governmental level;
2. regulation of capacity of the health-care scheme;
3. changes in labour and general tax regulations.

A detailed description of changes in regulation is outside the scope of this dissertation draft; for major changes, see Appendix 2.4. Significant changes are highlighted below. For a survey of data analysis of Hungarian hospitals, see Appendix 2.5.

2.2.1 Antecedents – separation of extensive hospital development and the insurance and service systems

Before a detailed introduction of the major changes in the regulatory environment in the last ten years, a short survey is in order of the investment and development policies of previous decades, in the context of which the hospital sector of the 2000s emerged, and of major measures in the insurance and funding environment after the regime change in 1990.

The extensive hospital construction and development policies under the 45 years of Soviet occupation had a substantial effect on the size and attributes of the hospital sector in Hungary, just as they did in most Central and East European countries and the former member countries of the Soviet Union (Jakab et al., 2002). These led to the extensive hospital capacity increase programme of the 1970s and 1980s. Another feature of the socialist model forced upon Hungary was the nationalisation of medical institutions and the implementation of direct bureaucratic ministerial and county council control over them.

After the change of regime in 1990, decentralisation, proclaimed with the Act LIV of 1990 on Local Government, brought about the greatest change in hospitals in the course of the transformation of the health-care scheme. Some 85 per cent of Hungarian hospitals were transferred from state to municipal or county local government ownership, while 15 per cent remained under the control of the health or other ministries. University hospitals later became quasi-independent under weaker direct ministerial control, enjoying the advantages of university autonomy.

Transfer of hospitals in local government ownership and administration was a general practice in the former socialist countries (Poland, Romania and, in the first round, the Czech Republic) (Jakab et al., 2002). Government expectations were basically that local governments were capable of adjusting the operation and service structure of institutions to local demands and the expectations of local communities.

The health-care scheme during the first government term after the regime change (1990–1994) was basically determined by three policy packages (at legislative and government decree level). As a result of Act LXV of 1990 on Local Governments, medical specialized institutions, hospitals and out-patient polyclinics were transferred into the ownership and administration of county and municipal local governments. Also, their health provision obligations were specified.

The next major change in the hospital sector was brought about by the separation of insurer, service purchaser and service provider functions, which in international literature is called the purchaser–provider split. This took place basically in 1990, under the impact of the "fund exchange" and the Act on Local Government. In the framework of the "fund exchange", as of 1 January 1990 health care was financed from the Social Insurance Fund, rather than the central budget, while maternity benefits were paid from the central budget (by the Ministry of Finance and later the State Treasury). Consequently, the Social Insurance Fund and health-care providers entered in a contractual relationship. However, genuine and perceptible changes took place in 1993 for two reasons – the former uniform administrative organ, the Social Insurance Fund was divided into two: the Health Insurance Fund and the Pension Insurance Fund (the latter is outside the scope of this dissertation draft). In the period under examination, the National Health Insurance Fund Administration (NHIFA) operated by and large in the same legislative environment and status. Changes included those in exercising regulatory power (government, minister of finance, minister of health) and the existence or lack of a separate legal entity of NHIFA county administrative organs. The transformation of the compulsory health insurance system into a multi-insurance business system in 1999 and again in 2007–2008 triggered great political and professional debates, but the system has not changed in its basic construction. (A separate chapter in *Magyarország Politikai Évkönyve 2007* is devoted to debates on various insurance models; see also Sinkó, 2008, Mihályi-Molnár, 2008, and Dózsa, 2008.) As a consequence of the regional structure superimposed in 2000, County Health Insurance Fund Administrations operated without legal entity, then, from 1 January 2003 to 31 December 2008 as legal entities; from 1 January 2009, regional health insurance organs have operated within a regional structure. Within the insurance system, a NHIFA department (of Cure and Prevention, or by its new name, of Financing) attends to methodological and financing tasks, while county (regional) organs exercise contractual and supervising functions.

Contractual relations, however, worked as administrative tools, rather contributing to genuine service purchases. The content (appendices) of the funding contract is determined by input elements following the logic of earlier base funding, such as the number of beds by department and specialty, the number and name of medical practitioners, the number of major diagnostic instruments, etc. Under the effect of changes in regulation and funding, hospitals in the last analysis faced inconsistent

incentives – input oriented regulation of contracts and capacity, and output oriented funding.

The third major group of measures was aimed to transform regulation of funding, which is described in Subchapter 2.3.

2.2.2 Strengthening the public purchaser's role as strategic purchaser

In the early 1990s, purchaser and provider institutions were separated in most Central and East European countries, including Hungary, which signalled a departure from the earlier nationalised, integrated Semashko system (Jakab et al., 2002), and the relationship between them was placed on a contractual basis. For years, however, several elements of funding retained vestiges of the earlier, central state system, such as base principled annual budget, specification by contract of the number of beds and out-patient hours, number of doctors, and central wage rises.

At the same time, in the second part of the 1990s, a new trend emerged in the form of the strategic purchaser role, with evidence based health policy as its scientifically proved pillar, which is most comprehensively described by Muir Gray in his work *Evidence Based Health Policy* (Gray, 2002). A major area of the strategic public purchaser role is the planning and authorisation of the establishment of high-cost technologies, described by Rosen, with examples taken from several countries (Rosen, 2002). Health-care schemes most relevant in this respect are found in Europe in Sweden, the Netherlands, the United Kingdom, France and Spain. In their study *Purchasing to Improve Health Systems Performance*, Figueras and co-authors emphasize the importance of strengthening strategic service purchaser role in improving performance, access and efficiency of health systems (Figueras, Robinson, Jakubowski, 2005). They highlight national health prioritisation, programme assessment by indicators, and the development of accountability mechanisms as primary tools. The transformation of insurance system in the Netherlands in 2006 strengthened the purchasing licenses of insurance companies (Maagdelijn, 2008). World Bank and WHO experts point to equal opportunity, quality, efficiency and expenditure containment as purchasing targets (Evetovits, 2008, Lewis, 2008).

Major areas in the mechanism of the strategic purchaser role are as follows (Figueras, 2008):

1. planning, substantiation by data, needs assessment, analysis of access;
2. capacity planning;

3. notices, tendering
4. evaluation and issue of coverage statements or permits;
5. funding of covered capacities;
6. monitoring, supervision.

In Hungary, Éva Orosz was the first to emphasize the strengthening of the role of NHIFA as health insurance purchaser (Orosz, 2001) and within it the development of a sector-neutral service sector, the introduction and improvement of performance-based funding mechanisms. In an earlier study, myself and co-authors described the kinds of purchasing licences the public purchaser (insurance fund) has and in what areas it can exercise them. However, for lack of health political support, NHIFA's strategic, proactive role as purchaser has not become general in recent years. In its conduct as purchaser, NHIFA followed international recommendations and practice, setting equity of access, efficiency improvement and expenditure containment as targets. Examples from some areas below serve to demonstrate reaction to institutional strategies and structure:

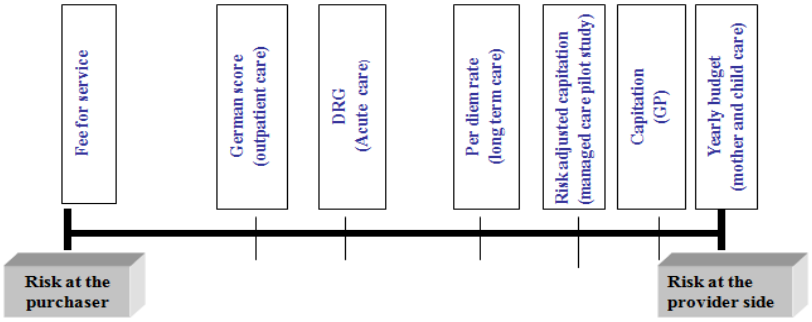
2.2. Table Major areas of strengthening the strategic purchaser role

Character of purchaser role	Areas affected in the operation of system
What are purchases made from?	impact on income; thorough analysis and monitoring of incomes
What is purchased?	specification of publicly financed insurance package; development of coverage policy system
Who are purchases made from?	regional level capacity regulation and tender system; strengthening of progressivity; institutional quality improvement and monitoring
How purchases are made?	development of funding techniques, integration of sub-funds; improvement of allocation efficiency; development of reimbursement policy for pharmaceutical products and medical aids
For how much the purchases are made?	systematic data collection in costs and expenditures; introduction of cost-based and flexible pricing

Source: Dózsa et al., 2006/2

Service purchase is theoretically founded on the analysis of financial incentives and their effects, which has a large literature. The essence of the theory of incentives is that the mode of funding significantly affects the activity of health providers (including hospitals) and physicians (Enthoven, 1979; López, 1997; Getzen, 2002; Steinmann and Zweifel, 2003; Eid, 2004; Dózsa, 2005). Closely connected to the financial incentives theory, the theory of risk sharing avers that the division of financial risk between the purchaser (financier) and the service provider can be changed by changing financing techniques (St George, 1990; Shmueli, 2003). (See Figure 2.2)

2.2. Figure Risk sharing model



Source: Dózsa, 2005

A variant of the risk-sharing model is presented in my recent study that shows the efficiency-based conditional supporting with the modification of the figure above (Dózsa, 2010/2, p. 93). According to this model, after an initial period of monitoring and analysis the risk share accompanying a new technology or a new therapy can shift towards the public purchaser if its efficiency becomes proven. Meanwhile public financing can be reduced or even withrawn if the efficiency of the technology is not proven during the minotoring period. Such financing techniques base decision making on up-to-date evidence.

A characteristic example of evidence-based health policy and strategic service purchase in Hungary is the spread of haemo-dynamic laboratories and their adoption in the coverage system in funding from 2000 onwards. Further examples are the adoption in coverage of dialysis centres on the basis of strict regional access principles (Health Ministry Decree No. 11/2002), and in part the establishment and licensing of CT and MRI equipments, the establishment of oncological and oncoradiological centres, the establishment and funding of emergency departments, the development and adoption in coverage of one-day surgery centres. Calculated development directions and regulatory funding elements conducive to structural change as proclaimed health policy targets generated genuine changes in the service portfolio (profile) of hospitals. A typical example is the concentration of oncological care (chemotherapies) from December 2005 onwards (from 55–60 hospitals to 25–27 major hospital centres), thus creating a network of oncological centres.

A further trend resulting in major structural changes and spanning more than one government term is the development of emergency care, and within it, the system of American-type emergency admittance through one door, instead of admittance to separate departments (the German–French model) (Dózsa, Gresz, Borcsek, Sántha, Boncz, 2004). As a result of health policy programmes, changes in regulation

(minimum conditions, professional codes, development of training profiles), funding (monthly fixed rate introduced in 2004), and tender invitations, the number of emergency departments rose from 5 in 1998 to 25 by 2005, and close to 40 by 2008, with ongoing development of the existing departments and the establishment of new centres and wards in the framework of ÚMFT TIOP 2.2.2 tendering programmes (www.nfu.hu).

Earlier transformation processes were accelerated by administrative legal measures introduced in April 2007, which had a bearing on the professional profile and capacity of the institutions. The number of acute-care institutions decreased from 145 to 123; 8 hospitals were entirely removed from the hospital sector; acute care ceased in 12; and the number of acute beds decreased by 27 per cent in the country.

2.2.3 Cost-containing and cost-decreasing policies effective from 2004

The pay rise in 2003 in the public service (Act on the National Budget, 2003), totalling 500 billion plus in the national expenditure, of which 134 billion was channelled into the Social Insurance Fund, burdened state debt by the end of the year to an extent that from 2004 on major austerity and cost containment policies had to be implemented in the public sector. In January 2004, the reimbursement system of Performance Volume Limit (PVL) was introduced, which triggered economic and professional debates and analyses in subsequent years (see Szummer, 2004, Dózsa, 2004/2, Molnár and Dublinszky, 2006, Fendler, 2008, Boncz, 2007). Though the austerity measures somewhat slackened at the turn of 2005–2006 in view of the election year, the first move of the new government was in June 2006 to draw up the convergence programme for 2007–2010, which was eventually approved in Brussels in August 2006.

According to Iván Csaba's calculations (Csaba, 2007), of the public service sectors affected by the convergence programme approved by the EU Commission, the greatest sacrifices had to be borne by health care. Of the total of expenditure cuts, 20 per cent was executed in public health care, which affected Social Insurance Fund benefits in kind especially severely. At real value, expenditure cuts between 2006 and 2009 surpassed 20 per cent, and the total health expenditure as a percentage of the GDP decreased from 6 per cent in 2003 to 5 per cent. In his study Fendler already calculated a 10–12 per cent real value decrease in 2007–2008, and 15 per cent in 2009, in health-care institutions (Fendler, 2009). In his study of 2008, Dózsa reported on the antagonistic effects of reform and austerity measures (Dózsa, 2008).

These government measures practically limited the scope for action for hospitals and left little time and energy for formulating and implementing genuine and comprehensive prospective strategies. Strategic thinking and action were, instead, replaced at many institutions by retrenchment in spending, ad hoc austerity measures and large-scale dismissals. For example, while performance assessment and motivation boost were set as major targets in human resources development, in the course of 2007–2008 public service staff in most hospitals had to be reduced by 12 to 15 percent, which meant dismissals of 300 to 500 in larger county hospitals in Győr, Nyíregyháza and Miskolc. To put it in another way, strategies in the last years of the period under examination were narrowed down to mere survival.

Major government and insurance measures with significant impact on the daily operation of hospitals in the period were:

a) decrease of normatives of Homogenous Disease Group (HDG) weight numbers (1999, 2001, 2003, 2009);
b) incorporation of 50 per cent pay rise in performance funding;
c) introduction of PVL system;
d) repeated tightening of PVL system (abolition of degression zones and decrease of fund (2006, 2007, 2009);
e) modifications of HDG system (correction of 'wadding' HDGs, fee harmonisation, tightening of guarantee rules (2005–2009);
f) hospital capacity downsizing through tenders (2006);
g) acute hospital capacity decrease through legislation (2007).

The austerity measures exercised a powerful impact also on institutional strategies and development plans. Strict cost restrictions speeded up hospital fusions, closures and total profile changes in certain premises and small hospitals. In the range of institutions examined, the following tendencies in institutional strategies strengthened:

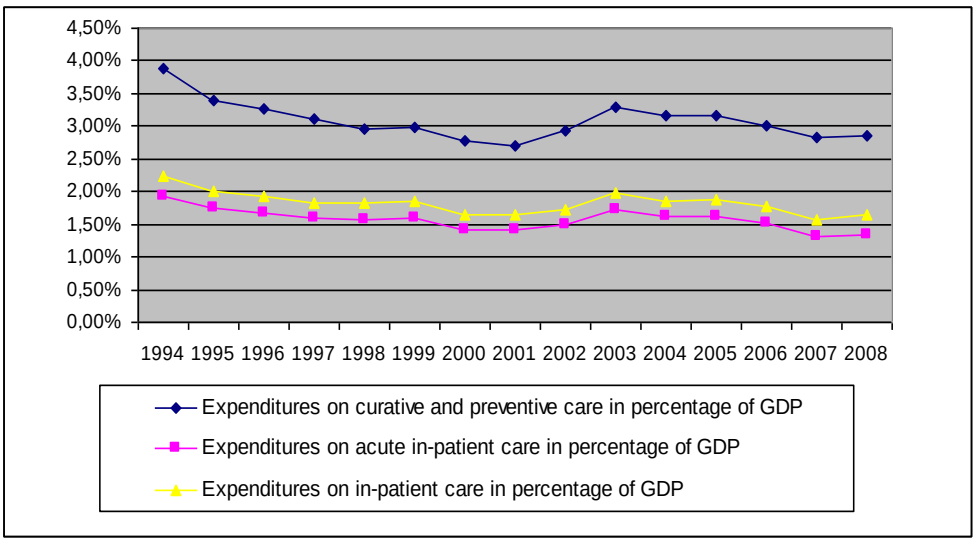
- competitive approach – who is to endure competition longer (e.g. between Medical University Hospital and Kenézy County Hospital in Debrecen)
- reduction of parallelism (Pécs, Szeged, Budapest);
- strengthening co-operation (e.g. between county and city hospitals in Miskolc);
- speed-up of fusions (Miskolc city hospitals, Veszprém and Somogy County institutions), establishment of holdings (Vas, Hajdú-Bihar and Szabolcs-Szatmár-Bereg Counties);

– development plans aimed at abolishing or bailing out premises and pavilions (e.g. Kaposvár, Eger, Dunaújváros, Sátoraljaújhely hospitals).

2.3 Changes in the financial and financing environments

For an analysis of financial and financing environment, a survey of macro-economic data is called for. The figure below reveals that from time to time the percentage of curative and preventive care expenditure, which makes up the predominant part of public financing, underwent significant changes in terms of the GDP percentage.

2.3. Figure Curative and preventive, in-patient and acute in-patient care expenditures in percentage of Hungarian GDP between 1994 and 2008



Source: Financing data processed by ESKI

Major and frequent changes in GDP percentage of expenditures appear also in institutional economy, where the 50 per cent pay rise in 2002–2003 brought significant growth (even in real value); from 2004 onwards, however, the government austerity measures which, owing to the convergence programme commitments, affected health institutions to a greater extent, showed their impact (Csaba, 2007; up-dated convergence programme for Hungary, 2010, p.39.). A study on the convergence program made by the National Bank of Hungary mentions health care as the area which suffers the greatest restrictions in expenditure, and where the expenditures expressed in percentage of the GDP remain far below the international average (MNB, 2010, p.31, p.35). Appendix 2.3 shows the breakdown of curative–preventive expenditures by sub-fund and their percentages of the GDP growth. Macro-financing rates also have a great effect on hospital debt, as discussed in Chapter 5.

2.3.1 The system of social insurance based public financing – the introduction of HDG system and experiences of its use

In the analysis of the financial and financing environment, the introduction of the Homogenous Disease Group (HDG) system, with experiences of its use in the past 15 years, brought the most far-reaching changes. After years of preparation, the HDG system was introduced on 1 July 1993, during the first government term after the change of regime. Medical institutions started preparing HDG-based performance reports already a year earlier. Performances in the base year were divided by the sum received in funding in the given year, which set the institutional base rates (Nagy, Boncz, 2003).[1]

The Hungarian HDG system is based on the DRG system introduced in Medicare payments in the United States in 1983 (Chilingerian, 2008). The Prospective Payment System (PPS), which takes into account the expenditure differences of hospital groups and is based on pre-calculated rates, is theoretically based on the yardstick competition formulated by Andrei Schleifer (Schleifer, 1985)[2]. Pere Ibern adapted the theory for the modernisation of the resource allocation mechanism in acute hospital care in Catalonia (Ibern, 1997). An adapted yardstick model for multi-insurance financing system was developed in the Netherlands by Argell (Argell, Bogetoft, Halbersma, Mikkers, 2006). The direct cause which elicited the greatest change in the past ten years in hospital funding was the rapid increase of hospital cost reimbursements based on prospective payment. In Europe, the DRG system was introduced for performance measurement and payment of acute in-patient specialised care first in Portugal, then in Hungary and Norway. By the mid-2000s, Germany and France also embarked on introducing various types of DRG systems, while in the British NHS, an own-developed system based on case mix was introduced. A comprehensive survey of typical international experiences gained in using DRG systems is found in the volume of studies *The Globalization of Managerial Innovation in Health Care* by Kimberly and co-authors (Kimberly,

[1] A feature of the introduction was that the institutions were financed continuously, while they received the concrete calculated sum equivalent of the performance rate first two months later, then, from 1998, three months later. Consequently, in statistical analysis, especial attention is to be paid to differentiation between financing and performance periods. E.g. the payment data of the financing year of 2006 are based on performances between 1 October 2005 and 30 September 2006.

[2] The theory of yardstick competition was developed by Schleifer in the United States for efficiency analysis of hospitals and hospital sectors and for working out effective incentives. The theory is mathematically and statistically based on Grade of Membership analysis, a multi-variable procedure with which hospitals are grouped according to their differing average cost pricing. Thus, in hospital reimbursement the regulator uses differing prices for different hospital groups.

Pouvourville, Aunno, 2008), in which Hungary is one of the eight case studies (Nagy, Dózsa, Boncz, 2008).

Characteristic data of DRG or HDG systems are: designation of major groups, designation of diagnosis groups, normative day, lower day limit, upper day limit, and group weight. Indices derived from care data are length of stay (LOS), average length of stay (ALOS), case mix index (CMI), bed occupancy rate (total LOS/number of beds*hospital days), monthly and yearly case numbers. These determine statistics and their analyses based on HDG systems, which are described in Chapter IV in detail. In addition, basic coverage documentation rules called guarantee rules were elaborated to set up certain limits in the frequency of covered cases. Another feature of the Hungarian HDG system is the system of *HDGs which include interventions and treatments that can only be performed in dedicated institutions.

Between 1993 and 2003, institutional base rates and calculation rules were modified from time to time. Éva Orosz describes experiences gained in the first eight years of HDG-based payments in detail (Orosz, 2001). She claims that the essence of the DRG–HDG method is the assertion of performance principle and the joint assertion of efficiency and professional viewpoints.

2.3. Table Characteristic data of the HDG system – extract from Appendix 3 of Welfare Ministry Decree No. 9/1993

** Major group: 01			Diseases of the nervous system	Lower trimpoint	Upper trimpoint	Normative days	Weights
*	01P	001A	special intracranial procedures above 18 years of age, non-traumatic	2	50	17	5.31178
*	01P	001B	special intracranial procedures above 18 years of age, traumatic	2	49	14	6.60028
*	01P	001C	special intracranial procedures under 18 years of age	2	45	15	4.41826

Major positive and negative incentives (p. 218) are up-coding, the DRG creep, up-coding with complication and co-morbidity for higher weight and payment. Another negative development is referral of patients in genuine need of high-cost treatment to institutions at a higher level of progressivity. Orosz highlights three phases in base rates and payments from the introduction of the HDG system up to the early 2000s (p. 221):

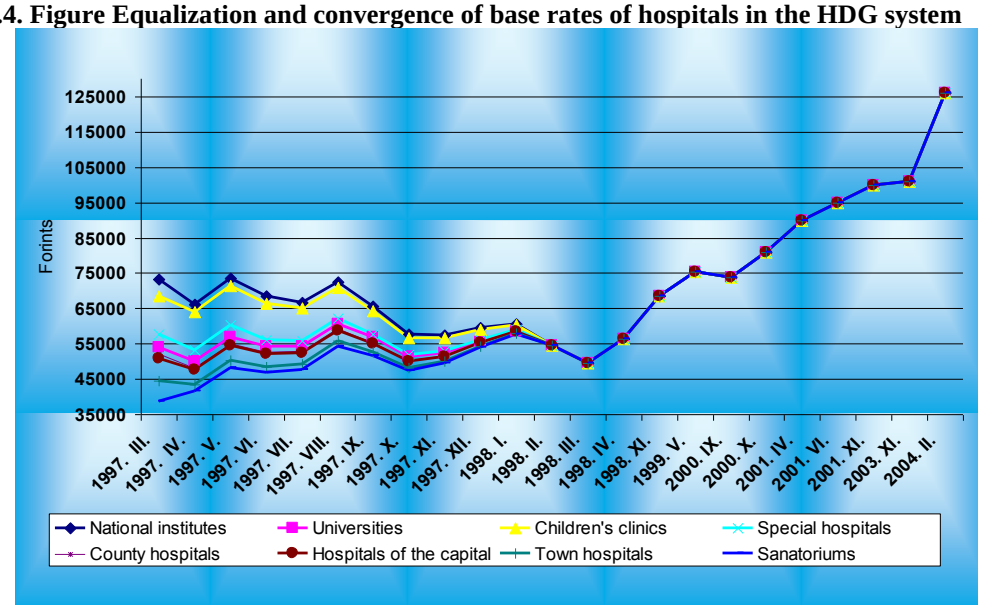
1. payments based on hospital-specific base rates, 1993–1994
2. payments based on professional and institutional multipliers, 1995–1996
3. equalization and prospective announcement of base rates, 1996–2001

Orosz emphasises that all in all performance-related payment system had a positive effect in that the principle ‘money follows the patient’ prevailed and higher payments were made for more complex and costly cases. Lépes makes the following statement

referring to the same initial period: 'Institutions were confronted with their own performance.' (Lépes, 1995)

The greatest challenge in the years after introduction was the standardisation of institutional base rates. At the outset, each institution had its own base rate. By 1997, base rates were standardised within institution groups but still differed significantly (e.g. the base rate was HUF 37 thousand for sanatoria and HUF 73 thousand for national institutions). Eventually, by the second half-year of 1998, the base rate of HDG payment was set at HUF 55 thousand uniformly in the country (Figure 2.4). This was important because the same payment was made for cares classified in the same HDG (e.g. appendectomy) independent of the character of the institution (national uniform base rate*HDG weight). This system basically differs from DRG payments in other countries, where certain regional centres and especially teaching hospitals are paid with higher multipliers (USA, Portugal, Norway and others). At the same time, base rates were standardised also in the DRG system introduced in Germany in 2004. In Hungary, itemised performance-based HDG payments were complemented by a fixed rate in recognition of progressive activities up until the end of 2077. Progressive rates amounted to 1.3–1.5 per cent of the total acute in-patient care sub-fund.

2.4. Figure Equalization and convergence of base rates of hospitals in the HDG system

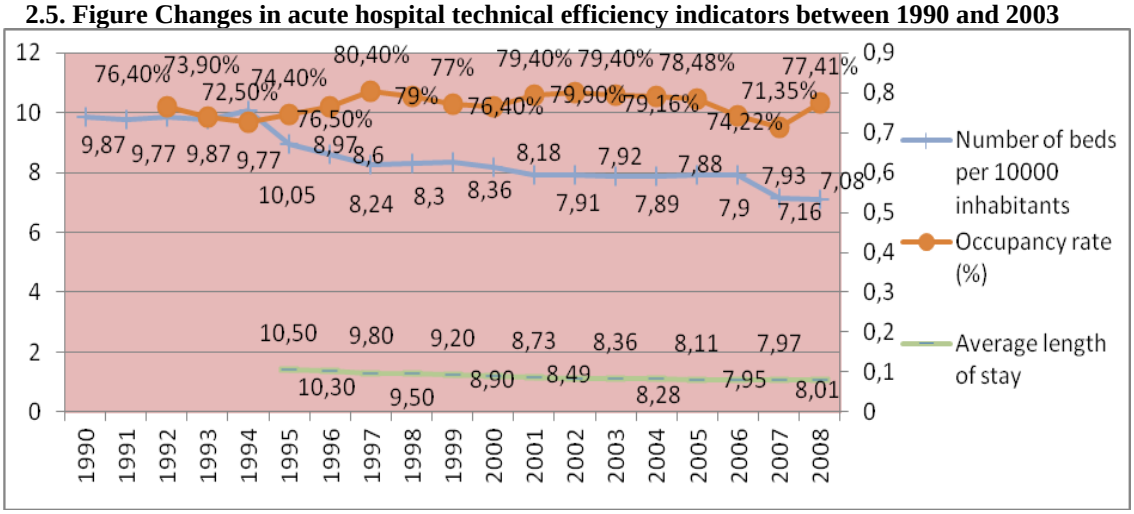


Source: Júlia Nagy, based on GYOGYINFOK data

Both positive and negative effects of the HDG-based funding of the Hungarian hospital sector could be clearly identified. In the first ten years of HDG funding (until the introduction of PVL), a positive effect was the decrease of average length of stay from 11.3 in 1993 to 8.36 in 2003 (then to 6.5 in 2008). In the period under examination, bed occupancy in acute in-patient specialist care somewhat increased (from 73.9 in 1993 to

79.4 in 2003). Decrease of beds and length of stay exercise a negative effect on the utilisation index of hospital technical efficiency. To put it in another way, the 20 per cent decrease in length of stay was in part counterbalanced by the 12 per cent increase in beds and the 2.3–3 per cent increase in care cases, resulting in a 6 per cent increase in utilisation.

2.5. Figure Changes in acute hospital technical efficiency indicators between 1990 and 2003



Source: NHIFA payment data

During this period a recurrent problem was the decreasing real value of financing (basic fee, weight number values), which forced institutional management to apply over-coding in order to compensate loss in real value.

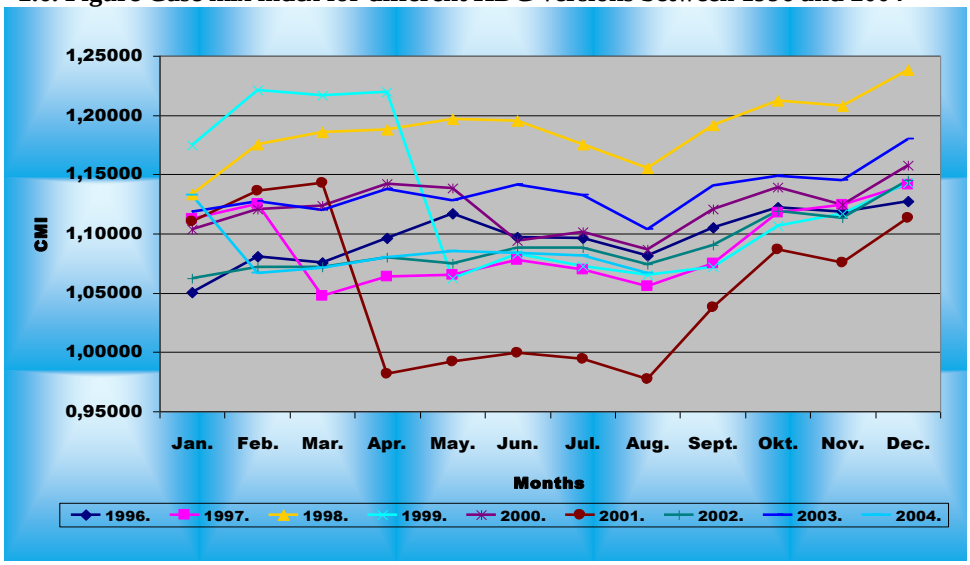
Therefore, among negative phenomena in HDG funding in the domestic hospital sector there are "coding tricks", up-coding or the DRG creep in terms of the international literature, for which the DRG system is unambiguously accounted for.[3]

During the ten years before PVL was introduced, the formulation and wide-ranging implementation of the so-called 'shaman programmes' became a sort of nationwide gamble. Hospitals and the purchaser (NHIFA) played 'cops and robbers'; to continuous rise of CMI resulting from up-coding, part of which was due to coding tricks, the funding organ and the Health Ministry reacted with periodical decrease of relative weights. (No reliable, scientifically supported source is found as to what extent CMI rise was due to technological changes on one hand and to diagnosis and intervention coding, the optimalisation game, on the other.) The figure below shows the annual increase in CMI index and the impact of periodical normative decreases, in the course of which HDG weights were reduced by an average of 8 to 12 per cent, in a monthly

[3] Internationally acknowledged expert analysts of DRG systems are Ceu Mateus /Portugal), Tor Iversen (Norway), John Chilingerian (USA), Paolo Tedesci (Italy), and Júlia Nagy (Hungary). A comparative analysis of DRG systems was carried out by Kimberly et al. (2008).

breakdown. Major decreases of relative weights were made in March 1997, May 1999 and April 2001.

2.6. Figure Case mix index for different HDG versions between 1996 and 2004



Source: NHIFA financial data, NHIFA Yearbooks

Based on the theory of incentives and collective action expounded by Mancur Olson in *The Logic of Collective Action* (Olson, 1998), such phenomena can clearly be traced back to interest effects of financial incentives and the nationwide, uniform funding, in which some 140–150 hospitals compete for a bigger slice of the common cake and not one single institution is interested in curbing there production, since no collective action can emerge with a high number of groups like that. Continuous CMI increase favours those institutions which, at a higher technical level, can admit higher weight cases (with complications and co-morbidities) in greater percentage.

In the strategic approach of institution management, therefore, in the first part of the period under examination, the financing environment worked in a relatively well-defined framework and regulation, nationally uniform floating and later prospective base rates. Institutions competed for the nationwide, uniform fund coverage by increasing their performance (increasing case numbers and/or CMIs).

2.3.2 Hungarian hospital sector in the shadow of health-care reforms

The publicly financed health care system in Hungary is constituted of three elements (NHIF Stat Yearbook, 2006): basic care with GPs; outpatient specialist care and diagnostic services; and acute and chronic inpatient care. In the past fifteen years several books and studies were published about the necessary reform of the Hungarian health and health insurance schemes (Ajkay, Orosz, Mihályi, Kincses, Kornai), and

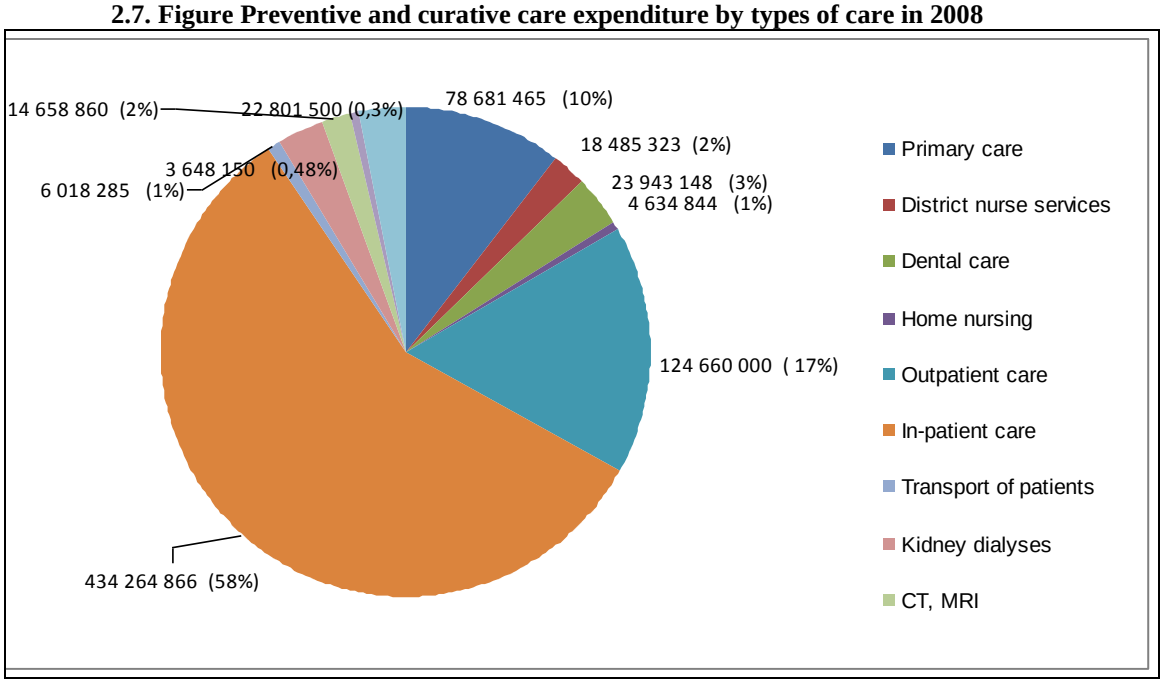
several government reform conceptions have been developed (e.g. Yellow Book of 1996, Green Book of 2006, Healthy Society Complex Programme, 2006). All emphasize the excessive volume of the hospital sector and the necessity of capacity decrease. Several expert proposals were elaborated also on governmental level, which were decisive in legislation and regulation as well as in the funding practice of NHIFA (e.g. Healthy Society Complex Programme, Ministry of Health, 2006). In her book *Félúton vagy tévúton* (Half-way or Wrong Way), Éva Orosz analyses the domestic health-care system from a health political viewpoint (Orosz, 2001). Her major findings relevant to this dissertation are that the replacement of unjustified hospital care by other forms of care and the significant decrease of hospital capacity are imperative (p. 63). A general problem with the reform plans is the lack of complex comprehension. These plans did not cover the entire care, they did not offer solutions to the structural and professional problems of basic care and outpatient care, they did not consider prevention or basic public care issues.

The most comprehensive work on the Hungarian hospital sector in the past 20 years is the volume of studies edited and co-authored by Zoltán Ajkay and Lajos Kullmann, *A magyar kórházügy* (The Hospital System in Hungary) (Ajkay and Kullmann, 1995). In the chapter entitled 'Hospital Reform', several authors discuss the need for rationalising hospital capacity in detail and in part its modes. In his study, Péter Lépes speaks about a significant, minimum 20 per cent decrease of the hospital sector, with especial regard to the closure of entire institutions or premises, as a major element of the modernisation programme of the health sector (Lépes, 1995). Based on NHIFA calculations, he reveals that even a significant capacity decrease and a lesser case number decrease could result in a rise of the current average bed occupancy of 63 per cent to no more than 80 per cent, which can be considered the international average. Lépes also calls attention to structural problems, the excessive number of paediatric beds and the insufficiency of care and rehabilitation capacities for the treatment of geriatric problems. In the same volume, Gyula Kincses emphasizes the unevenness and lack of a guiding principle in hospital capacity planning and the need for reducing excessive percentage of in-patient specialist care within the framework of health-care structural changes.

From the aspect of strategic planning by institutional managements, the continuous threat from 1990 onwards – unambiguous opinions voiced independently of experts and political forces on excessive hospital capacities, especially acute hospital capacities, and on the pressing need for major capacity decreases (institution closures) – is to be treated

as a determinant environmental factor. Figure 2.7 illustrates the prominent weight of inpatient care in financing.

2.7. Figure Preventive and curative care expenditure by types of care in 2008



Source: NHIFA Statistical Yearbook, 2008

Éva Orosz in her study on *The strategic issues of the Hungarian health insurance* (Orosz, 2010) emphasises the importance of radical changes in the incentive system, the financing and the services, as she holds that the present system is not sustainable, because it does not urge to improve the quality of care.

2.3.3 Central governmental earmarked investments and EU developments and investments

The analysis of financial and financing environment is followed by an analysis of the investment and development policy environment. In the first part of the period under examination, domestic – central governmental, ministerial and local governmental – developments predominated. (Appendix 13 in the Vol. 2 of studies on the significance of public health in the national economy published by EüBt (Health Care Limited Partnership) contains the yearly total of earmarked investments.) The most important earmarked investments were those for which basically municipaliy-owned health institutions could compete. From the analysis of the amounts spent in the framework of earmarked investments and the number of hospitals participating annually in the programme, it emerges clearly that in certain years substantial development resources were channelled into the health sector. At the same time, nearly half the developments were directed basically to the reconstruction of existing infrastructure, which in other

countries is financed from amortisation funds rather than central budgets. (Reconstruction investments included, for example, the hotel building reconstructions at Vác City Ödön Jávorszky Hospital and Szent Lázár County Hospital in Salgótarján, reconstruction of the Internal Medicine complex of Semmelweis Hospital in Budapest and the building reconstruction of Nagykanizsa Hospital.)

For several smaller provincial hospitals, some major earmarked investments ensured survival for years, which counted as a significant decision from the aspect of the medium-term institutional strategy. The expanded volume thus created, however, further strengthened the economic situation of these institutions, as will be explored in detail in the analysis of debt situations. In my own analyses I found that the number of institutions in which earmarked investments led to a dead-end, as in about 4 to 8 years such capacities became idle and acute in-patient specialist care stopped, can be put between 12 and 15, which is approximately half of the 30 hospitals with less than 300 beds (typical examples are those at Szikszó, Kisbér, Mezőtúr and Pásztó).

From a strategic viewpoint, those developments carry weight which raise institutions to a different progressivity level of care and contribute significantly to a strategic renewal of the hospital (e.g. concentration of units or establishment of central theatre and intensive care units, such as at Uzsoki Hospital in Budapest and Sopron Hospital) or to the shaping of a new care and service profile which ensure strong position or even competitive edge in care. A typical example is the renewal of Szent Imre Hospital in Budapest, where a central emergency admission wing was formed, Bajcsy-Zsilinszky Hospital in Budapest where the establishment of diagnostic and surgical units was accompanied by the introduction of new technologies (MRI, haemo-dynamic laboratory), the Markusovszky Hospital in Szombathely where a central emergency unit was built, and the National Rehabilitation Institute in Budapest where the building and the stock of professional instruments were entirely renewed.

Health investments by local governments are not to be disregarded either, nor are the instrument purchases and lesser building and infrastructural developments made by hospitals from their own income surplus. In several cases these were aimed at maintaining the level of existing infrastructure (stock of diagnostic and surgical instruments) or at development to meet the exigencies of the time. In the literature on strategy, these are regarded as part of the strategies of enhancement and the maintenance of the status quo and stability (Swayne, Duncan, Ginter, 2007, p. 248).

Several examples are also found when investments were aimed at prospector growth by the introduction of state-of-the-art technologies (Swayne et al., 2007, p. 263). Institution and/or hospital managements aimed to develop the strategic and competitive position of the institution in many cases by high-value (500 to 1000 million) investments without preliminary NHIFA coverage adoption. Typical examples include the PET purchase made by Imre Hollós County Hospital at Kecskemét, the haemo-dynamic centres at Markusovszky Hospital in Szombathely and Székesfehérvár Hospital, and the CT unit at Makó Town Hospital. Such developments based on posterior forced coverage involve great risks, because no investment return is possible within the planned period of 8–10 years without public financing, and what is more, post-development operation itself may lead to serious losses for several years. Developments by local governments and hospitals included PPP projects[4] in several institutions, which were also aimed at improving competitive edge and gaining market. Typical examples include the construction of diagnostic and oncoradiological centres at Kaposvár, the gamma knife project at Debrecen University and the reconstruction of the oncoradiological centre at Borsod-Abaúj-Zemplén County Hospital.

From May 2004 onwards, EU accession posed a serious challenge for Hungarian health policy and health-care scheme. Access to the EU Structural Funds (National Strategic Reference Framework – NSRF; National Development Plans) called for medium-term strategic planning on the part of the government (New Hungary Development Plan – NHDP, 2007; Advisory Notes to Investment Project Feasibility Studies). Both governmental and institutional tender documentations have to contain basic elements of strategic planning – analyses of environment, domestic resources and capabilities – that is, SWOT analysis; a clear description of medium-range development goals; indicators and their values relevant to attaining such goals; activities conducive to attaining goals; detailed action plans; detailed timetable and costing of action plans; and (development) plan of available human resources. Within NHDP (plan period II, 2007–2013), all developments have to contain a detailed feasibility analysis as a horizontal aspect, and an equal opportunity plan. This methodology compels institutional and sectoral managements and analysts to adopt a systematic strategic and project-oriented thinking. In order to gain access to funds, architectural plans and suitable political lobbying do not suffice any more; to meet the requirements, a thorough examination and planning of

[4] In Public-Private Partnership (PPP) projects, partners share responsibility and risks in providing public services ordered by the state from the private sphere for a long term (20–30 years). Responsibility of the private sphere may extend to planning, construction, operation and financing, for which the state pays service fee as fixed by contract.

development ideas have to be carried out, together with their accommodation to environmental changes, demands and patient expectations, and they also have to seek cost efficiency and sustainability.

Access to EU development resources was not a 'dream come true' for Hungarian health-care system. In the first NDP plan period (2004–2006) , plus two years, a total of HUF 25 billion was spent on health institutions – these can be considered as model developments. Concentration of units by restructuring traditional pavilion-based hospitals (Auguszta project in DE OEC) and concentrated developments along professional policy priorities began (construction of cardiovascular and oncological centres under the Auguszta project again). Under the structural change, the concentrated development of modern preventive and diagnostic procedures began (diagnostic and screening units in four health centres). In four institutions, the development of rehabilitation care started meeting increasing care demand.

From the aspect of the hospital sector it is a decisive fact that under NHDF between 2007 and 2013, of all the fund recipient countries Hungary plans to use the most resources – both nominally, running to some EUR 1.7 billion, and in percentage – in the health-care scheme and national health programmes (DG Sanco, Brussels). Several studies examined the structural and technical conditions of hospitals (EGVE survey, 2004; EüBT volume of studies, 2009).[5] NHDP offers diverse support possibilities to develop modern hospital institutions and infrastructures:

– formation of modern hospital concentrations; technological concentration; concentration of high-tech units (central theatre, intensive care and diagnostic units); emergency care concentration by admission through one door to replace uneconomical operation in several pavilions and premises;
– formation of specialist centres (e.g. cardiovascular and stroke centres); development of oncological centres; development of paediatric care.

From a strategic aspect, the so-called pole programmes – TIOP 2.2.7 and tender programmes supporting structural change: TIOP 2.2.4 – are of major importance for the hospital sector. Eight selected great centres in the former tender programme, and 22 county and municipal hospitals in the second, may receive funds in six (regional)

[5] A detailed analysis of the building stock of Hungarian in-patient institutions carried out in the second half of 2006 was published in Appendix 9 of Volume II, according to which close to 20 per cent of hospital buildings and bed are in need of total reconstruction and further 20–25 per cent of extensive renovation.

convergence programmes. These programmes ensure for hospitals to concentrate and optimalise physical infrastructure and building stock, thereby directing them onto a sustainable course, and also, for modernising the stock of instruments and machines in the most important remedial and clinical areas. Such developments may bring strategic advantage for these institutions and help expand their leading role in the given local market.

Sources of human resources management are expanded by the support of TÁMOP 6.2.2 trainings and TÁMOP 6.2.4 employment by tendering possibilities. Such tender possibilities can be incorporated in the human resources development plans and internal training programmes of the institutions. These can be utilised to strengthen or maintain their core competence. TÁMOP human resources development tenders support the employment and training of physicians and graduate ancillary workers in specialties where shortage is especially great, such as oncology, rehabilitation, emergency and anaesthesiology, though other areas can be included if appropriately justified. The direction of tenders determines those keywords which bear down on the direction of institution management strategy.

2.4 Labour market and human resources in health care

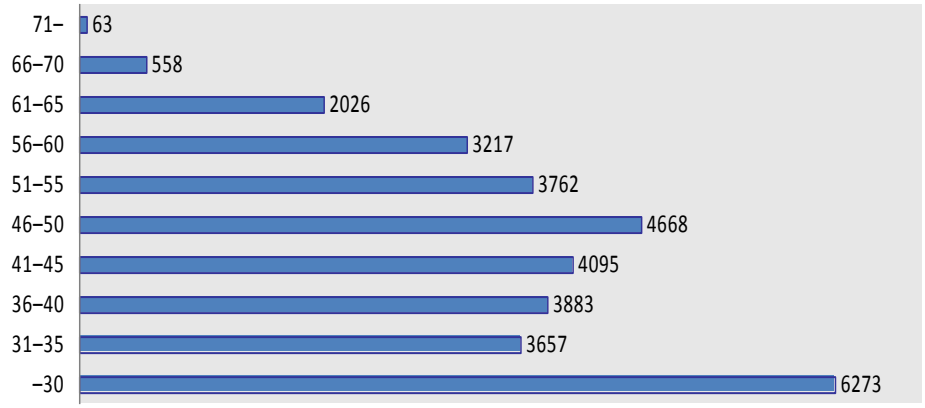
Alongside education, the social sector, tourism and the civil service, health care is one of the most labour intensive sectors of modern economies (WHO, 2002). This means that labour cost percentage is very high in the production cost of the end product or service. In Hungarian hospitals before the 50 percent wage rise NHIFA assessments in 2002 showed labour costs running to 50–65 per cent in acute care and 75–80 percent in long-term care. The human resources situation in Hungarian health care, and within that in the hospital sector, can be assessed basically by the number of physicians, specialist ancillary workers and graduate nurses and the tendencies in their wage levels. Such data are found in the annual statistics of the Central Statistical Office on one hand, and in *Egészségügyi Közlöny* (Health Care Bulletin) on the other. Data of the age structure and geographical distribution of physicians, which are shown in Appendix 2.5, are also illuminative of the situation of the medical profession.

A detailed analysis of the age and the migration of Hungarian physicians was made by Péter Balázs (Balázs, 2010). The study reveals that in the past 20 years immigration prevailed due to the massive arrival of qualified professionals from Rumania. After joinung the EU emigration dominated (immigration was not able to compensate for the

emigration to Western countries). To conclude, Hungary will have to face a decrease in the number of physicians, a phenomenon which urges a strategic problem solving and a different type of organisation of care, where the need for opening up new jobs for personnel with a degree is imperative. (Balázs, 2010, p. 250).

The age pyramid clearly shows that supply of physicians in the 35 to 40 age group has worsened. Among those under 30 years of age, a great number of residents and consultant candidates leave the country after obtaining specialist degree. Concurrent with EU accession, the migration of physicians to more developed Western countries, primarily the United Kingdom and Sweden, intensified, and year by year a significant number of physicians apply for work permits in foreign countries (604 in 2005 and 728 in 2008; source: EEKH, 2008). Péter Balázs carried out analyses of the mobility, composition and reinforcement in the medical profession in Hungary in several publications (Balázs, 2004).

2.8. Figure Demography of the medical profession in Hungary – the age pyramid of active physicians (2008)



Source: KSH, Statistical Yearbook, 2008

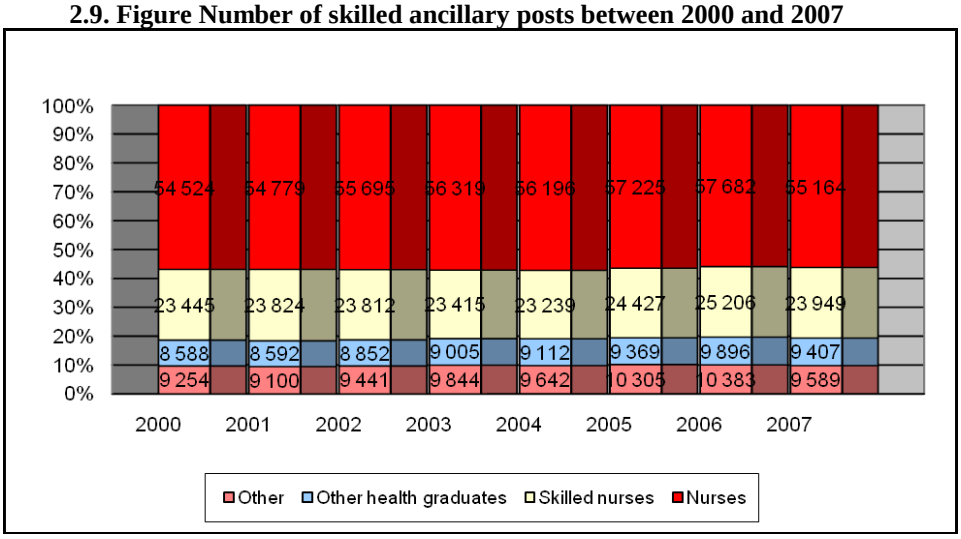
There are basically two major tendencies emerging in labour wastage in the medical profession. On one hand, leading physicians, especially in the manual specialties, with considerable prestige, professional background and specialist knowledge quit the domestic health institutions; on the other hand, young physicians – new graduates and new specialists – tend to find employment abroad. “Labour wastage is typical of physicians who speak languages and have excellent abilities, because for them inflexible and hierarchic structures make it very difficult to progress” (interview with Imre Repa, 2009). Recently graduated young doctors are also inclined to taking jobs abroad. From the mid-1990s onwards, many physicians (3–5 thousand) left the profession to become medical representatives of pharmaceutical firms and surgical instrument production companies. Until the mid-2000s, the job of the medical

representative was a tempting alternative for physicians who were expected to attend to monthly 6–8 duty shifts in hospitals. In the framework of the 'reform' acts of 2006, Parliament passed a bill which tied medical representative jobs to an annual registration fee of HUF 5 thousand, reinforced the generic programme, introduced tax-like reimbursement requirement, and decreased public expenditure for drug reimbursement by 25 per cent. These restrictive measures greatly weakened the drain power of medical representation.

The geographical distribution of physicians is especially characterised by centralisation in the capital city. The number of physicians is also higher in those counties where there are medical schools (Csongrád, Baranya, Hajdú-Bihar counties). In other counties, supply of adequate number of physicians poses a major problem in the medical services and specialist fields, such anaesthesiology, oncology and emergency, and in several rural hospitals there is a shortage of physicians even in primary care, such as paediatrics, internal medicine and traumatology.

Alongside the supply of physicians, that of ancillary workers, a less researched area, must be dealt with in the analysis of the strategic human resources environment. As shown in Appendix 2.2, the number of ancillary workers in Hungarian health care in the period under examination was 100–105 thousand, with a permanent, significant number of vacancies (4.5–5 thousand). In nursing, characteristic tendencies were in the past decade a kind of over-qualification, the strengthening of degree-level (even MSc) nursing and ancillary training, the establishment of health science faculties, while staff shortages in primary care nursing proved an increasingly great problem (source: detailed analyses of the labour force situation in certain county hospitals). The prospects of highly qualified skilled ancillary workers are shadowed by the lack of the regulation of competences and the delay in adapting license exams. Therefore, highly qualified skilled ancillary workers and nurses cannot provide the types of care they are qualified for. This waste of resources can be considered as an opportunity to be used optimally in the future.

2.9. Figure Number of skilled ancillary posts between 2000 and 2007



Source: KSH Health Care Statistical Yearbook, 2000–2007

Balázs (2010) points out the scarcity of human resources in the field of skilled ancillary workers. Again, the EU's brain-drain effect is evident as a result of considerable differences in the level of the wages.

Human resource management – a strategic approach

Among hospital resources, human resources and within that, an adequate number of appropriately qualified physicians are a most important factor. From strategic aspect, the leading role of a hospital is greatly determined by eminent physicians and professors of national or international acclaim. Typical examples are Dr Pál Varga-Péter in vertebral surgery, Dr Lajos Papp in cardiosurgery, Dr Béla Merkely in invasive cardiology, Dr Zoltán Hegedűs in laser ophthalmology or the paediatric cardiosurgery team at the National Cardiologic Institute in Budapest. Thus the development potential of in-patient institutions is greatly determined by the number of physicians, the preservation of leading clinicians, or educating new ones and securing their replacement.

In W. K. Atkinson's words, health care organisations today encounter several challenges, among them a shortage of physicians, nurses, and other specialist and support staff (Fried, 2008). Human resources development and high-standard human resources management, which are based on the continuous training of employees, is a relatively new sphere in the operation of private and public institutions. At the same time medical organisations do not generally have strong human resources development programmes and, within this, no strong connections with local higher educational institutions providing medical and health training. Despite a deteriorating public financing environment, the formulation and implementation of a comprehensive HR

strategy targeting recruitment, preservation and development of labour force, development of internal trainings, career management, coaching of existing staff and fight against burn-out are key elements in the strategic development and scope of health institutions. The development and targeted further development of human resources management, its organic integration in institutional development strategies, the improvement of motivation, and the strengthening of organisational culture and team spirit must become core elements in the operation of modern health institutions (Bakacsi, 2004). Several hospitals only have traditional personnel departments or groups, and if there are HR experts they perform no genuine human resources development activities. In view of the above (especially in view of the scarcity of resources and potential competitive advantages), **strategic human resources management (SHRM)** is duly expected to become a core element of institutional strategies. SHRM includes a wide range of activities and tasks targeting quality development and preservation of human resources (Fottler, 2008, p. 2), of which some are highlighted below:

- development of personal interest system (introduction of performance pay, individual pay and incentives);
- career and supply planning;
- development of internal training system;
- development of internal communication, worker empowerment in decision-making, development of bottom-up techniques;
- implementation of new recruitment techniques.

2.5 Summary assessment of external environmental changes

Determinant environmental changes can be summed up as follows:

a) <u>Demographic changes</u>
   a. continuous and significant decrease in child births,
   b. continuous and significant increase in number and percentage of the elderly,
   c. increase in number of chronic patients (diabetes, high blood pressure, COPD);

b) <u>HR situation</u>
   a. increasing physician and specialist worker migration after EU accession,
   b. implementation of working time directives – duty shifts taken into account;

c) Health technology development
    a. technological shift in cardiology, oncology and one-day surgery,
    b. introduction of tele-medicine, tele-pathology and tele-radiology,
    c. spread of PACS systems in institutions,
    d. thousands of new drugs in public financing and OTC during the decade;
d) Health policy programmes, measures on the frame of strategic purchaser role
    a. extension (beginning of 2000s) and termination (in 2006) of managed care model experiment;
    b. Tenders aiming the development of one-day surgical services, hospice and emergency care,
    c. Development of haemodinamic service system, introduction of new DRGs for invasive cardiology and oncology chemotherapies, admission of capacity enlargements,
    d. national public health screening programmes (with special emphasis on breast tumour screening);
e) Cost-containment government policies
    a. Besides the DRGs system, the introduction of performance-volume limit (PVL), flotation of basic fees, separation of labor diagnostic account, and the introduction of contracted secondary care account.
    b. 27 per cent decrease in in-patient specialised care capacity under Act CXXXII. of 2006 on the Development of Health Care System;
f) Structural changes and EU funded investments
    a. EU Structural Funds tendering system from the second half of the decade onwards,
    b. surgery streamlined to ambulatory and one-day care,
    c. in-patient paediatric care capacity reduced to half,
    d. extension of emergency units,
    e. spread of matrix structures;
g) Other environmental changes
    a. almost yearly tax and contribution modifications,
    b. spread of private providers and enterprises at the end of the decade,
    c. motorway and road network doubled – significant improvement in access time to hospitals and medical centres.

Based on the number and speed of external environmental factors as described in the above subchapters, the Hungarian hospital sector can now be examined in Lawrence

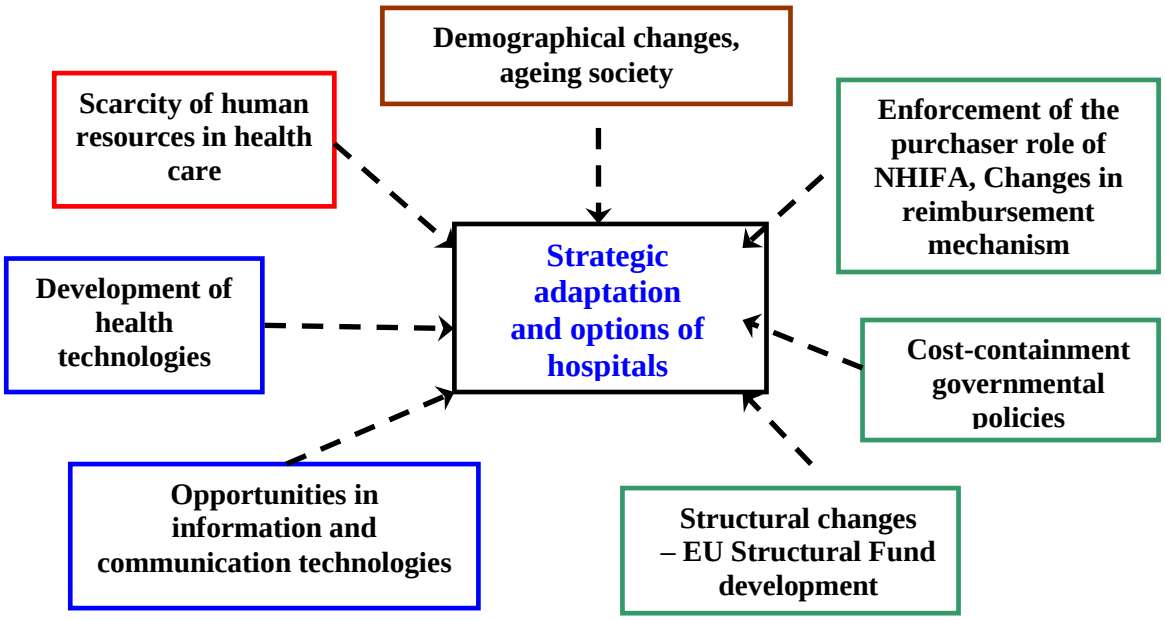
and Lorsch's two-dimensional figure. Major environmental changes in the past ten years number close to twenty, so the number of environmental factors is high, and as is also seen in the above summary list, the high figure was associated with significant and rapid changes. In view of these two factors, the table below shows an altogether turbulent environment.

2.4. Table Number of environmental factors and speed of their change

Speed of change, number of environmental factors	slow	fast
numerous	complex	**turbulent**
few	stable	dynamic

The figure below gives a summary of environmental changes described in Subchapter 2.3.

2.10. Figure Environmental changes affecting strategic adaptation and options of hospitals in Hungary, between 2000 and 2008



Swayne and co-authors developed a strategic position and action assessment model for the description of environmental diversity (Swayne et al., 2007, p. 301.) Factors they used in determining environmental stability were: technological changes, inflation rate, diversity of demand, price differences (zones) of competitive products and services, market entry limit, competitive environment pressure, and price flexibility of demand. Each factor was weighed on a 7-grade scale. Of them, 3–4 factors are more reflexive of the private market based American health scheme. In my earlier analyses I found that the factors figuring in the table below are relevant in the context of Hungarian health

care and insurance (e.g. price competition is irrelevant in domestic health-care environment and in NHIFA funded care).

2.5. Table Intensity of impact of environmental changes on institutional development plans

Determinative factors	Upper values	7	6	5	4	3	2	1	Lower values
demographic change	fast					X			slow
medical technological change	strong		X						weak
IT and ICT change	strong		X						weak
consumer demand change	strong			X					weak
effect of service purchase and financing changes	strong		X						weak
effect of austerity measures	heavy		X						small
effect and potential of EU accession	heavy			X					small
quality and goodwill competition	strong				X				weak
HR decrease	strong		X						weak

Source: own elaboration based on work by Swayne et al.

Based on the above, hospital environment in Hungary can be described as turbulent even in comparison with the business sector.

3 Analysis of the Internal Environment of Hungarian Hospitals

After a detailed introduction in Chapter 2 of the external environmental factors which have a significant impact on the operation of Hungarian hospitals, environment analysis continues in this chapter with an exploration of the internal factors. In analysing hospital organisational structure, Jakab and co-authors put especial emphasis on issues of management autonomy and accountability, and the measure of financial risk assumption and responsibility (Jakab et al. 2002, p. 181). Based on the literature on strategic management (López and Martín, 2006), I aim to analyse the following features of internal operation:

1. ownership structure;
2. hospital size (capacity);
3. professional profile (specialities);
4. technological features.

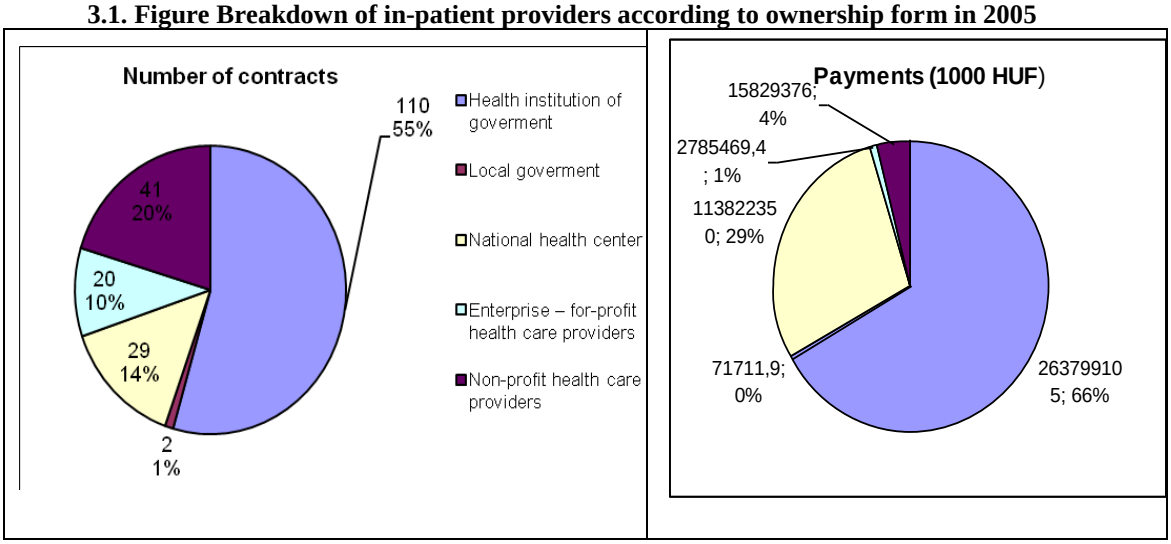
3.1 Internal structure of Hungarian hospitals

3.1.1 Ownership forms and privatisation in the hospital sector

From the mid-1990s onwards, regulatory and financing environments, discussed in Subchapters 2.2 and 2.3, made sector-neutral financing mechanism: thus NHIFA contracts state, local government and church institutions as well as non-profit and for-profit enterprises under the same conditions. The following figure shows the breakdown of hospitals according to ownership.

Privatisation tendencies were significantly different with regard to provider types and sub-funds, as shown in Figure 3.1. As typical forms of privatisation, many small providers (predominantly GP and dental services) emerged on one hand, and on the other, specialist home nursing providers entered the service market in this form from the outset.

3.1. Figure Breakdown of in-patient providers according to ownership form in 2005



Source: NHIFA financing data

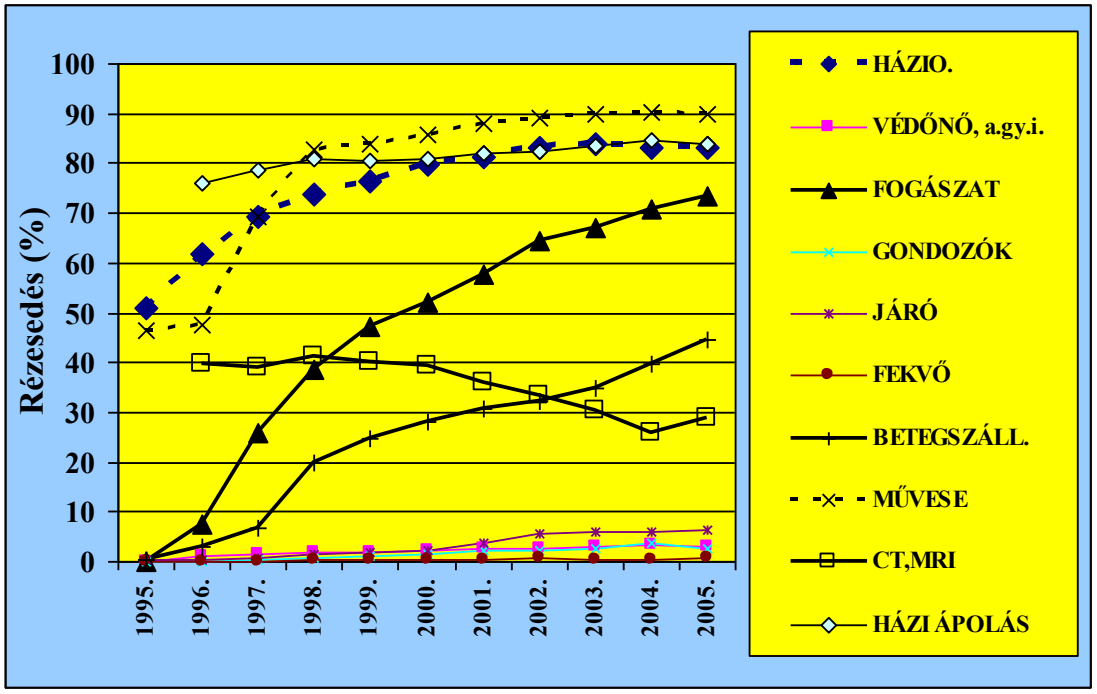
Another tendency was to be observed in the area of high-value technological services, such as dialysis, CT, MRI and laboratory diagnostics, ambulance service, and later PET diagnostics. Out-patient clinics were privatised in a smaller, 10–15 percentage, characteristically in some Budapest districts (e.g. XI, XVII, XXII), and to a lesser degree in provincial towns (e.g. Siklós, Várpalota).

In his recent study Imre Boncz analyses in detail the changes according to ownership types in the last decade (Boncz, 2010). The past two years offer examples of privatisation as well as growing proportion of state ownership, due to the breakdown of some private hospitals.

In the second half of the 1990s, some hospitals or hospital units were transferred to church ownership or administration (e.g. Szent Ferenc Hospital, Buda Charity Sisters Hospital, Bethesda Children's Hospital in Budapest, Nursing Home of the Maltese Charity Service in Vác), but no major privatisation occurred in the sector. From 2005–6 onwards, a new change took place in ownership relations in Hungary. Hospital privatisation began, though moderate in degree. It was a kind of functional privatisation in which operational (administration) rights of public hospitals with obligatory in-area care were ceded to private companies. Proprietary rights of hospital premises and building infrastructure in most cases remained in state or county and municipal local government ownership. (For an outline of the legal environment of hospital privatisation, see footnote[6].)

[6]Several acts and bills on the transformation of medical institutions to business companies, or the privatisation of their assets, were elaborated in 2002 and 2003, but none remained eventually in legal force or passed the normative control of the Constitutional Court (Act CLII of 2001 on the transformation of health-care institutions; Act XLIII of 2003. on health providers and the organisation of public services

3.2. Figure For-profit private providers' share in NHIFA sub-funds between 1995 and 2005



Source: NHIFA financing data processed by Dr Imre Boncz, 2010

*Háziorvos = Primary care; Védőnő, anya-,gy. és ifj.= District nurse services; Fogászat = Dental care; Gondozóintézetek = Dispensaries; Járóbeteg szakellátás = Out-patient specialist care; Fekvőbeteg szakellátás = In-patient specialist care; Beteg- és halottszállítás = Patient transfer; Művese kezelés = Dialysis; Otthoni szakápolá s= Home specialist care; Összesen =Total.

Another tendency was that smaller specialist private institutions were adopted into NHIFA coverage mainly by tender, such as private clinics providing one-day surgery service (e.g. Telki Hospital, Istenhegyi Clinic, Ars Medica in Budapest) within the framework of NHIFA 2003 and 2007 tenders.

In Hungarian legislative environment there are wide-ranging possibilities for ownership changes. In theory, changes from state (ministerial) to local government ownership and vice versa are possible, and in recent years several municipal and county local government-owned institutions have been transferred to medical schools. Under Hungarian legislation, real estate proprietary rights are kept by the previous owner in most cases, while utilisation or trustee rights are ceded to the new owner, for which the decision of the proprietary local government body, or in case of state treasury property, government decision, are necessary.

in health care). Consequently, shifts in ownership and operation took place in the general legislative framework, such as the Act on State Budget (ÁHT), Act on Business Companies (Gt), Act on Civil Procedure (Ptk) and Act on Local Governments, under no special regulation on guarantee, responsibility or quality for the health-care sector. In the referendum of 4 December 2004 the predominant majority voted down privatisation of Hungarian hospitals, which in this case entails a five-year break for re-introduction of bill.

3.1. Table Types and cases of ownership changes and functional privatisation in Hungary in the first decade of the 21st century

From / To	State or ministerial ownership	State medical school ownership	Local government (city or county)	Private ownership	Church, non-profit
state or ministerial ownership	MÁV H, BM H to ÁEK	OITI	OBSI	Parádfürdő State H	BIK
state medical school ownership	OGYK	X	X	X	X
Local government (municipal or county)	X	Baranya County H to PTE; Szeged Municipal H to SZTE; Kazincbarcika Municipal H to DEOEC	X	Siklós H; Körmend Hatvan Gyöngyös Eger County Hs	Mosdós Lung H; Vác Nursing Home of the Maltese Charity Service
Private ownership	X	X	Eger County H; Parádfürdő State H	X	X
church, non-profit	X	X	Mosdós Lung H	X	X

*Source: own elaboration from NHIFA contractual data, H - Hospital

In identifying strategic options and in managerial/proprietary decision-making, considerations as to medical institution or their units or premises should be given over to other ownership or administration have a significant role. In discussing ownership relations in the strategic goals system, however, I do not examine changes in forms of operation, the transformation of budgetary institutions into public benefit company, non-profit company or public limited-liability company.

3.1.2 Impact of ownership relations on hospital efficiency

In international analyses of hospital strategic scope and efficiency, ownership relations are treated as a major factor. In several analyses in the international literature, the efficiency of health-care institutions is examined in the context of ownership changes. In such studies, institutions and institution groups in different ownership types and with different operational forms are classified. Ownership analyses of strongly market-based and multi-insurance health-care schemes especially abound in countries where the number and percentage of for-profit and non-profit hospitals are high. Typical examples of researches and sector-level analyses from the literature in recent years are those conducted by Sloane (Sloan, 2000), Chakravarty (Chakravarty et al., 2005), Guy David (David, 2005) in the US and Annika Herr (Herr, 2008) in Germany. In the course of

these researches several hundred or in the US several thousand hospitals were examined.

In his study, Sloan gives a detailed analysis of the operational efficiency of non-profit hospitals *vis-à-vis* for-profit institutions (Sloan, 2000). After elimination of differences resulting from input price, size, case mix and educational status, no major difference was found between the operational efficiency of for-profit and not-for-profit hospitals.

In his study of the hospital sector between 1960 and 2000 in the US, Guy David focuses on the convergence of size and capacity between for-profit and non-profit hospitals (David, 2005). In examining hospital size he took the number of beds, cases and length of stay as a basis. Changes in the make-up of for-profit (FP) and not-for-profit (NP) hospital groups according to size are demonstrated by concentration curves and their time changes (David, 2005, p. 6). Hospital capacity changes may occur in several ways, such as development, closure, fusion, merger, and shift in operational form. David examined changes of hospital size in periods of four years. He set up hospital types according to the direction of change, such as (1) constant status, (2) exit, (3) entry, and (4) switch for for-profit. The dependent variable of the analysis is the NP/FP rate, the size rate.

One of the findings of the study is that levelling and convergence in hospital size is predominantly due to growing governmental interventions, such as the introduction of uniform DRG-based funding by Medicare, the regulation of the certificate of need, managed care, and the country-wide spread of hospital accreditation (David, 2005, p. 29). Economic environment also induces institutions to change ownership structure. Originally, in earlier decades (1960–1980), non-profit hospitals were characterized by a lower expenditure level owing to tax concessions and tax-free bond issue. MCfp>MCnp ensured competitive advantage for them. Population growth and income growth on one hand, and government subsidies and decrease of communal funds on the other, speed up convergence between FP and NP hospitals.

Chakravarty and co-authors examined changes in the American hospital sector between 1984 and 2000 from the aspect of the impact ownership form exercised on entry and exit decisions (Chakravarty et al., 2005). Based on the relevant literature they processed (Newhouse, 1970, Pauly, 1978, Sloan, 2000), they set out from the assumption that not-for-profit (NFP) and for-profit (FP) hospitals differed in their targets and capital costs. Their hypothesis was that in reaction to changing market conditions, FP hospitals entered or exited the hospital market faster than NFP hospitals. The econometric

method they used for examining entries and exits was the ordered probit model. They concluded that FP hospitals did react faster to demand changes by exit and entry.

Lindrooth and Weisbrod examined the adaptability of hospices to changes in Medicare funding (Lindrooth és Weisbrod, 2007). Their main conclusion was that private hospitals made a better use of financing criteria (financing according to length of stay) than non-profit ones.

In her study written in 2008, Annika Herr was the first to examine the impact of ownership differences on technical and cost efficiency in the entire German federal hospital sector (Herr, 2008). She took the hospital sector of the period between 2000 and 2003 as a basis in her research. The German hospital sector has a varied ownership structure. The federal statistical office classifies hospitals in three categories: public, non-profit (NP) and for-profit (FP) hospitals; church and mining company hospitals are classified as NP hospitals. The trend in Germany is that the percentage of public hospitals decreases (from 45 to 36 per cent between 1992 and 2003), while that of FP hospitals increases (from 15 to 25 per cent). The analysis was carried out with the Stochasticus Frontier Analysis method (SFA). In the period under examination, the average efficiency rate improved somewhat; in the initial year on domestic benchmark data it was 87 and 83 per cent. Herr examined in her study the period which was still characterised by a length of stay based funding. Characteristic of the adaptation of private hospitals to the environment, the average number of length of stay figures at such institutions was demonstrably higher than in NP and public hospitals. Poor efficiency is established in the study from benchmark institutional data against the production function - frontier, with the number of hospital beds and the prices regarded as input. Herr examined whether the institutions reach the highest possible output level at fixed input levels. In her analyses she used total institutional costs, the number of full-time workers (full time equivalent – FTE), while she deducted ambulatory and research costs from total costs. She took the number of weighted cases as result variable.

Economic literature in the United States deals extensively with the difference in cost level and efficiency between state-owned, non-profit and for-profit institutions. The wealth of literature is nurtured by available central statistical data based on performance, a greater stability of the regulatory and financing environment, and from a statistical angle, the great number (7–8 thousand) of hospitals.

Boncz in his study (Boncz, 2010) conducts a literature review of the working efficiency and efficacy of other countries' for-profit and non-profit hospitals. The author on the whole suggests that the for-profit hospitals do not have better efficiency and efficacy indeces than the non-profit institutions.

In Hungary, analysis of the operation of non-profit and for-profit hospitals is rendered difficult by several factors. In the best part of the period under examination, up until 2005–2006, very few private hospitals (5–6 church institutions and 3–4 other institutions with one-day surgery service) appeared in public financing. Non-profit institutional forms (foundation and association hospitals) gained ground mostly in chronic care, nursing and hospice services which supplement acute care. Meanwhile, 100 per cent local government-owned institutions were transformed first into public benefit companies (PBC), then from 2009 into non-profit enterprises (Dombóvár and Dunaújváros Town Hospitals, Hévíz State Hospital). Functional privatisation appeared in the next wave, in the course of which several newly founded firms obtained operational licence in the domestic hospital sector (between 2007 and 2009, already ten institutions were operated by for-profit private firms). This transformation took greater momentum only after 2006, and what is more, between 2009 and 2010 some institutions reverted to local government administration. In contrast to other countries, this situation does not make analyses spanning longer periods possible.

Beyond the small number of hospitals in certain ownership types, research is difficult also in view of the fact that no sector-wide, institution-level annual cost data and no systematic data collection of input prices – which appear in analyses in the US as major variables – are available in Hungary. Further analysis problems are posed by the fact that the great majority of Hungarian private hospitals operate in a narrow service range, such as long-term care, one-day or ambulatory care (e.g. Mosdós Lung-treatment Hospital; Kelen Hospital in Budapest – one-day surgery and dermatology; Nursing Home of the Maltese Charity Service in Vác).

In Hungarian environment, efficiency differences in the operation and performance of public and private service organisations could only be examined in the areas of CT/MRI, laboratory diagnostics, ambulance and dialysis services on account of their high percentage, as well as in ambulatory specialist care, where already from the second half of the 1990s local government owned out-patient polyclinics underwent functional privatisation and were taken over by private firms operating as limited liability

companies or share companies. The examination of such companies, however, is outside the scope of this dissertation.

3.2 Size of hospitals

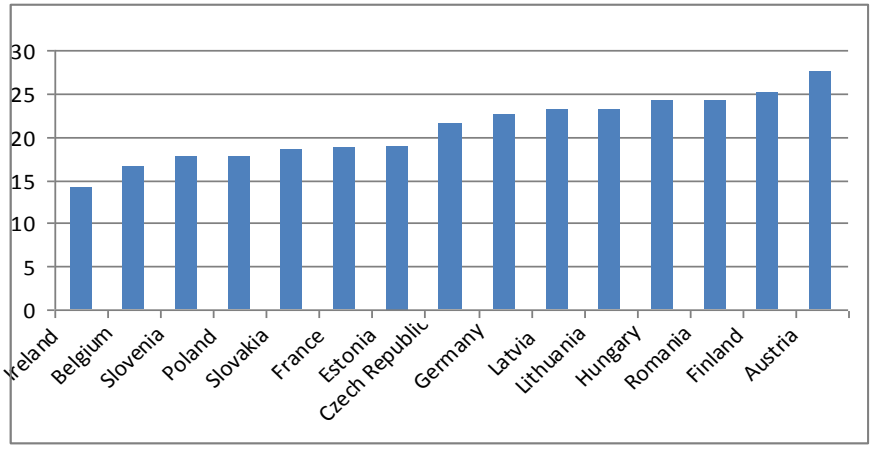
Hospital size is traditionally measured by the number of beds in both international and domestic literature. In my analysis I aim to concentrate on acute in-patient care, but in certain statistics and international comparative analyses the total number of beds are used, which I indicate in the tables and explanations (for an outlook on data analysis in the Hungarian hospital sector, see Appendix 2.5). Alongside the number of beds, I also use the annual discharge (or admission) numbers in characterising hospital size and performance volume.

The first question to be answered is to what measure the Hungarian hospital sector differs in capacity volume and in proportion to the population from data of the EU or OECD countries. Hungary is in general classified among countries with a high number of hospital beds; at the same time, such statistical data reveal that neither the extent of demand, nor other factors were taken into account. International comparison in the analysis of the Hungarian hospital sector is of importance for a proper handling of the often voiced criticism as to the excessive number of beds and in-patient cases. In the later part of the subchapter I concentrate on Hungarian data and the distribution of hospital beds. Values and time changes in the concentration of the hospital sector are discussed in Subchapter 5.3.

3.2.1 Characteristic data of the Hungarian hospital sector in international comparison

I begin the examination of the domestic hospital sector with an international comparison of in-patient admissions (case numbers) and bed capacities. On the basis of available WHO data for 2005–2006, the specific in-patient case number in Hungary (242.3 cases/1000 population) is the fourth highest. With regard to both case numbers and bed numbers, data from the Central European countries show the highest values (e.g. 276 in Austria, 242.6 in Romania, 215.1 in the Czech Republic cases/1000 inhabitants), including also Germany (226.4 cases/1000 inhabitants); Hungarian data differ from the specific values of neighbouring countries in no significant measure.

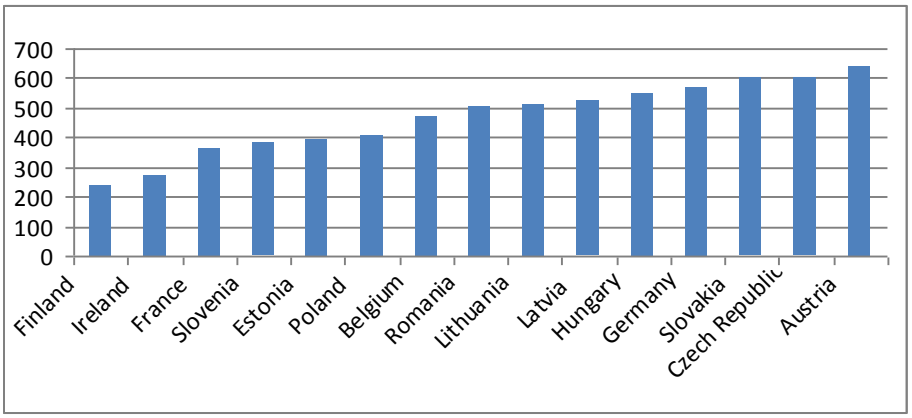
3.3. Figure In-patient admissions per 1000 inhabitants in EU member countries in 2006



Source: WHO database

The picture is similar with regard to the number of beds – the Hungarian number of beds per 100 thousand inhabitants is typical in the entire region (Austria, Slovakia, the Czech Republic). Similar data appear in the Baltic, ex-Soviet Union member countries where voluntaristic hospital building policies also prevailed for decades. Differences in a more favourable direction from the bed and case numbers in this region are found mostly in Poland and Slovenia.

3.4. Figure Number of acute beds per 100 thousand population in EU member countries in 2006



Source: WHO data base

In the opening part of the subchapter I raised the question as to what extent higher hospitalisation rate in Hungary can be explained by higher mortality and morbidity rates characteristic of the country. In this respect, I regard mortality rate, by proxy as it were, as a variable reflexive of demand. Demand for health care can also be determined by premature deaths, the number and percentage of chronic cases, and morbidity (incidence and prevalence) data.

Based on WHO data base of 2005, I carried out a comparative examination of mortality rates and in-patient cases in 25 countries (the 2006 mortality rate in Hungary was not to

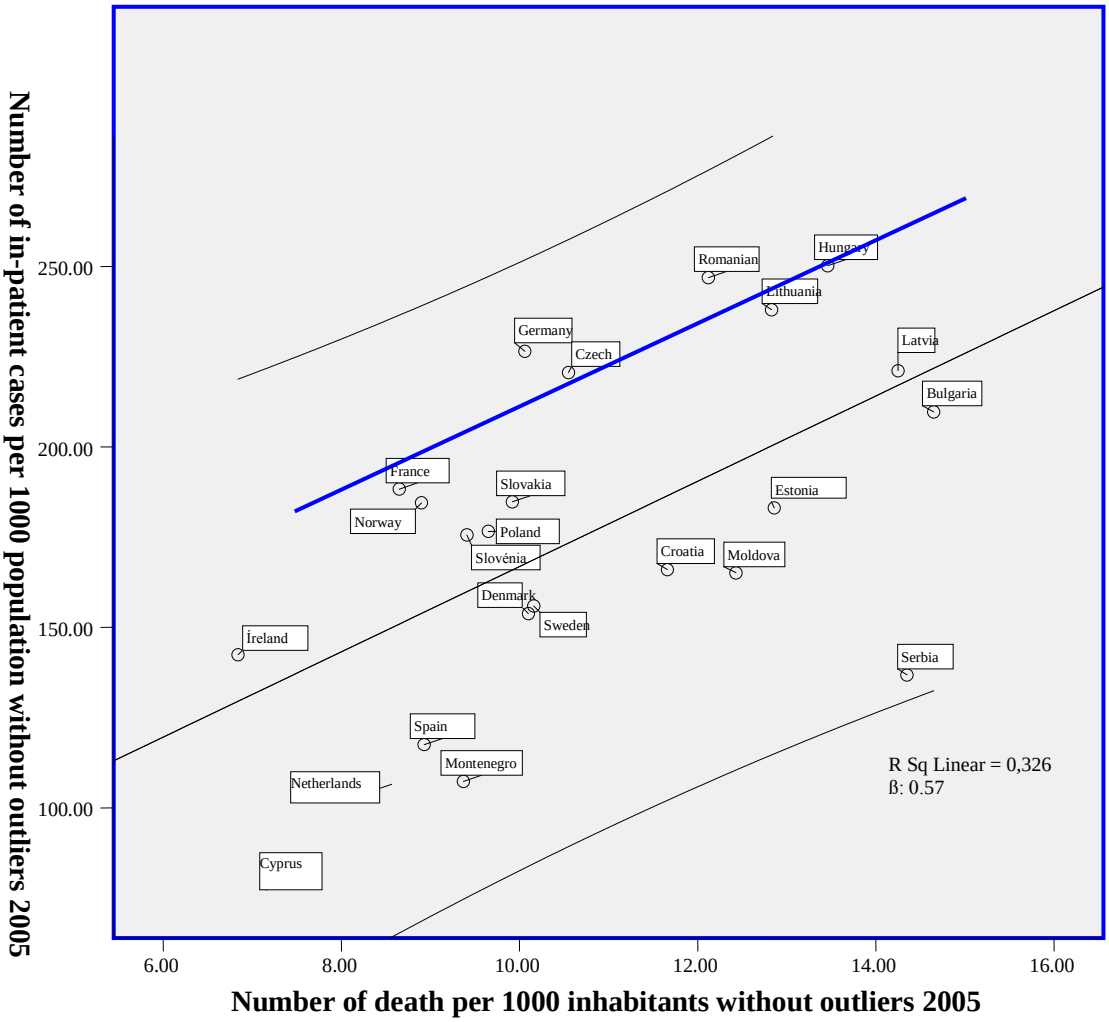
be found in the 2006 WHO data base). In the first figure in Appendix 3.1, I represented countries with poorer mortality data with a vertical line. All of them are former socialist countries in Central, East and Southern Europe and the Baltic region. In four former socialist countries, however, mortality rates are lower (the Czech Republic, Poland, Slovakia and Slovenia). In another interpretation of the figures, high mortality rate is not necessarily concomitant with a high number of in-patient cases, which is mostly explained by poorer health-care system and lower capacity.

In the following I examine mortality and in-patient case numbers per thousand population in the EU countries based on 2005 data (see Appendix 3.1). In two developed industrial countries, Finland and Austria, the high number of hospital cases cannot be explained by high mortality rates (9.1 per thousand in Finland and 9.13 in Austria), but the number of in-patients cases per thousand is especially high in international comparison (257 in Finland and 273 in Austria). As they can be regarded as outliers, I omitted them from the following analysis.

Country data of two variables in the figure, mortality rate and hospitalisation rate, show a medium strong correlation (Pearson correlation) with a high significance level (p=0,004). I represented Hungary's situation in the above figure with a separate regression curve.

To make it simple, one may say that high hospital case numbers in Hungary can be almost fully explained by the high mortality rate. The joint curve shows that that in the case of the Czech Republic and France lower hospital case number is proportionate to lower mortality rate: moving left on the axis, 20 per cent decrease in mortality rate yields a 15 per cent decrease in hospital cases. However, the above analysis is unsatisfactory in view of countries where the joint curve shows correlation at a lower level, such as in Bulgaria, Poland, Slovenia, Sweden and Denmark. Here the number of in-patient cases is 15 to 20 per cent lower than in the countries with the highest values. These data unambiguously support the argument that based on 2006–2006 data, there were significant (15 to 20 per cent) efficiency reserves in in-patient cases in the Hungarian health-care scheme.

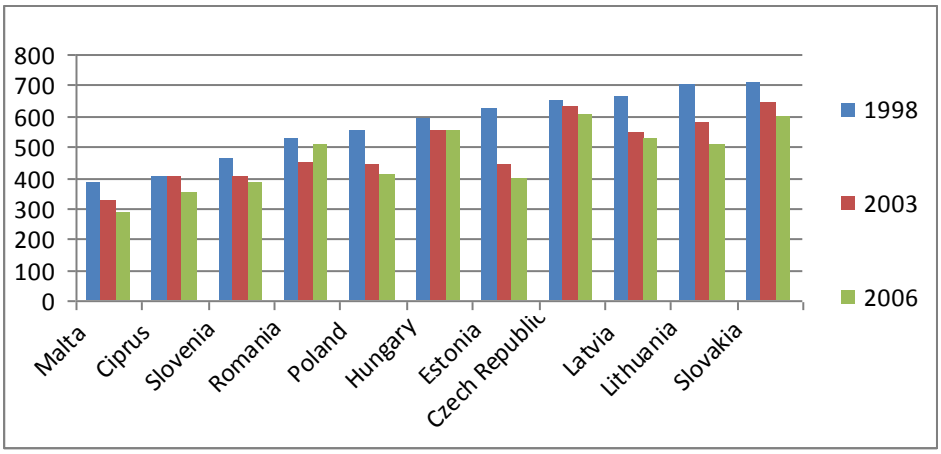
3.5. Figure Mortality rate per 1000 inhabitants compared to in-patient cases in some OECD countries in 2005 without outliers (Austria, Finland)



*Source: own elaboration

Since Hungary's EU accession, the then existing 15 countries (EU15) and the 12 countries who joined after 2004 (EU12) are usually handled separately in the statistics. Reflexive also of the state of economic and social development, this distinction also appears in my analysis of hospital sectors and capacities. The two tables below show the number of acute beds per 100 thousand and the number of in-patient cases per thousand in the EU12 countries in 1998, 2003 and 2006. Other figures of the number of total beds and care days in the EU15 and EU12 are to be found in Appendix 3.1.

3.6. Figure Number of acute beds per 100 thousand inhabitants in the EU12 countries

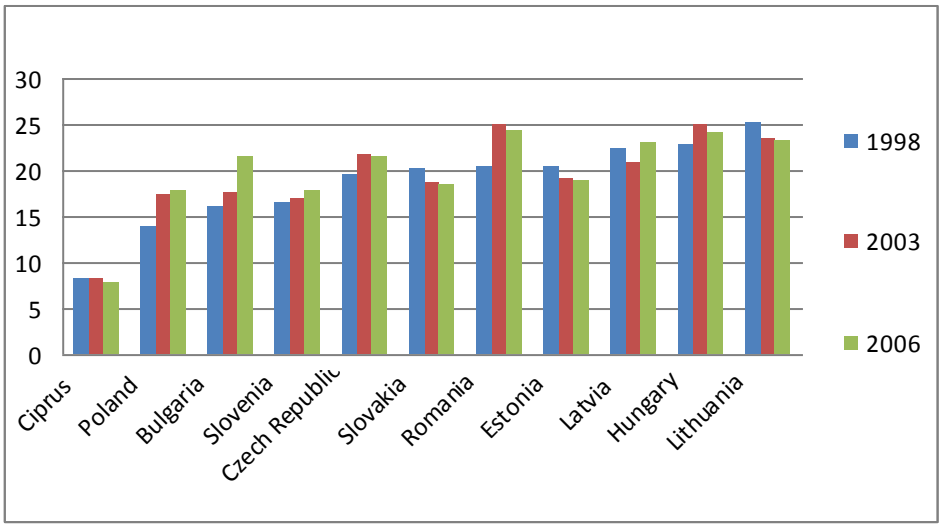


Source: WHO database

Focusing on the Central and East European countries, it is clear that Hungarian data are in the strong midfield. Another conclusion to be drawn from the chart is that in the 10 years under examination in this dissertation, the number of hospital beds in newly acceded countries decreased considerably from 1998 on, while the Hungarian figure was stagnant. This too highlights the pressing necessity for a drastic reduction in the number of beds in Hungary in 2007. Bed capacity in the EU12 countries was about 500–700 per 100 thousand population in the former socialist countries and Soviet member states in 1998 (I do not deal here with the bed numbers reflecting a different cultural environment in Cyprus and Malta). Data of the hospital sector of Slovenia and Romania show the lowest values in 1998, while those of Estonia and Slovenia are the most favourable in the last year of my examination. The greatest change took place in Estonia, where the hospital sector was transformed under a long-term strategy called Master Plan.

In analysing hospitalisation rates in the EU12, Hungary's is the highest, though very close to respective data in Slovakia and Latvia. These figures indicate that high bed number capacities have better utilisation and occupancy, for which – alongside the already mentioned high mortality and morbidity rates – the prompting effect in increasing case numbers under HDG-based performance financing can probably be accounted for.

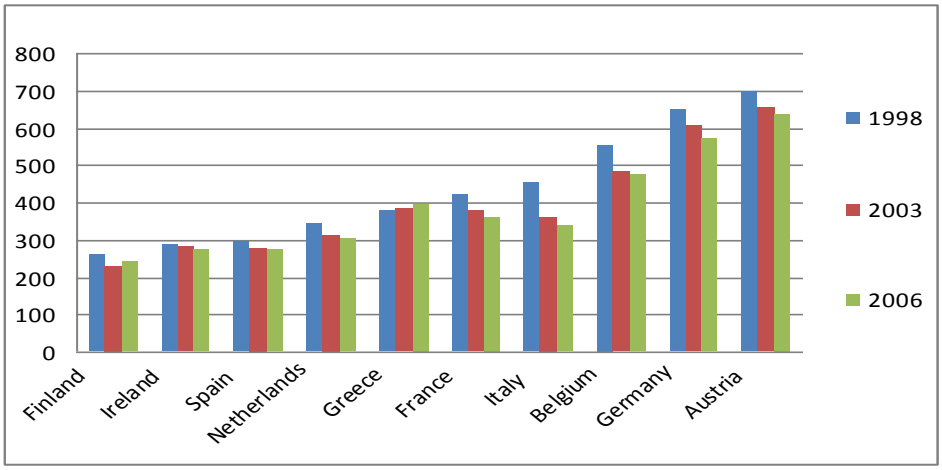
3.7. Figure Number of in-patient cases per 1000 inhabitants in the EU12 countries



Source: WHO database

Figure 3.5 can be taken as a basis for comparison with the EU15 countries. Interestingly enough, the high acute-bed capacities in Austria and Germany may point to a Central European peculiarity. In comparison, respective data in both the Mediterranean and the Scandinavian countries fall far behind data in those two countries; also, there is a significant, more than 100 per cent difference between the data of five countries with the two highest and two lowest values.

3.8. Figure Number of acute care beds per 100 thousand inhabitants in the EU15 countries



Source: WHO database

The number of hospital cases can also be compared to variables indicating other demands, such as premature deaths (number and percentage of life-year losses) or morbidity rates. The very high number of hospital beds in international comparison can also be explained by the high number and percentage of chronic patients; however, more researches are needed to substantiate it.

3.2.2 The composition of Hungarian hospital sector according to size

We now focus our attention on Hungarian data. My aim is to examine changes in the Hungarian hospital sector, its major capacity and performance indicators, and their correlations with as well as differences from other major specific performance indicators of hospitals. In this area, the following research questions are analysed:

a) distribution of hospitals by capacity (histogram);
b) concentration of the hospital sector (Lorenz curve);
c) correlation between the numbers of hospital beds and annual acute in-patient specialist care cases (scatter plot);
d) correlation between the numbers of annual in-patient specialist care cases and the case mix (CMI) (scatter plot).

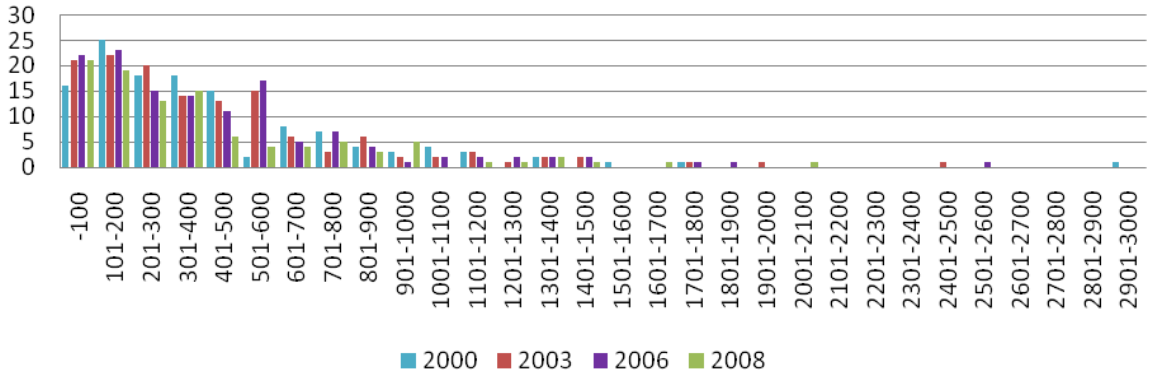
For a starting-point of the analysis, the circle of acute hospitals is considered as a type of service sector. In the following the size, number, hospital types, proportion of hospitals with low and high number of beds, their major performance indicators, their differences and time changes are examined. For the full list and major characteristics of hospitals under analysis, see Appendix 1.1.

As seen in Figure 3.9, the number of hospitals with acute beds under 100 increased somewhat in the period under examination, while those in categories with 100–200 and 200–300 beds decreased. Furthermore, a change of lesser extent can be observed between 2003 and 2006, when the number of hospitals with 800–900 and 200–300 beds decreased, and the number of hospitals with 700–800 and 100–200 beds increased. Causes for this are to be found in upgrading conveniences and to a lesser degree in mergers after certain earmarked investments. In some cases, changes in the opposite direction are found on account of mergers and fusions of institutions, which occurred in smaller numbers already between 2003 and 2005 (e.g. the Pécs Honvéd Hospital with 227 beds was in 2007 incorporated in the Medical School of Pécs University, thus raising bed number of the latter to 1461; Ödön Kerpel-Frónius Children's Hospital in Pécs merged with Baranya County Hospital with a total of 724 beds; Szeged Children's Hospital merged with the Medical School of the University of Szeged resulting in a centre with 1291 beds).

A change of considerably higher extent was caused by the enforcement of Act CXXXII of 2006 (Eftv), resulting in a nationwide decrease of 27 per cent in the number of beds. As a consequence, by 2008 the number of institutions in the 900–1000-bed category increased, owing to the decrease in the number of beds in institutions earlier with 1000–

1200 beds. Furthermore, major concentrations and mergers of institutions were carried out. Typical examples in Budapest are the State Health Care Centre with 1786 beds, which was formed from the capacities and premises of the former HM, BM and MÁV, as well as OGYK. In Miskolc, two municipal hospitals with 369 and 988 beds respectively were merged under the name MISEK. In the chart, extremes appear throughout at the Budapest Semmelweis University, with varying number of beds (in 2000 it was merged with HIETE; in 2001 OGYK was created; by 2008 the 25 per cent bed number decrease under the impact of Eftv is evident).

3.9. Figure Bed number distribution by groups of 100 beds in hospitals with acute care profile in Hungary between 2000 and 2008



Source: own elaboration based NHIFA financial data

I examined the values of the above histogram also with descriptive statistical methods, the values of which are shown in the table below.

3.2. Table Distribution of hospitals with acute beds in groups increasing by 100 beds, between 2000 and 2008

Number of acute beds between 2000 and 2008				
	2000	**2003**	**2006**	**2008**
Mean	441.29	445.77	450.80	419.42
Standard deviation	36.32	35.10	36.06	39.46
Trimmed mean (5%)	396.60	399.37	404.01	378.28
Minimum	36	36	36	20
Maximum	2907	2444	2563	2079
Skewness	2.45	1.99	2.03	1.55
Kurtosis	9.92	5.24	5.72	2.51

Source: own elaboration based on NHIFA financing data

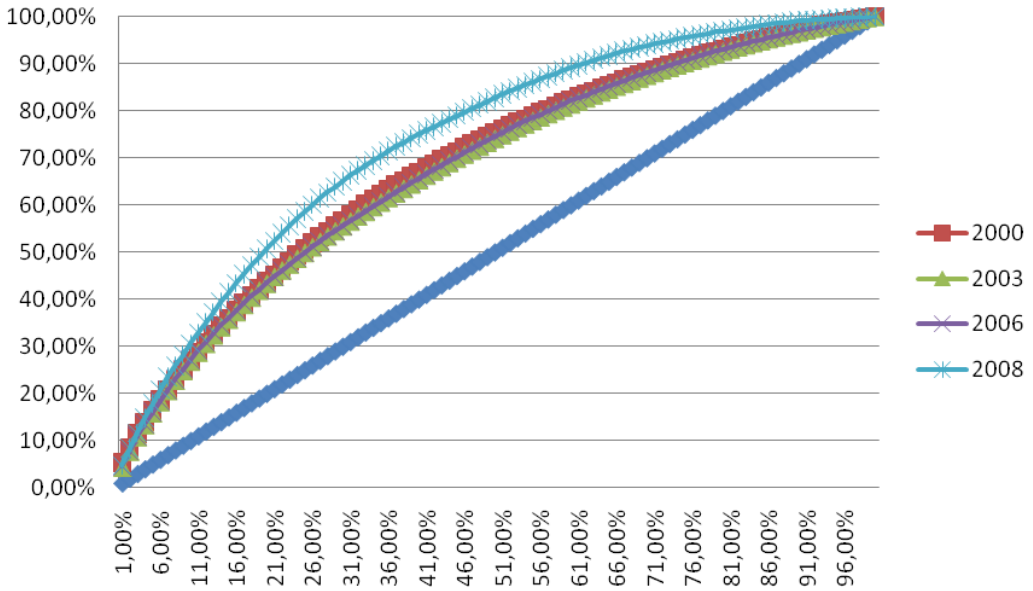
In the distribution of the hospital sector according to the number of beds, a powerful shift to the left is to be observed with regard to skewness between 2000 and 2008, which was brought about naturally by the separation of OGYK and SE, the institutions representing extremes. The shift between the kurtosis of the distribution is significant between the beginning and the end of the period under examination.

In examining changes in the hospital sector it emerges that institutional managements had a relatively small scope for making independent decisions. With regard to the strict regulations in capacity and financing roles, one can conclude that in the decade under examination ownership decisions and central governmental (legislative) decisions played a more definite role in hospital capacity changes than hospital management decisions on affecting independent structures.

3.2.3 Changes in the concentration of the hospital section in Hungary

In this subchapter I examine the concentration index of the Hungarian acute-care hospital sector according to the number of beds and cases and the accomplished weight. In calculating concentration index, I adapted the Herfindahl–Hirschmann Index (HHI)[7] to domestic circumstances, which is widely used in the international literature and indicates the market share weight of the 50 largest organisations in a given market (Hirshman, 1964; Warren-Boulton et al., 1990).

3.10. Figure Changes in the distribution of operating acute beds between 2000 and 2008



Source: NHIFA financial data
*x axis: from the smallest to the highest bed number of hospitals , y axis: cumulated number of hospital beds

The HHI is used also in the analysis of classification and soft budget constraint in the hospital sector (Yu-Chu Shen, Eggleston, 2008). As can be seen in the following figure, between 2000 and 2008 there were no major differences in the concentration of the

[7] Herfindahl Index (also called the Herfindahl-Hirschman Index) is a measure of concentration equal to the sum of the squared market shares of companies in the given market, with values between 1/N and 1 where N is the number of companies on the market.

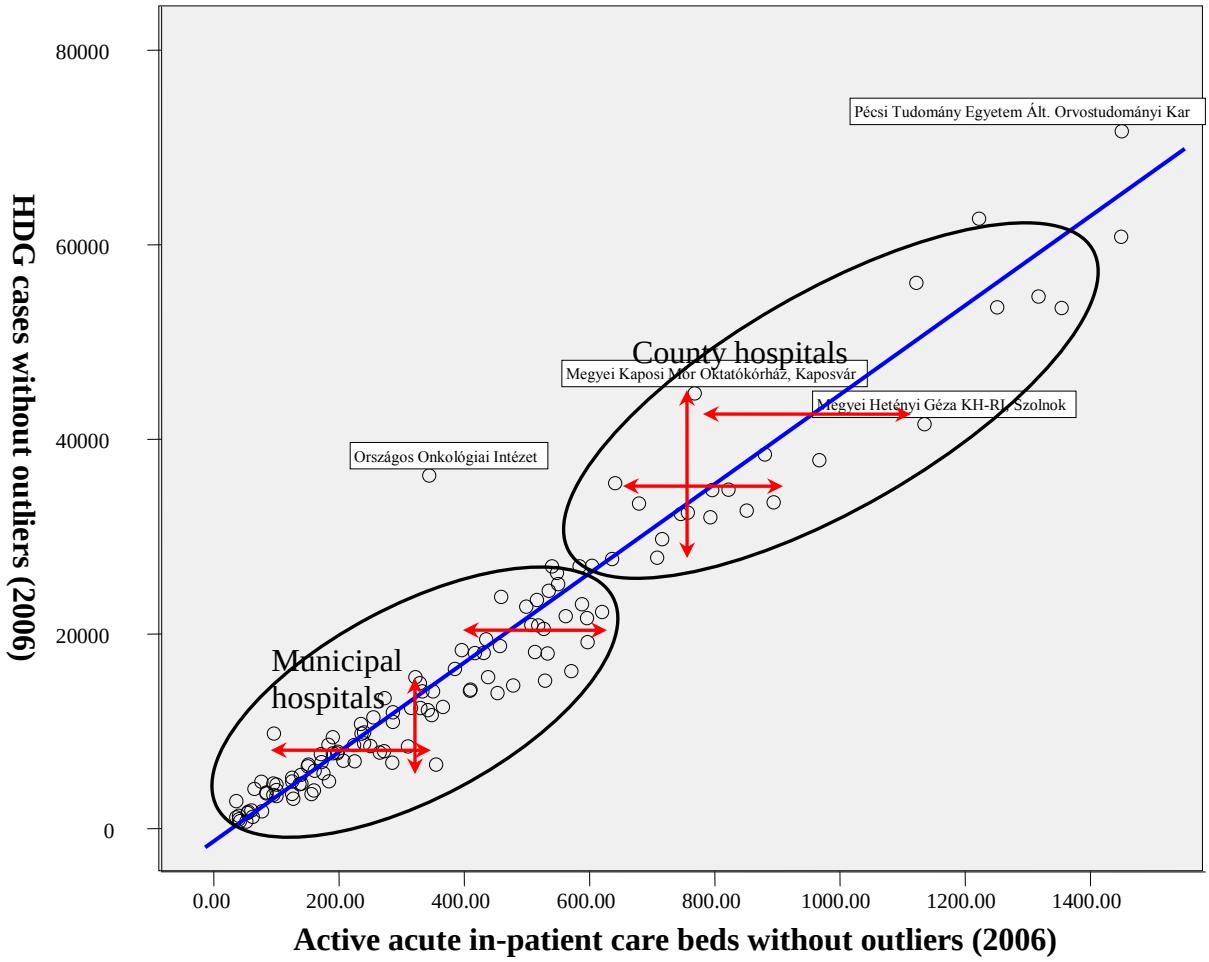
sector. Subsequent to the enforcement of the Eftv, the distribution of hospital capacity changed and concentration increased.

In the following, I examine the correlation between the number of acute hospital beds and the number of acute in-patient care cases, which I carried out with respect to both the entire hospital sector (see Appendix 3.2) and a narrower circle of institutions, from which I omitted some hospitals with extreme data (National Institute of Neurological Surgery, György Gottsegen National Institute of Cardiology in Budapest, State Cardiology Hospital in Balatonfüred), which count as outliers as regards the number of beds and yearly cases or extremely high CMI (see Appendix 3.2). The case number/bed number value in these institutions surpasses yearly sector averages by 80 to 300 per cent.

The angle of the joint curve is close to 45^{o} (43^{o} precisely), which indicates that there is a linear correlation between the numbers of hospital beds and cases in the entire hospital sector, with coefficient value of 1 (or close to 1); in other words, 1 per cent increase of hospital beds (as input factor) results in close to 1 per cent increase in case number. As is well observable in the figure, naturally there are also institutions operating in the area both above and below the curve, which clearly indicates differences in hospital efficiency. With the outliers omitted in the analysis below, the distribution of the institutions is more observable.

Differences in efficiency can be interpreted from two approaches – the number of cases attended to with identical numbers of beds (with fixed input, the output is maximised), or the number of beds needed to reach identical annual case numbers (with fixed output, the input is maximised). In calculating case numbers per bed numbers, efficiency differences of 15 to 20 per cent can be found among municipal, county or Budapest institutions with similar profiles. Such differences direct attention to strategic options and decision alternatives to be made by the management as well as to benchmark data. (For typical examples of institutions, see Appendix 3.2). This analysis is significant and assigns the directions of causes of efficiency differences (input-optimization or output-optimization) rather than the exact values, but at the same time in order to increase the validity of the exact values, it is necessary to conduct the standardization with several factors like the professional structure of the hospitals or the variables typical for the composition of patients. Further constraining factor of this analysis is the introduction of the PVL-system in 2004 that is an administrative constraint for the hospitals with the limitation of case numbers besides given bed-capacity.

3.11. Figure Relationships between acute in-patient care bed numbers of hospitals and acute in-patient cases in Hungary without outliers, 2006



Source: own elaboration from NHIFA financing data

I made another analysis with respect to the correlation between acute beds and CMIs (Appendix 3.2). In examining the connection between hospital beds and CMIs with the Pearson correlation calculation (p=0.00) I found that the result was significant in every respect, at the same time the CMIs showed weak or medium correlation with the numbers of acute beds and HDG cases (0.443 and 0.468) even without outliers. This means that even omitting special national and specialist institutions, significant differences exist between CMI values of institutions with identical type and capacity.

From the aspect of institutional management strategy, this interpretation of efficiency points to the fact that benchmark data must be given increased attention within the hospital sector. Naturally, differences should be thoroughly explored in the strategic analyses of particular institutions because they may be explained in part by differences in profile. For institutions in leading positions, the targets may be the preservation or improvement of this position. For the management of institutions in detrimental position, the target may be the exploration of internal problems in provision and organisation and reaching the standard of more efficient institutions. Another lesson

resulting from the analyses is that specific indicators characterising the operation of an institution – CMI, average length of stay (ALOS), case per bed number, monthly/annual case per bed number, monthly/annual weight per one bed – might be basic indicators for measuring institutional efficiency and their strategic goals.

3.3 Changes in professional profile (specialities)

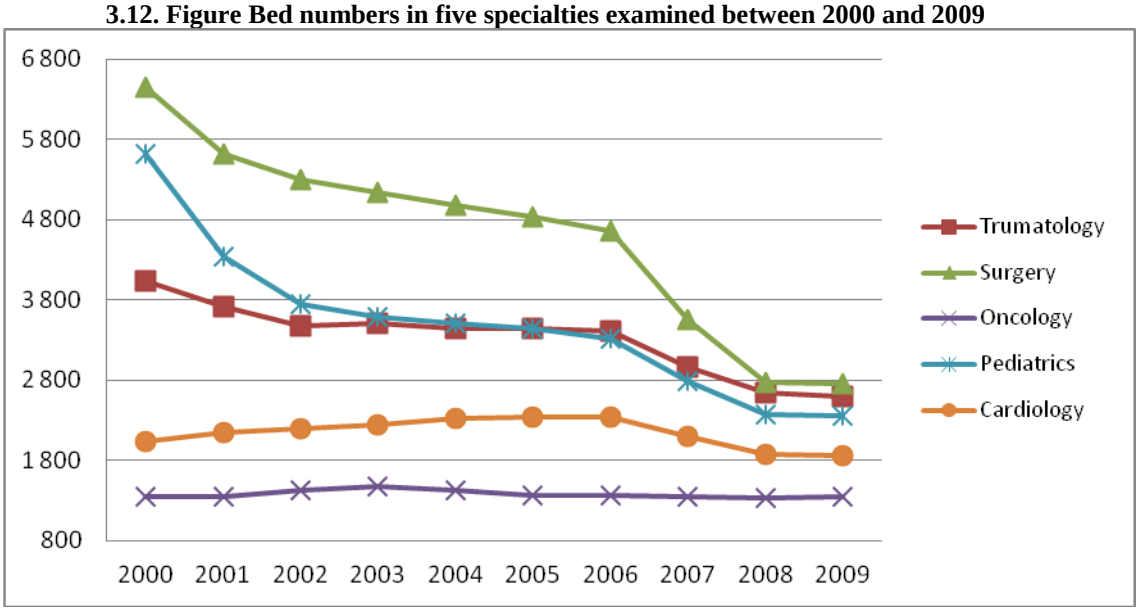
In this subchapter I analyse two areas – in the first place, changes in the traditional medical specialisation and profile elements and in the second place the spread of one-day surgery as an example of entirely new profile elements. (Care forms replacing acute hospital care forms are demonstrated in the figure in Appendix 4.3.)

3.3.1 Analysis of hospital capacity, case number and performance in major medical specialties

Part of the medical specialties examined in detail below operated in a dynamically changing demographic and technological environment, and others in a static or less changing environment in the last ten years. These areas can be regarded as base specialties in hospital care, thus changes in them bear down significantly on the entire hospital sector. Institution managements had basically a narrow margin in deciding which specialties to preserve, but they did have a margin, if only moderate, in shaping their internal make-up, capacity decrease or increase, and the introduction of special interventions and therapies. Typical examples are the introduction of invasive cardiology alongside cardiology, minimal invasive procedures alongside traditional surgical care, or increased percentage of one-day care. Under the pressures of demographic and technological trends and budget austerity measures, institutional managements may also decide on downsizing certain care types insofar the services are taken over by other providers in the vicinity. Typical decisions are the closure of separate cardiology services and their merger in the matrix of internal medicine, the closure of the paediatrics departments, or the fusion of several departments and a significant decrease of capacities. Major characteristics of the medical specialties under examination and determinant environmental impacts in the last ten years are shown in the table below. (Detailed capacity and chronological time-series data of specialty groups are shown in Appendix 3.3.) Financing data show the yearly share in percentage of the given specialty group compared to HDG funding, which indicates the weight of the given specialty in the entire acute in-patient specialist care. In the analyses, I use in the first round the capacity and performance data of NHIFA, starting out from yearly

national data, to establish characteristics of national capacities (bed numbers), case numbers, average length of stay, and CMIs of the given specialties.

3.12. Figure Bed numbers in five specialties examined between 2000 and 2009

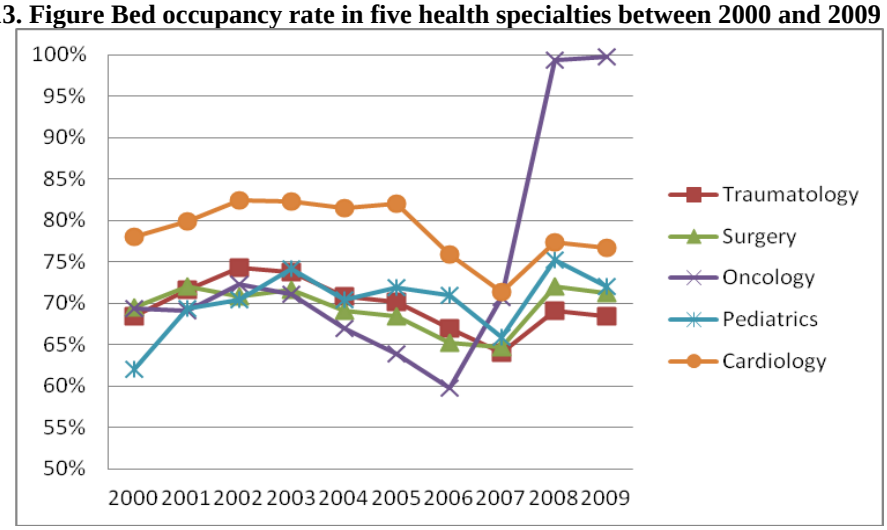


Source: own development based on NHIFA financing data

There is correlation between certain indicators of the five specialties examined; in some case they point to the same direction and in others, to the opposite direction. For instance, bed occupancy rate is the quotient of care days and the number of beds (*365 days) and the resultant of changes in them. Average length of stay is the quotient of all care days and the number of cases. Among macro-level analysis I examine the share of a given specialty of the total number of beds, annual number of cases and annual NHIFA funding.

Owing to environmental challenges, to the decreasing trend in cases and technological changes, and to a lesser degree to shortage of physicians, the largest drop of bed numbers took place in surgical and paediatric care, and to a lesser degree, in traumatology. In most specialties under examination, bed occupancy changed in the same direction in the last ten years. Oncological care shows a degree of difference from this trend, where the spread of curative treatments (more than one patient treated per bed per day) renders the interpretation of the result methodologically difficult.

3.13. Figure Bed occupancy rate in five health specialties between 2000 and 2009



Source: own elaboration based on NHIFA financing data

The analyses are then extended to HDG performances on one hand and to individual institutions on the other, in order to establish whether characteristic changes in the medical specialties under examination are representative of the entire sector or the differing data of the institutions concerned and their differing adaptation to the environment are to be accounted for. In drawing the circle of institutions to be examined in the analyses by medical specialty I was selective, omitting those with incomplete periods, those in which, after transformation into matrix, no itemised data on the performance of the given specialty were available, and those where institutional fusions and transformations rendered the examination of chronological data unfeasible.

Major characteristics of cardiological care

In the nine years under examination, the **number of beds** decreased from 2033 to 1852 (9 per cent). The decrease, however, was not linear; until 2006 there was a minimal and almost even increase, while in 2007, owing to current health policy trends, the number cardiological beds decreased as well (by 10 per cent), continuing in 2008 (11 per cent) and in 2009 (1 per cent).

The **number of cases** altogether increased (24 per cent), which was not linear either; until 2005 there was an even and relatively strong increase (35 per cent), in the subsequent two years a powerful decrease from 105 110 to 89 811 (24 per cent), then it became stagnant. The decrease which took place between 2006 and 2007 can be traced back to three causes:

1. in acute infarction treatment, acute intervention became general;
2. general capacity (bed number) downsizing led to waiting lists in chronic care, readmissions and elective interventions;

3. number of patients to be treated at the same time was also limited by the abolition of degression in funding in the summer of 2006 and the introduction of capped budget.

Owing to technological developments, the **average length of stay in hospitals** decreased lineally, from 8.46 to 5.72 days (32 per cent). The same developments account for a continuously rising **CMI,** from 1.36 to 2.10 (65 per cent), the highest value of all the specialties under examination in the nine years.

The above changes are mirrored in **bed occupancy**, which in 2007 was the lowest in ten years (71.4 per cent), despite the significant decrease in bed numbers. Apart from this drop, this indicator showed no major changes between 2000 and 2009. Cardiological **weights** showed a continuous increase, from 93 297 to 188 789 in the nine years under examination (~50 per cent). Considering the increase of case number by half this size, the 65 per cent increase of CMI, and the 35 per cent decrease in length of stay days per case, it is clear that the medical profession paid attention to the changes in care to be reflected in HDGs and their weights.

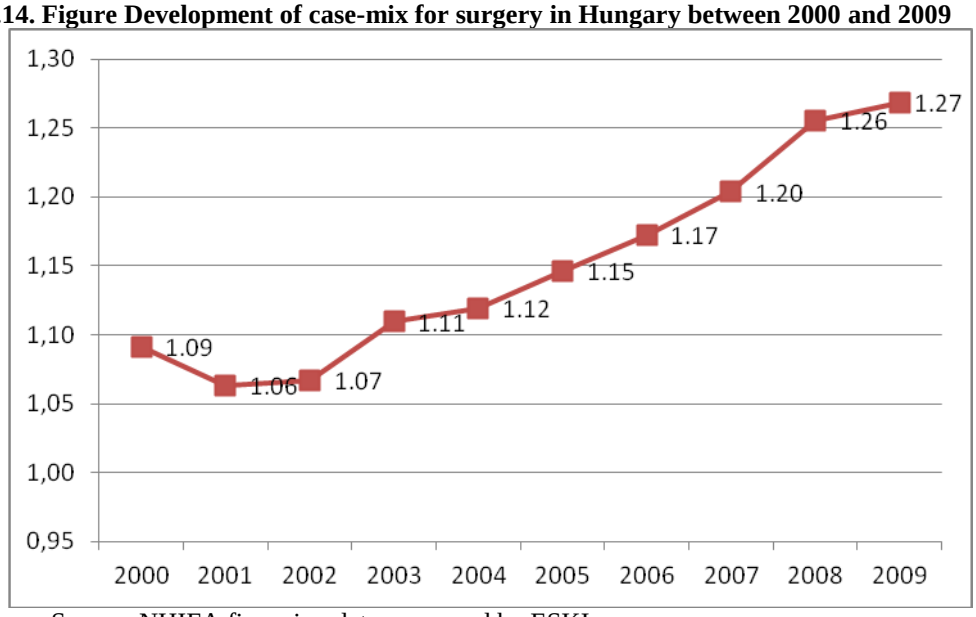
Major characteristics of traumatological care

The period under examination saw a significant decrease in traumatological **beds**, from 3501 in 2003 to 2602 in 2008 (26 per cent). The decrease of **care days** was even greater, 31 per cent (from 943 thousand to 651.2 thousand). As length of stay decreased to a greater extent than the total number of beds in the country, despite the 26 per cent capacity decrease, **bed occupancy** decreased by 5.2 per cent (from 73.8 to 68.6 per cent). In traumatological care the **average length of stay** changed to the least extent, by 12 per cent between 2003 and 2009. **CMI** remained very stable at the same time, with values 1.33 and 1.41, which indicates that the gravity of cases did not change on the whole, nor did the technological content of therapies in a significant way in the period.

The transformation of surgical care

The **number of surgical beds** showed the greatest decrease (58 per cent) in the period. Fifty per cent of the 3791 beds was closed between 2006 and 2008. In this period, one-day surgery was strongly encouraged, and in 2008 ambulatory institutions could also join among those providing one-day surgery. Thus it happened that in 2009 the number of institutions providing one-day surgery (70) surpassed the number of those providing longer in-patient care (65).

3.14. Figure Development of case-mix for surgery in Hungary between 2000 and 2009



Source: NHIFA financing data processed by ESKI

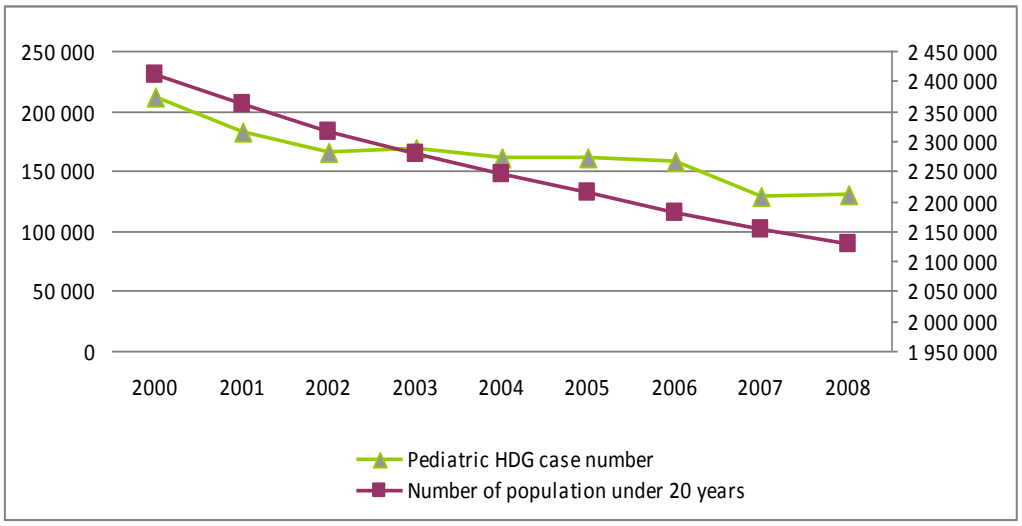
The **case number** significantly decreased altogether – in 2009, 101 446 less interventions were made than in 2000 (47 per cent decrease). **One-day surgery** appeared in funding reports for the first time in 2004, with one institution reporting 500 cases. By next year the number trebled (1667 cases), representing still a mere fraction of total cases (below 1 per cent). 2008 brought a breakthrough, when more than 7.5 per cent of surgical interventions were performed in one-day services. The change in CMI well characterises the change surgery underwent: hospitals CMIs showed a significant and even increase (25 per cent), which is reflective of the appearance of one-day surgery in simpler cases on one hand (CMI here is around 0.4), and on the other, the spread of new surgical techniques (laparoscopy) and interventive care forms. Interestingly enough, surgical technical development is not mirrored in **length of stay per case**: it decreased from 7.53 to 6.14 days, merely by 18 per cent. This may indicate that genuinely severe cases were treated in the hospitals where the length of stay could not significantly be reduced. This indicator was calculated without one-day care data. **Bed occupancy** shows a hectic curve owing to ongoing changes in surgery, in part professional, in part structural: it was around 70 per cent, with the exception of 2006 and 2007 when structural transformation hit surgical capacity. In these years, when surgical units were mostly reorganised, bed occupancy was around 65 per cent. Changes in funding also strongly affected surgery, because similarly to the decrease in bed and case numbers, the **weight number** was considerably lower in 2009 than in 2000: the weight of the entire specialty decreased from 235 979 to 138 797 (41 per cent decrease).

Within that, in 2009 one-day care already took a 3 per cent share (7.5 per cent of cases; CMI around 0.4).

Major characteristics of paediatric care

The **number of paediatrics wards** was practically halved in the period under examination, reduced from 144 to 73. Concurrently, the **number of beds** decreased by more than half, from 5620 to 2602 (54 per cent). **Admissions** fell considerably too, from 211 593 children hospitalised in 2000 to 127 182 in 2009 (40 per cent decrease). **Bed occupancy** grew at the same time from 62 to 72 per cent, which indicates that by downsizing hospital beds, surplus capacities were removed, and this branch still has reserves. The great difference between the 72 per cent bed occupancy for covered days and the same indicator (94.5 per cent) for normative days suggests that HDG normative days can further be decreased, as the great majority of children stay in hospital as long as the normative days corresponding to the disease. **Length of stay** in hospitals altogether decreased from 1 276 136 to 618 221 days (52 per cent), while length of stay per case decreased from 6 to 4.86 days. In the nine years under examination, CMI changed to a lesser degree, increasing from 0.75 to 0.82, which remained constant in the last three years. Under the principle that the CMI is around 1 in hospital care, the relatively low CMI indicates that more children are still hospitalised whose disease could be treated on lower service levels.

3.15. Figure Number of HDG cases in paediatric care and the number of the age group under 20 between 2000 and 2008



Source: NHIFA financing data processed by ESKI

Major characteristics of oncological care (chemotherapy, radiotherapy)

The **number of** oncological **beds** remained almost unchanged in 7 years under examination. In 2005–2006 there was some increase, with 108 more beds (7 per cent) in

the system; in the following year capacity decreased by 50 beds, then by further 78 beds in 2008, which was unchanged in 2009. Of the medical specialties under examination, this rising, then falling tendency can only be observed in cardiological care. This capacity change measured by bed numbers was not reflected by other indicators. The **case number shows an even and very significant increase,** nearly trebling between 2000 and 2009 (from 48 378 to 143 065). The rise is almost linear, affected none by the fluctuation in bed numbers, the introduction of PVL, the new HDG system introduced in January 2006, or the major structural change in 2007. The **total** of covered **care days** rose significantly between 2000 and 2009, from 339 565 to 522 407. If, however, the covered cases are examined in light of normative days, the picture is more interesting: between 2000 and 2005 there was a significant increase according to normative days (from 390 745 to 675 585, 173 per cent), then a sudden drop from 2005 to 2006, from 675 386 to 349 325 (193 per cent). Another significant decrease in length of stay (141 per cent) took place the following year, after which no major change was to be observed. This indicator properly mirrors corrections in HDG.

No such sudden changes can be seen in the number of **length of stay per case**, which decreased almost lineally from 7 to 3.6 days. This was consistent with the general tendency in all medical specialties, though its extent was the greatest of all the specialties examined.

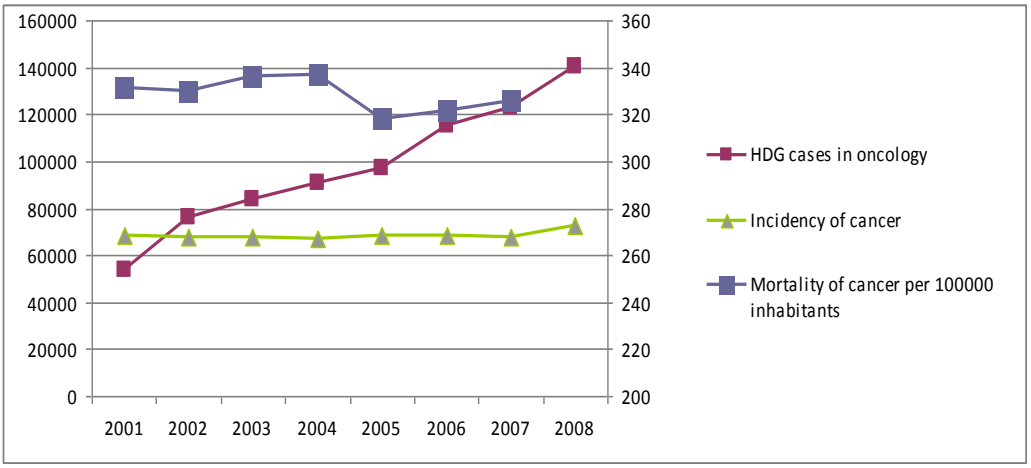
The increase in covered care days here can be attributed to the significant rise in the number of patients who were provided for with an unchanged number of beds. This appears also in bed occupancy, which rose from 69.3 to 99.8 per cent, the most significant in all the specialties examined. CMI also rose from 1.23 to 1.37, which can, however, be interpreted with difficulty, for a major change in HDGs took place in this branch: medicinal products formerly funded separately or by individual eligibility were incorporated in the HDGs, forming special HDGs in the chemotherapy of certain tumour types. Thus the case mix forming the basis of CMI changed fundamentally.

3.3. Table Care data of cancer diseases

Year	HDG case number Cancer NHIFA	Number of patient with cancer (KSH)	HDG case number/percentage of cases
2001	53544	**68 570**	**0.78**
2002	76425	**67 916**	**1.13**
2003	83857	**67 985**	**1.23**
2004	90628	**67 177**	**1.35**
2005	96823	**68 510**	**1.41**
2006	115629	**68 535**	**1.69**
2007	122992	**67 467**	**1.82**
2008	140226	**72 675**	**1.93**

Source: NHIFA financing data processed by ESKI

3.16. Figure Development of cancer mortality, incidency and treated cases in oncology between 2000 and 2009



Source: NHIFA financing data processed by ESKI

In the following I examine how the national trends shown in the above prevailed in 79 hospitals providing traumatological care, and to what extent indicators reflective of changes in efficiency prevailed either uniformly in the entire sector or else differences in bed occupancy, CMI and average length of stay grew among individual providers. I examine capacity and performance indicators within the specialties with variance analysis to reveal whether the particular field becomes concentrated, or diversed. I seek answers to the following questions:

a) in which specialties did the number of providers increase and decrease in the period under examination;
b) to what extent services were concentrated in the larger providers;
c) to what extent such changes are in harmony with external, demographic and technological changes.

3.3.2 Analysis of the spread of one-day surgery

The penetration of one-day surgery and its percentage of all funded interventions show a clear picture of the relative inflexibility of the domestic health-care scheme and its adherence to traditional care forms and internal professional structures.

3.4. Table Characteristic macro-level data of one-day surgical care

year	possible one-day surgery CASES	one-day surgery CASES	Possible one-day surgery WEIGHTS	one-day surgery WEIGHTS	possible one-day surgery DAYS	one-day surgery DAYS	one-day surgery expenditures (thousand HUF)
2006	631 641	110 314	344 680	40 866	1 422 089	110 340	5 343 597
2007	592 624	156 049	316 457	65 229	1 202 071	155 973	8 825 415
2008	600 366	231 159	316 369	99 829	1 095 078	231 657	1 4 028055

Source: NHIFA financing data processed by ESKI

The upswing in 2008 was due to the fact that in 2007 a contingent of more than 60 thousand HDGs was distributed through competition among some 30 providers (among them several new ones), which is shown by the increase in institutional case numbers. This ensured a margin for the institutions, for in other forms of care the maximum volume of covered cases, the PVL was decreased in both 2006 and 2007. The number of reported cases also rose considerably, doubling in two years.

3.5. Table Characteristic macro-level data of one-day surgical care

	2006	2007	2008
Number of hospitals	94	124	126
HDG case number	110 314	156 049	231 159
HDG weight	40 866	65 229	99 829
Day	110 340	155 973	231 657
Expenditure (thousand HUF)	5 343 597	8 825 415	14 028 055

Source: NHIFA financing data processed by ESKI

Indicators characteristic of modern acute in-patient care are the number and percentage of non-invasive, minimally invasive and one-day interventions. In West European countries, the percentage is between 30 and 50 (Boncz, 2006). Hungarian data show that for years after the introduction of flexible regulation, the percentage of one-day interventions hardly increased. It took several government measures and the distribution of performance volumes by competition for the percentage of these interventions to increase and reach close to 20 per cent of all surgical procedures by 2008.

On the basis of my own calculations it can be established with good reason that for the best part of the period under examination the Hungarian hospital sector did not exploit efficiency reserves hidden in modern forms of care.

3.4 Technological characteristics in hospitals

For reasons of scope and information constraints, the technological level of Hungarian hospitals can be examined here only sketchily. The comprehensive – nationally uniform and systematically updated – technological survey containing data of public acute-care hospitals is at present unavailable for the purposes of research and analysis. Some data can be found in the register of authorisations of ÁNTSZ, NHIFA financing contracts, and the register of medical instruments of EMKI, but no collection and systematisation of instruments and equipments has been currently carried out with uniform methodology.

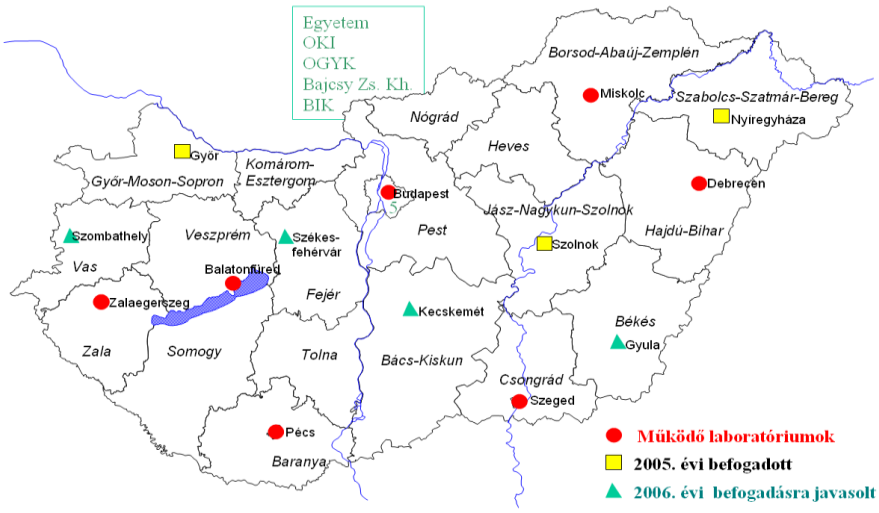
Most information can be obtained from NHIFA financing data by tracing back covered activity codes, HDGs. Based on these, analyses can be performed at a certain level and some tendencies can be detected. For example, NHIFA reimburses CT and MRI machines as well as PET examinations from separate sub-funds. Also, the age and type of machines (number of segments of CTs, TESLA number of MRIs) are kept on file in public financing, which allows the rate of spread of these high-cost appliances and replacements in the machine stock to be traced with precision.

NHIFA's data base also makes the analysis of further special, high-investment and high-cost health-care technologies possible. For the purpose of cluster analysis, for instance, I developed a variable for the interpretation of high-value technology, based on the most frequent and costly diagnostic and therapeutic technologies. As regards the existence in the institution of CT, MRI machines, intensive care unit (ICU), neonatal intensive care unit (NICU), neurosurgery, cardiosurgery, thoracic surgery, haemo-dynamic laboratory and oncoradiology, the national average was 2.2, and one institution had all nine technologies.

The expansion of CT and MRI stock continued in the decade examined. CT has now become a fixture amongst the diagnostic equipment of municipal hospitals, while MRI is available in all county hospitals, and in some major medical centres and medical schools there are two of each (Nyíregyháza Hospital, Miskolc county hospitals, Budapest, Debrecen and Pécs medical schools: SE, DEOEC, PTE). Digital X-ray and mammographic apparatuses which cost HUF tens of millions, multi-probe and 4D ultra-sound scanners and bone densitometers now also form part of the general technologies in Hungarian hospitals and out-patient clinics attached to them. High-performance lab automation has spread, owing to which 'mega-labs' catering for county-wide areas are available.

All the same, the introduction of haemo-dynamic laboratories and with that, of invasive cardiology, was number 1 in the top list of technological areas. In 2005 a national installation plan was developed at the Ministry of Health and NHIFA (Figure 3.10). Consequently, the number of NHIFA-covered labs, with funding running to HUF 15 billion, rose from 3–4 at the beginning of the decade to 17 to by 2005 (NHIFA funding data). The earliest possible acquisition of haemo-dynamic labs and the introduction of invasive cardiological care, which is of high importance in institutional development, income growth and the strengthening of regional leading position, triggered serious position manoeuvres among some, mainly county, hospitals.

3.17. Figure Active and planned haemo-dynamic laboratories in Hungary in 2005



● Active laboratory; □ Laboratory funded in 2005; ▲ Laboratory Proposed for funding in 2006

Oncoradiological care also puts county and regional institutions in a power position and enhances their weight in the health-care scheme. This technology, for instance, ensures the innovative edge and weight for Kaposvár's health care system *vis-à-vis* similar county hospitals. The county hospitals and their owners in Veszprém and Székesfehérvár fought for the establishment of new oncoradiological centres for five years. Other leading hospitals intended to strengthen their position or achieve leading regional position by modernising their radiotherapeutical machine stock as well as capacity increase (Miskolc, Szombathely, Nyíregyháza County Hospitals).

Medical technological change is one of the most significant factors bearing down on the performance, efficiency and strategic scope of economic organisations. In this respect, both the 1990s and the 2000s brought major changes. Typical management decision options are described in Subchapter 4 in greater detail. Technological developments affect institutions in more than one way, therefore from a strategic aspect they have to

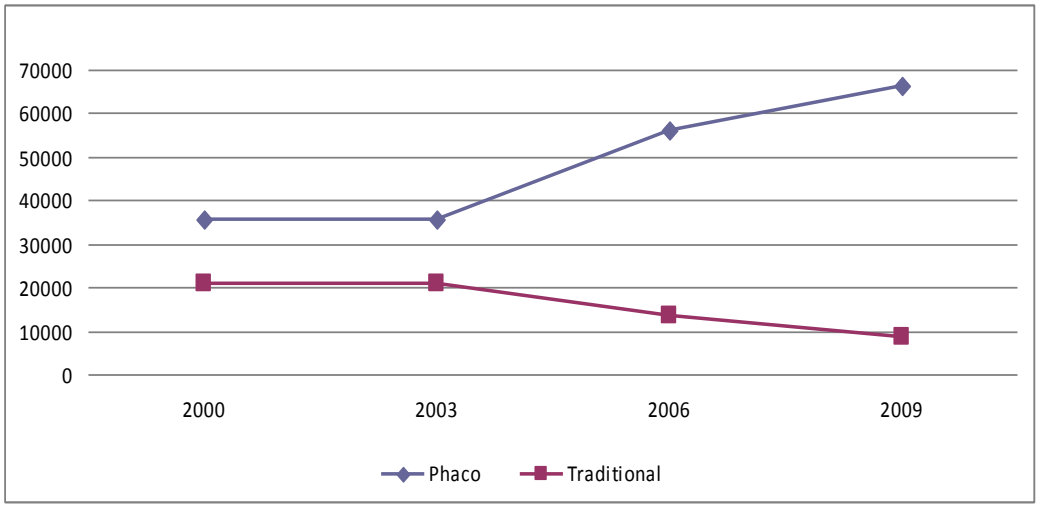
assume a sophisticated attitude in implementing medical technologies. In Appendix 3.5. some characteristic directions in technological development and their impact on hospitals (on structure, capacity, nature of care, profitability) are listed.

Some examples for the internal technological changes in hospitals are given below.

a) Hip prosthesis: implants in various indications underwent significant changes in the past ten years. Prostheses without cement could be replaced more easily and with less complications; the number of cases rose slightly until 2000, then reached a steady state.

b) In cataract removal, the phacoemulsification procedure, with significantly smaller incision and tissue trauma, short length of stay and with very good results, began spreading at the turn of the millennium and practically replaced traditional procedures in this indication. Financing regulation was somewhat slow to follow professional developments: the procedure type was classified in separate HDG only in 2002, and now appears among the first one-day interventions allowed.

3.18. Figure Yearly cases of traditional and modern cataract treatment in Hungary between 2000 and 2009



Source: NHIFA financing data elaborated by ESKI

Conditions, percentage of population, waiting lists of cataract interventions are in the focus of health-care analysis; in his study, for instance, McKee examines cataract interventions in several OECD countries (McKee, 2002, p. 62). The switch to the modern procedure was spectacular in Hungary in the decade under examination; compared to 2000 the number of yearly cases almost doubled (from 35.4 thousand to 66.2 thousand), while the number of traditional cataract interventions fell by less than half (20.8 thousand to 8.6 thousand).

c) Within cardiology, the greatest therapy change occurred in the treatment of acute myocardial infarction (AMI). In 2000 no special treatment was generally used. A temporary pacemaker was implanted, if necessary, and thrombolysis with streptokinase and urokinase was performed in special circumstances, with many complications and moderate success. In 2002, acute percutaneous coronary intervention (PCI) was introduced in the HDG reports in treating AMI, with or without stent implantation. The technique was a success and the case number showed a rapid rise, by now becoming almost exclusive in AMI treatment, and its efficiency is also manifest in the improvement of Hungarian mortality rates (ÉKMEO). Thrombolysis with streptokinase and urokinase lost ground, in part for professional reasons, in part through increasing access to PCI. In 2077 the possibility of thrombolysis with a much more modern and effective remedy appeared; however, owing to major organisational work in cardiology and to a supportive health policy environment (see Subchapter 2.4.2), haemo-dynamic centres providing PCI were established in adequate regions in the country with access for an increasing number of infarction patients within the adequate time frame (90 minutes). Thus thrombolysis became unnecessary, and dilation or stent implantation is performed as permanent solution. The change of technology at the same time meant that investment costs of invasive cardiological centres rose close to HUF one billion, and since such interventions can only be performed by specialists with great expertise, cost efficiency can be reached in only a few centres (14–16 in Hungary).

4 Strategic decision situations and choices in the Hungarian hospital sector

In Chapters 2 and 3 of the dissertation draft I discussed characteristic areas of the external and internal environments of the Hungarian hospital sector and the trends and tendencies prevailing in them. In this chapter I give an outline of the strategic options available to institution managements (owners) in the period under examination. I examine these options in several dimensions, such as size, capacity, professional and care profiles and range of activities of the institutions, and the range of the high-value diagnostic and therapeutical technologies they employ. In the final version of the dissertation I shall examine, with analysis methods to be described in Chapter 5, how typical decision situations explored in the course of the environment analysis proved effectual in practice, what typical institutional examples can be found, and with what frequency.

4.1 Analysis of strategic decision situations in the literature on strategic management

Before an introduction of theories and major works on strategic planning and management in health-care institutions, it is appropriate to give a short outline of major general strategic management theories. Strategic planning in health-care institutions, especially as regards its system of tools, differs in no substantial way from that in industrial, commercial and service organisations. The range of strategy theories and analysis methods relating to companies and business organisations can be also be applied to Hungarian public hospitals. Leading theoreticians often bring up examples from health care (Porter, Norton and others). The greatest differences are in content – in the formulation of basic targets, in determinant environmental factors, stakeholder expectations, the determination of strategic dimensions, the character of strategic targets, and the range of concrete tools.

Of determinant strategy theories I aim to explore in particular the health-care aspects of contingency theory and the theory of strategic choice. In Chapter 1, I already referred to the importance of contingency theory and within that of the theory of strategic choice, connected with the name of John Child (Child, 1972). In his contingency theory he emphasises that differentiation and the increase of complexity in organisations are concomitant with growing complexity of the environment. Characteristics, variability

and complexity of the environment affect organisations not deterministically, but they strongly bear down on the decision margin and the range of strategic alternatives of the latter. Decision-makers of the organisation, the so-called dominant coalition (top executives, owners and other determinant and powerful members) develop decision alternatives based on environmental factors and the capabilities and targets of the organisation in its operational area (portfolio, product or service mix), in the technologies applied, in organisational structure and the make-up and geographical area of human resources. In decision-making, the dominant coalition considers prospective results, utility and even possible negative consequences of the alternatives (Zoltayné Paprika Zita, 2002, p. 59).

In the following, some characteristic examples from the literature will facilitate the exploration and classification of decision situations which appear in the strategic conduct of hospitals. In strategic management, the most accepted and informative tool of delineating decision situations and strategic target systems is the strategic map. The strategic map was most comprehensively and generally used for drawing up strategic options and target systems by David Norton (Norton, 2009), who also provided an example from health care in the case of the Nemours Health System. The strategic map offers a general framework for the description of strategy (Kaplan-Norton, 2002, p. 89). Another function of the strategic map is that it reveals major dimensions of strategic planning for the management and the options within them (Bodnár, 2007). The strategic analysis map contains findings of the analysis of external and internal trends and impacts. Zuckerman points to the exploration of feasible options, the list of pros and cons and based on it, the analysis of options, and the selection of the option recommended for executives, as major steps in strategy development (Swayne et al., 2007, p. 281). One strategic map should be prepared for the current situation and another for the end of the period the strategic plan spans (terms of 3–5–7 years). By overlapping them, the maps show the direction of moves planned by the management in each dimension. (Some examples from the literature on strategic target tracking within an organisation are shown in Appendix 4.2.)

In his handbook on strategic planning (Zuckerman, 2005), **Zuckerman** gives a comprehensive survey of major elements of strategic planning and implementation for health-care executives with an eye on practicability. He discusses the importance of strategic planning, major steps of strategy development and implementation, and the importance and necessity of strategy tracking and updating. Examining from the aspect

of decision theory, Zita Paprika Zoltayné emphasizes that the body of available, scientifically substantiated knowledge on the process of strategic decision-making is very limited. In the chapter entitled 'The theory of limited rationality' (Zoltayné, 2005, pp. 103–115) she gives a detailed account of the characteristics and difficulties of strategic decisions.

Most comprehensive in the literature on the subject, **Swayne, Duncan and Ginter's Strategic Management of Health Care Organizations** (Swayne et al., 2007) has so far been published in five editions (888 pp.). In style and approach, the entire book is characterised by applicability, practice-oriented case descriptions and the identification of issues and tasks. The authors provide 20 health-care strategic case studies in the appendices. Of especial relevance to Hungarian health-care organisations, hospitals in the first place, Chapters 4–6 describe strategic alternatives and classifications of alternatives and choices. Naturally, the detailed analysis of strategic choices available to public and private hospitals and clinics is meant to benefit health-care institutions functioning in the American business environment. In Hungary, however, health-care institutions have found themselves in an increasingly dynamic situation in the last 20 years, owing to the economic and regulatory environments and the emergence of market economy (see Chapter 2 in detail). Viewed from this angle, the analysis of strategic options available to institutions rooted in such environment is pointing to the future.

Similarly to business organisations, health-care organisations must consider several strategic decision situations in developing their strategies. The authors define several phases in strategy development, such as selection of strategic guidelines ⇨ adaptation strategies ⇨ market entrance strategies ⇨ competitive strategies ⇨ implementation strategies (Swayne et al., 2007, p. 229). They classify adaptation strategies into three categories, with several strategic alternatives within them (p. 233):

a) expansion of scope – diversification, vertical integration, market development, territorial expansion of services, product development, increase of market penetration;
b) contraction of scope – sale, closure, decrease of service area, decrease of activities, decrease of geographical area of activity;
c) maintenance of scope – strengthening of current activity in quality, efficiency, innovation and flexibility, or maintenance of status quo with no major changes.

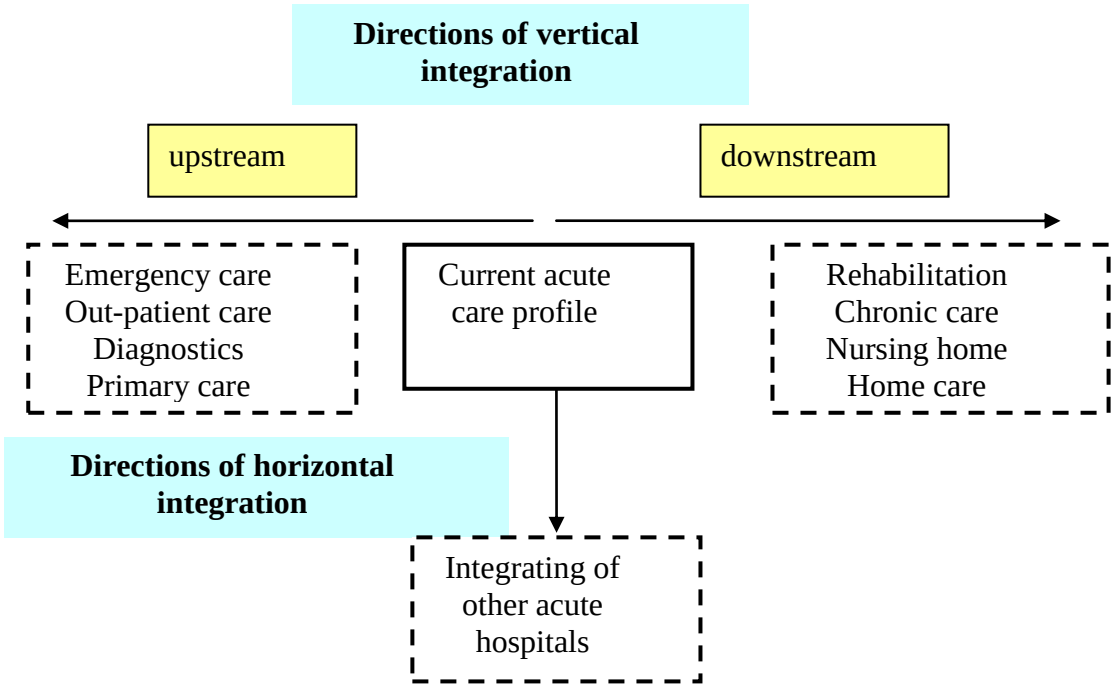
Diversification, the extension of service activity scope, is possible in two directions (Swayne et al., 2007): concentric diversification in primary service areas; in health care

these are diagnostics, in-patient care, nursing and care for the elderly, home nursing, rehabilitation. Another direction of diversification could be in ancillary service areas, such as health industry (e.g. pharmacy, therapeutical equipment) or external service areas (restaurants, wellness and fitness services, laundry etc.). In this dissertation I concentrate on the domestic cases of diversification in primary services.

For the purpose of the analysis of the various types of vertical integration, the authors developed a unique mode of representation. Acute-care hospitals are represented on a co-ordinate axis, and they examine the direction of vertical integration upstream towards emergency, in-patient and primary care, or downstream towards rehabilitation, nursing, or specialised home nursing.

Market entrance strategies can further be classified according to type, such as purchase of existing health-care organisations, acquisition, fusion of institutions of equal ranking, purchase of license in installation of new technology, internal development from own available resources.

4.1. Figure Possible directions of vertical and horizontal integration between health care providers



Source: own adaptation of figure in Swayne et. al., 2007, p. 239

The range of strategic options available for health-care institution managements is strongly dependent on the power of the organisation and the diversity of services provided. American health-care institutions operate in a strongly market-oriented and competitive environment in which their strategic options naturally offer a different

scope. However, the examination of such options might prove useful also for Hungarian providers in their strongly centralised regulatory environment.

Porter argues for the strategy of positioning in his book (Porter, 1990) which offers strategic choices mainly for companies operating in a competitive environment. Such choices include the choice of area in which they aim to compete and the mode of cost minimisation – low prices, technological renewal, quality, or a combination of these. After him, other authors further refined the positioning strategic approach for health-care organisations (Swayne et al., 2007, p. 274). According to them, there is the defender who aggressively protects his area of activity and provision; the prospector or innovator who constantly seeks new areas of products and market; the analyst who weighs up protection of existing markets and entry in a new market segment, the identification of leading role by low costs/prices; the differentiator who competes by developing particular products and services. I shall examine the applicability of positioning strategy in the environment of Hungarian health-care services in interviews conducted with institution leaders.

Porter and Teisberg's 550-page book entitled **Redefining Health Care – Creating Value Based Competition on Results** can also be counted among literature on health-care strategic management as it is strongly connected to the strategic environment of health-care institutions and the content of their strategies (Porter and Teisberg, 2006). They argue for a new, value-based health-care scheme (for more details on value-based strategic approach, see Appendix 4.1.). In the first chapters they survey current approaches of agents in the health-care scheme in health-care policies, institution managements and health-care insurers. Currently, cost minimisation by any means, cost cutting, disregard for genuine health gain for patients, and breaking up the remedial process into episodes, strongly prevail in the health-care scheme. In the ensuing chapters they argue for putting competitive approach on new bases. They set forth the principles of value-based competition in detail, according to which simple cost cutting must be replaced by value creation in the focus of health-care services and treatments. At micro-level, at the level of patients, individuals, they propose to demonstrate and analyse costs in a relative form in every case: the value of the unit of health gain must be compared to health expenditure and costs. After a detailed description of value-based competition and health-care service, the authors examine the strategic aspects arising from the new value-based approach for health-care providers at the mezo-level (pp.

149–228). In further chapters they make recommendations for managed care providers, governmental and health-care agents, suppliers, consumers and workers.

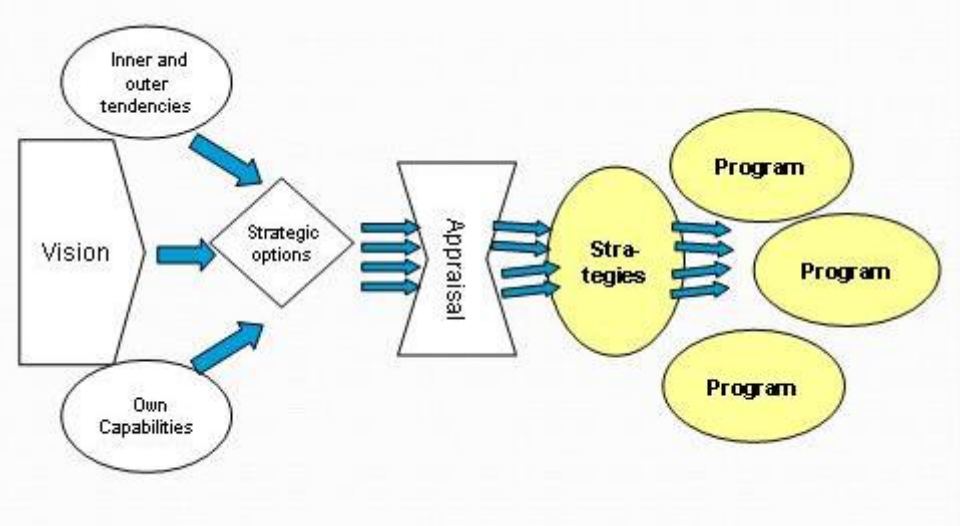
Porter expounds on the care delivery value chain for integrated practice units (p. 205, Figure 5-5): prevention/monitoring ⇨ diagnosis ⇨ preparation ⇨ intervention, treatment ⇨ recovery/rehabilitation ⇨ monitoring/nursing. The value chain results benefit patients in the form of efficiency/health improvement per cost unit. The theory of value chain might be considered as the basis of strategic choice; it is a tool for the analysis of services competition, management decisions, identification of development and growth options and decision-making. Adopting and implementing Porter and Teisburg's strategic approach in health-care delivery strategy may ensure a competitive edge in the medium and long terms *vis-à-vis* traditional approaches to delivery. It may set an example for Hungarian health-care providers, on which further empirical examinations may be based.

In light of the above, major steps of strategic analysis for health-care institutions (especially hospitals) can be delineated with good reason as follows: analysis of external environmental factors, trends, and internal resources (core competencies); formulation of values, mission, and vision, and on this basis, identification of strategic alternatives and options (Research Centre for Performance Management, Corvinus University); analysis and assessment of strategic options, selection of strategic targets, definition of indicators, detailed elaboration of actions.

4.2 Decision situations in the Hungarian hospital sector

After a survey of strategic literature relevant to the subject, my analysis is now focused on the decision situations existing in the 2000s for Hungarian hospital managements. I explored typical decision situations after an analysis of the external and internal environments of health-care institutions, determinative trends and impacts. After the environment analysis, the next step in strategic analysis is the exploration and assessment of strategic alternatives, options, as is demonstrated in the figure below.

4.2. Figure The process of strategy development



Source: Viktória Bodnár, teaching material, Research Centre for Performance Management, Budapest Corvinus University, 2007

In the following I examine the major professional and service dimensions in which management decisions are made. The dimensions examined are not always clearly separate as professional profiles, technological contents, and service types are in some cases strongly interconnected. The introduction of invasive cardiology, for example, can be regarded as both technological development and professional profile development. The establishment of an oncology department for providing chemotherapy care can indicate the development of professional profile and at the same time the development of technological content. Despite such methodological difficulties, in the course of empirical analyses I intend to explore typical decision situations in strategic options in all the dimensions to be examined.

In the analysis of decision alternatives, background and ancillary areas and outsourcing in the operation of hospitals (own or contracted laundry, catering, pharmacy, chemical laboratory or imaging diagnostics services) are outside my scope.

Dimensions of management decisions under examination in hospitals:

1. size – capacity (in bed numbers), extent of service area;
2. professional profile, activities, service types;
3. technological content;
4. structure (change of structure, reorganisation).

A range of tools is available for making strategic management decisions and implementing them in the chosen strategic directions. Such management tools are available also for Hungarian hospital managements in the early 2000s:

- ✓ strategic management;

- ✓ controlling;
- ✓ development of integrated IT tools and intelligent management information system;
- ✓ management tools supporting project execution;
- ✓ modern human resources management;
- ✓ logistic systems.

The employment of such management tools cannot be regarded as strategic options; at the same time, however, resources spent on them and management decisions in this area, after successful introduction and execution, are in the last analysis of strategic importance.

4.2.1 Size/capacity of hospitals

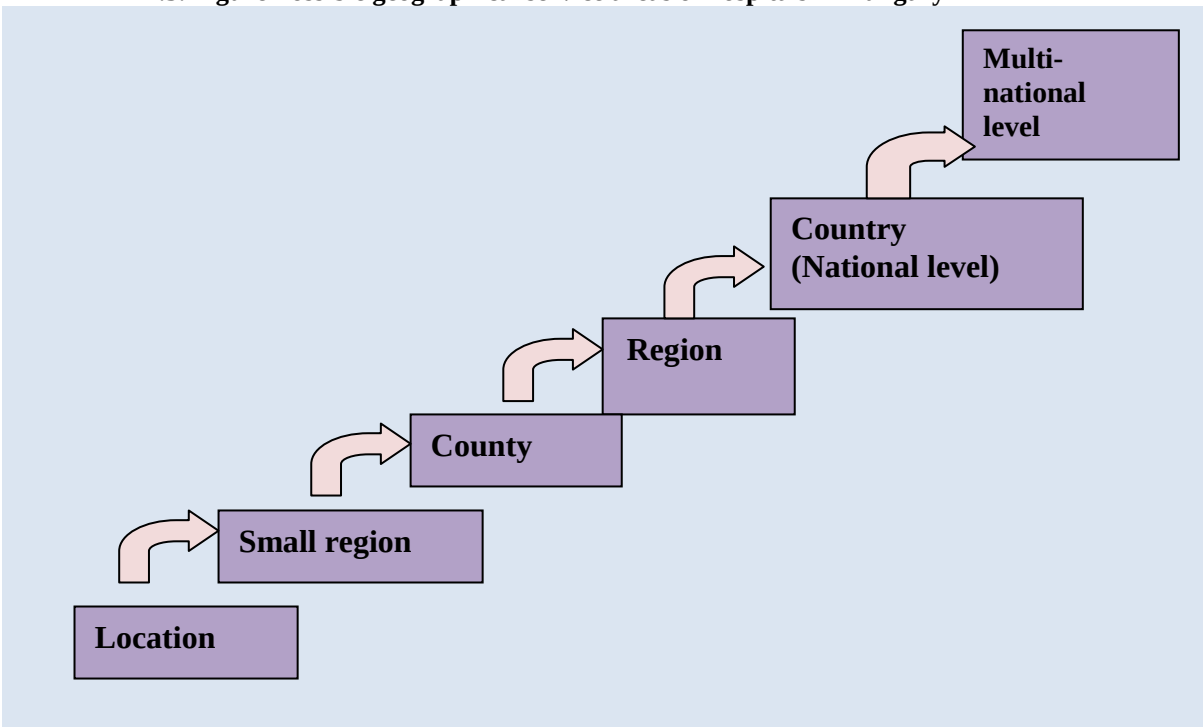
The size, number and weight of hospitals in the Hungarian hospital sector were analysed in detail in Chapter 3. In both Hungarian and international literature, hospital size is basically measured by the number of beds, which may be complemented by the number of cases. Decision alternatives in this respect may be bi-directional – increase or decrease (downsizing). Maintenance of the status quo, stabilisation of existing capacity as decision (or non-decision) alternatives are not hereafter analysed.

Capacity increase is aimed to attain leading position in a county or region, and with that, to strengthen stability, improve economies of scale, gain access to surplus resources, acquire new service areas, thus satisfying the provision needs of the population at a higher standard. Capacity increase may take place by building new pavilions and wings, or annexing or merging other institutions (in greater detail, see 4.2.2).

Another decision alternative is the **decrease of the number of beds, capacity downsizing**, which is of significance with respect to sustainable functionality and efficiency, but it can also be an indicator of quality care. This might be racing against the time: with demand – or rather social insurance solvency – falling (see PVL), the operation of an institution with excess capacity might in a few months be jeopardized by decreasing bed occupancy. A typical mode of capacity downsizing (decrease of bed number) might be the closure of premises, pavilions and wings, concomitant with the decrease of operating expenses. Also, upgrading conveniences in existing hotel sections by installing plumbing units in formerly 6–8 bedded wards and reducing the number of beds to 2–4 may also result in a decrease of bed number.

Closely connected to hospital size, the number of inhabitants and the geographical character of the obligatory in-area care of the institution or within that, of certain specialist cares, may also create decision options for the hospital management. In Hungary, grading is generally adjusted to territorial statistical (administrative) units, such as settlement, small region, county, region, country, and within the capital city, district.

4.3. Figure Possible geographical service areas of hospitals in Hungary



Source: own elaboration

The obligation of in-area care in several hospitals differs department by department. Some municipal hospitals have departments with obligation to provide county-wide or regional care (e.g. the psychiatry wards of Albert Kenessey Hospital in Balassagyarmat). For county hospital managements, regional in-area care means prestige, and in some cases, obligatory specialist care extends to more than one region or to the entire country (e.g. paediatric bone marrow transplantation and burn departments at BAZ County Hospital).

Such decisions qualify as strategic in case a significant change takes place in the obligatory in-area care either of the entire institution or of its particular departments. Change in care obligation usually results in changes in capacity or funding. Subsequent to the enforcement of Eftv, several institutions took over specialised in-area care of closed institutions. The management can bring strategic decisions also without official transformation (by resolution) of the service area by ÁNTSZ. Patients can be enticed from other service areas by adequate market tools, the improvement of care standards,

technological renewal and the introduction of popular and modern test and therapy methods. Service areas may also change owing to infrastructural developments, such as the construction of bridges and roads (e.g. Danube Bridge in Dunaújváros, Tisza Bridge in Cigánd, M8 and M30 motor roads).

4.2.2 Professional profile, range of activities, care types

Professional profiles are best examined with respect to the close to 50 clinical specialties stipulated by law. (Specialties and specialty codes used in the Hungarian health-care scheme are listed in Health Ministry Decree 2/2004 (XI. 17.) In Subchapter 3.3 I described changes between 2000 and 2009 in the weight, capacity and performance of some determinative medical specialties. It is important to point out that specialty profiles cannot be tackled uniformly, as their characteristics and tendencies are significantly different. Thus institution managements are faced with decision situations from time to time as to which specialties to develop, to put into focus, and which specialties to merge or close.

As regards professional profiles, on the basis of an analysis of applications for adoption of capacities into the NHIFA coverage system, characteristic decision situations in the period under examination (more precisely, from the mid-1990s) are as follows:

- specialisation in internal medicinal care types – spin-off and development of cardiology, endocrinology, haematology, diabetology departments (out-patient clinics);
- spin-off of stroke (and thrombolysis) care within neurology;
- establishment of emergency departments/centres;
- merger or separation of traumatology and orthopaedic departments;
- establishment or closure of vascular surgery, hand surgery and oral surgery within general surgery;
- establishment of oncology departments;
- closure or merger of obstetrics and paediatrics departments;
- concentration of pulmonology departments into specialist hospitals (in the Central Hungarian region);
- closure or merger of smaller, ophthalmology, otorhinolaryngology and dermatology departments.

Part of professional profile developments are carried out at initiation by clinicians, another part in compliance with health programme expectations or at management

initiation in view of more favourable funding (emergency care, oncology departments). In some cases subspecialties appear within the branches, the technological content and following from that, the cost-intensivity of which are characteristically different from the main specialty (invasive cardiology within cardiology, audiology within otorhinolaryngology).

The choice of care types and forms – diagnostics, acute in-patient specialist care, one-day surgery, hospital day-care, nursing, long-term in-patient care, rehabilitation, hospice care (see figure in Appendix 4.3) creates decision alternatives similar to the choice of professional profile, but these are classified in a separate category on account of their weight. Vertical integration and the value chain theory elaborated in theoretical literature, which were introduced in Subchapter 4.1, are mainly applicable in this dimension (see Figure 4.1, Porter, Swayne).

Choices of care types and forms are in part made also under the impact of health policy and funding incentives (Dózsa, 2004/1). Emergency care and rehabilitation development is a highlighted target in the New Hungary Development Plan; the development of one-day surgery, curative and hospice services facilitated under tendering programmes between 2003 and 2007 with increased funding levels. (For care forms targeting rationalisation of acute-care capacities, see Appendix 4.3.) Fee harmonisation and the elimination of 'wadding' HDGs served the purposes of increasing out-patient care to redeem hospital care. National data on the spread of one-day surgery were shown in Subchapter 3.4. Decisions on the part of institution managements regarding care forms, their weight and role, are of strategic importance in the medium term, but pose financial risks in the short term on account of increased human resources needs and the inflexibility of capacities.

4.2.3 Technological content of inpatient care

The concrete technological content of health care poses one of the greatest challenges for the strategic managements of institutions. (For considerations in deciding on the introduction and installation of health-care technologies, see Appendix 4.4.) In the short run, typical issues in high-cost development in the hospital sector in the period examined were as follows:

a) in diagnostics, installation of laboratory automats, CT, MRI, PET, SPECT, or new-generation equipment;

b) in surgical areas, creating, on one hand, the technological conditions of minor and minimally invasive (laparoscopy) surgical care; minimally invasive cares (laser eye interventions, knee arthroscopy, kidney, pancreas, stomach endoscopy etc.); on the other, creating conditions for major, complex interventions (transplantation, neurosurgery);
c) in non-manual specialties, development of stroke and thrombolysis care, kidney stone destruction as non-invasive care, spread of high-cost medicinal therapies in oncology and neurology;
d) in oncology, development of a radiotherapy centre or chemotherapy treatments as decision alternatives;
e) in emergency care, creating conditions for separate emergency department or centre;
f) in rehabilitation, creating the technological infrastructure of locomotor rehabilitation;
g) development of information and communication technologies (ICT), tele-radiology, tele-medicine, tele-pathology, digitalisation of health records.

The most important area of technological innovation in the decade under examination, which called for strategic decisions, was the establishment of the network of invasive cardiology centres (haemodynamics, catheterisation, ablation treatments). The examination of this area will figure high in the final version of the dissertation.

Technological development within an institution, the choice between development options, is a characteristic example of strategic choice (Swayne et. al, 2007, p. 233). However, scarcity of resources, both human and financial, the structural and operational form of institutions and the infrastructural constraints of buildings greatly narrow down the scope for action for hospital managements. Orosz also points to the introduction of state-of-the-art technological therapies as a tool in the competition among health-care providers, but it may lead to surplus capacities. Excessive competition may encourage provision of special services even if their utilisation remains below the economies of scale threshold (Orosz, 2001, p. 225).

The development and installation of medical technologies in some cases require considerable space and investment (e.g. new diagnostic equipments like CT, MRI, special theatre, invasive cardiology laboratory and other therapy premises), or in cases a new building (bunker) as in oncoradiology and radiotherapy. In other cases, shortage of specialist staff, both physician and ancillary, pose another constraint, which cannot be

eliminated in a short time, and schooling or recruiting also require significant resources because of high wage-levels.

At the same time, fundamental changes are to be expected in the strategic development of the institutional system in the following major areas:

a) change of weight and role of organisational units within institutions;
b) transformation of task division across institutions, rearrangement of emphases, financing and care rates;
c) growing importance of hospitals, especially major centres, with a high number of specialists and consultants in several clinical areas, which thus become regional knowledge centres;
d) optimisation of human resources inside and across institutions.

Changes in point a) are best described by shifts in the weight of particular divisions within the organisation, measured in the number of cases, in weight numbers, in the rate of internal costs and the number of physicians. Such changes call for a strategic approach on the part of managements. They have to identify areas in which the institution can provide tele-medicine services, develop own staff of specialist physicians, or give up independent capacities and join a tele-diagnostic and tele-consultation system to utilize its potential for keeping patients, increasing efficiency and decreasing costs.

From the strategic angle, task division across institutions (b) is of major importance, which in a matter of a few years may redraw the map of institutions and cares. It calls for assessment and analysis of needs and harmonisation with the potential provided by modern IC technologies. The development and development directions of ITC are basically part of technological development, yet they can be treated as strategic environmental factors on account of their potential impact in transforming structure and organisation and on basic care organisation and remedial processes.

Elements of e-health and ITC development that have a bearing on hospitals are as follows:

– diagnostic imaging systems within institution – PACSs;
– integrated IT systems within institution (high-level HIS, e-medical records);
– inter-institutional IT developments (HEFOP 4.4. targets and implementation[8]);

[8] After EU accession, Hungary had access to EU Structural Funds between 2004 and 2006 under the first National Development Plan. The HEFOP 4.4 programme targeted the establishment of intra-institutional IT system in the health sector. The budget of the programme implemented in three regions (DD, ÉA and

– tele-medicine, tele-radiology, tele-consultation systems;
– other e-health developments, electronic booking system, e-prescription, customer relationship management (CRM), interactive website developments;
– in part, AAL technology developments (ambient assisted living diagnostic and therapy equipments) (for more detailed ICT development directions, see also Appendix 3.4).

4.2.4 Change of structure and types of reorganisation in the Hungarian health-care scheme

Changes in hospital capacity are usually contingent on major changes in structure and infrastructure, which may be called by the generic word reorganisation. It means a reorganisation of the activities and the operation of health-care institutions. **Reorganisation** can be interpreted in several areas, such as reorganisation of the organisational structure (changes in organisational and operating regulations and organogram) and/or infrastructural development and transformation.

4.1. Table Major dimensions of reorganisation

major areas		infrastructural change, investment/development	
		yes	no
transformation of organisation	yes	- change of profile with development (rehabilitation, one-day surgery, special acute care); - fusion and merge with major infrastructural development or transformation	- creation of matrixes, institutions, simple fusion of departments; - fusion of institutions without infrastructural development or transformation
	no	upgrading conveniences, concentration of buildings, closure of pavilions and premises, construction of new buildings and wings	------

Source: own elaboration

In the two major dimensions, three basic types emerge – transformation of organisation with or without investments, and organisational change without transformation of organisation. No reorganisation exists without infrastructural change and transformation of organisation – this type does not exist. Simple upgrading of conveniences cannot be called reorganisation unless combined with a transformation of the departmental structure or the establishment of new organisational units (e.g. VIP department, special nursing unit).

ÉM) totalled HUF 4 billion, of which 3.2 billion was spent by medical institutions on the development of their own IT equipment, the rest was spent on intra-institutional system development (IKIR).

These two dimensions are complemented by a third one, that of organisational fusions and annexations, upon which the basic reorganisation types can be taken into account again. After fusion of several institutions, the organisational structure must obviously be transformed. Thus, such cases can be called reorganisation. It is a further question whether these fusions are combined with infrastructural development, rationalisation of building stock and premises, and specialisation of premises.

Change in organisational and operational form is not counted in this analysis as a type of reorganisation. Transformation into non-profit forms of company (non-profit plc., non-profit ltd., or earlier, public-benefit company) does not necessary entail changes in the basic organisational structure or service profile. In the overwhelming majority of cases, changes in operational forms, and with it, of ownership, and functional privatisation are carried out to improve operational efficiency. Important tools in this are the change of organisational structure (merger of departments, establishment of matrices, institutions), streamlining and transformation of profiles, change of basic institutional profile, or prioritised development of certain areas of activity.

Based on the practice of Hungarian health care and reform programmes, the following main types of reorganisation within the particular divisions can be distinguished:

<u>Intra-institutional changes</u>

1.1. full transformation from acute in-patient care into long-term care, rehabilitation and nursing, mostly accompanied by investment demand;

1.2. from acute in-patient specialised care to out-patient specialist care, improvement of diagnostics, one-day surgery, day-care hospital profile, accompanied by investment demand;

2. significant change of acute bed number and profile while maintaining acute care, with development of special areas on one hand and closure of others on the other hand;

3. while preserving existing acute-care profile, changes, concentrations in institutional structure and infrastructure of buildings and premises (less premises and pavilions), which may take place with streamlining of premises profile, e.g. establishment of long-term care, rehabilitation, nursing and hospice premises; such concentration and bailout of premises and pavilions entail considerable investment demand;

1-2-3. mix of above types – complex reorganisation with profile change and significant restructuring and reconstruction of building stock and premises;

4. transformation of operation without major profile change (merger of departments, establishment of matrix units).

Based on current experiences and the Social Infrastructure Operational Programme and Regional Operational Programme tender constructions, in case of points 1.1, 1.2 and 2, investment demands may be put approximately at 300 to 800 million HUF. In point 3, Hungarian hospital plans and already completed earmarked investments, projects and investments range from 1.2–2 to 12–15 billion HUF (in the case of some medical schools, the planned figures were between 30 and 33 billion HUF earlier).

After reorganisation, merger and fusion of institutions, there is a wide range of possibilities for reorganisation in certain premises:

a) profile streamlining across premises after fusion and merger (e.g. enhanced long-term, rehabilitation, acute and emergency care profiles);
b) fusion, merger, then closure of certain premises, development and concentration of central premises.

Investment demand and character in these cases are similar to those above, with possible differences in the number of premises and the complexity of reorganisation.

4.2.5 Typifiable strategic choices according to types of institutions

According to Child's theory, the environment strongly determines the scope of institutions (Child, 1997, p. 53). This is more so in the case of public health-care where institutions conduct their activities in a structure and with duties laid out by legislation. Management decisions and decision alternatives emerge at different levels of institutions in the Hungarian hospital sector. Resulting from changes in the market and the regulatory and financing environments in the past decade, strategic choices according to hospital types (levels) can be typified as follows:

4.2. Table Typifiable strategic choices in the Hungarian hospital sector in the early 2000s

hospital type	direction of strategic change	content of strategic change
university hospitals, national institutions regional and county institutions	growth, expansion of service area, profile, activities	gamma knife, lung transplantation, laser eye treatment, PET-CT
	shrinkage, concentration on activities of higher progressivity	decrease of (mass) cares of low progressivity
	growth – development of university and nation-wide functions	development of transplantation, cardiosurgery, PET, oncoradiology and haemo-dynamic cares
	shrinkage and/or concentration on less specialties	passing down of cares of high progressivity (thoracic surgery, neurosurgery)
city hospitals	growth toward activities of higher progressivity	MRI, development of traumatology, cardiology and stoke cares
	specialisation, change of profile	toward psychiatry, geriatrics
town hospitals	shrinkage, concentration on primary branches	small, manual branches (ophthalmology, otorhinolaryngology), passing down of major specialised cares (urology, pulmonology); in some cases, of primary care (surgery, obstetrics)
	development of special profile	development of one-day surgery in internal medicine and obstetrics
	total change of profile	transformation into psychiatry, geriatrics and nursing specialist hospital

Source: own elaboration

5 Empirical analysis of the Hungarian hospital sector: analytical methods, hypotheses and results

5.1 Empirical analysis of the hospital sector

This chapter focuses on the empirical analytical methods (based on environment analysis and the on the analysis of the decision making situations) that I applied to statistically test changes in the hospital sector. Furthermore, I present the databases that were used to calculate the values of the dependent and independent variables. In the second part of this chapter the hospital sector analysis methods are listed together with the relevant literature in English. The sector-level analysis of hospitals, classification (clustering), the exploration of differences in efficiency, as well as the basically quantitative analysis of indebtedness and the impact of soft budget constraint lead up to an analysis of institutional strategies mainly by qualitative methods. These analytical methods help reveal how decision alternatives available to hospital managements, described in Chapter 4, prevailed in the period under examination. For reasons of scope, a systematic survey of the literature on particular areas under analysis, the detailed description of methodologies, and sketches of the interviews conducted with top managers of hospitals, are found in the appendices.

After a detailed analysis of the environment and the situations of decision making, in this empirical part of the thesis the main question is to what extent are the institutions free to choose? What can serve for the institutions as a guideline? In order to answer these questions I examine the following fields:

a) To what extent is the Hungarian hospital sector well structured in the different progressivity levels, capacity and scale? Is it possible to shift from one category to another? Is there any mobility between progressivity levels?

⇨Cluster analysis will be applied to explore possible answers to these questions.

b) How much difference is there between institutions and institutional groups? Which are the most efficient and the least efficient institutions? What can serve as a guideline for institutional management to catch up with the most efficient hospitals?

⇨Data Envelopment Analysis has been chosen to answer these questions.

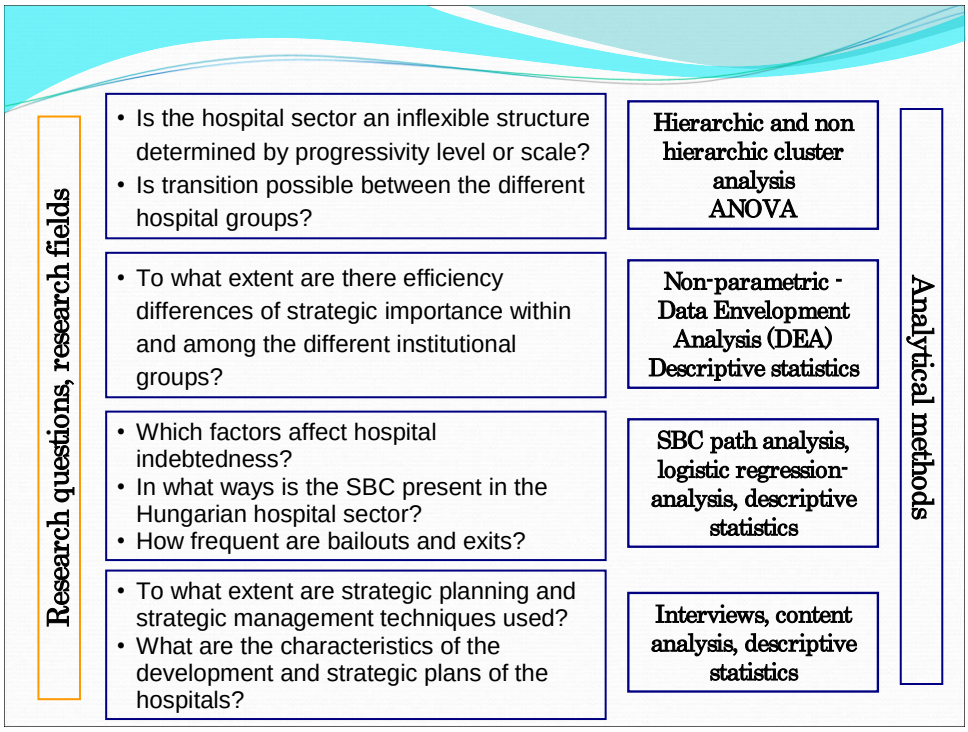
c) How debt is distributed within the hospital sector? How indebtedness changes in time, and what factors influence such changes? In what way can we test the phenomenon of soft budget constraint and its changes in time?

⇨Descriptive statistics (distribution, frequency) and logistic regression are the methods applied.

d) To what extent does hospital management practice use the methods of strategic management? What are the main features of the professional and strategic development plans of the institutions?

⇨Interviews and content analysis of relevant documents on development.

5.1. Figure The Summary of the research questions and analytical methods of the hospital sector analysis



The 10 hypotheses are divided into 4 groups, according to this Figure. These hypotheses reflect the research topics presented in the previous chapters, such as the questions of progressivity levels, efficiency differences, the causes of indebtedness and the extent of the application of strategic management tools.

5.1.1 Database to the empirical analysis

In this subchapter I introduce the databases and sources that I used in the course of the statistical analysis.

Data are derived from NHIFA register of contracts and funding data bases as well as the bi-annual Ministry of Health questionners on debts by voluntarily submitted questionnaire. These may be supplemented by interviews and background conversations conducted with treasury and local government commissioners. Data thus gathered of all Hungarian acute-care hospitals are processed in the analysis.

The full-range national hospital data base contains all data of all institutions with acute in-patient care profile in the period under examination (2000–2009).

5.1. Table Hungarian data bases used for the analysis of the hospital sector

Institution	Publications, on-line data bases
Hungarian Central Statistical Office	Statistical Yearbook on Health Care
	Statistical Yearbook on Demography
NHIFA (National Health Insurance Fund Administration)	NHIFA Statistical Yearbooks
	GYOGYINFOK and FIFO data bases
	performance data of in and out-patient institutions and GP services under NHIFA coverage
	Data base of one-off data collections
ESKI (National Institute for Strategic Health Research)	IMEA = Internetes Magyar Egészségügyi Adattár (Internet-based Hungarian Health Data Warehouse)
	MEA = Magyar Egészségadattár On-Line (Hungarian On-line Health Data Base)
	REA = Regionális Egészségügyi Adatbázis (Regional Health Data Base)
	TEA = Tételes Egészségügyi Adatbázis (Itemised Health Data base)
	Register of allocated subsidies
Ministry of Health	bi-annual debt assessment questionnaires
National Institute of Oncology	National Cancer Register

Accessibility of statistical data on the Hungarian hospital sector and characteristics of data bases and publications are described in detail in Appendix 5.1.1.

The character of the majority of variables is determined by the funding technique described in detail in Subchapter 2.3. As part of compulsory social insurance, the Homogeneous Disease Groups (HDGs) system, a Hungarian adaptation of the American Medicare's Diagnosis Related Groups (HDGs) system, elaborated for performance-based funding, has been implemented in funding acute hospital care by NHIFA since 1

July 1993. The variables are the following: financed case number, weight number, case mix index, duration of care, HDGs, list of one-day care.

The other part of the variables derives from regulations on the hospital sector, from registers and statistical data collected by the Ministry of Health. These variables are hospital bed numbers, number of medicals specialities, number and character of valuable technologies, group of institutions with earmarked investments, sum of the grant, maintainers' subsidy, debt. The detailed list of the variables is given together with the presentation of the methods in question.

5.2 Classification of hospitals by cluster analysis

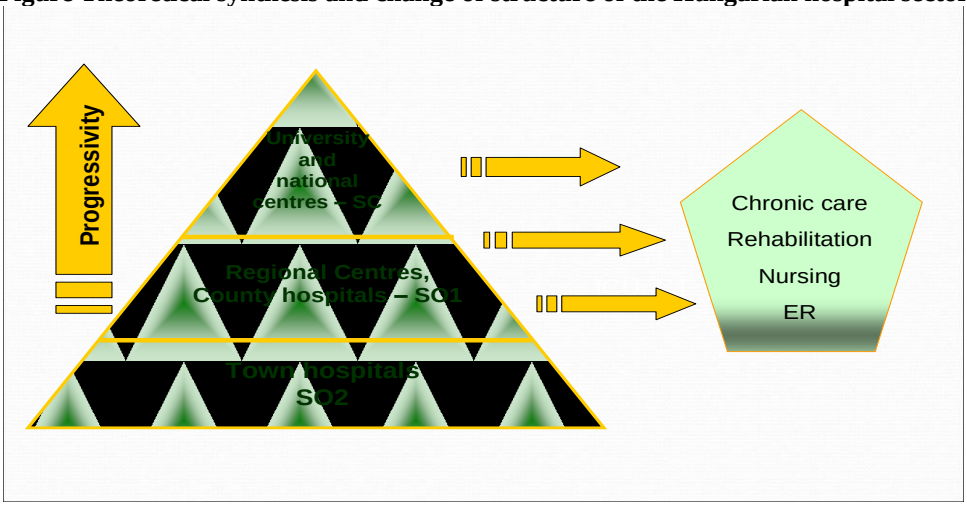
5.2.1 Theory – progessivity levels of hospitals

The scientific classification of the hospital sector has gained especial topicality in recent years on account of the fact that in the autumn of 2006 Parliament passed Act CXXXII of 2006 on the Development of Health Care System (hereafter Eftv) at Government proposal within the framework of the so-called health-care reform programme. Under the act, 39 priority and 52 territorial hospitals as well as several dozens of nursing, chronic and rehabilitation specialised hospitals were designated. The move elicited sharp criticism especially on the classification of institutions, the designation of particular priority hospitals and for the lack of precise definitions. In the appendix of Eftv, capacities of priority hospitals were determined according to a breakdown of branch groups and bed numbers, thus rendering any changes in adjustment to needs highly difficult.

From a theoretical approach, in contrast to Eftv categories, a clear tripartite division can be detected, which forms the basis of the organisation especially of emergency care (emergency department SO2, SO1, and emergency centre; see figure 5.2 below); according to the latest minimum conditions, however, three levels are distinguished (I, II, III) in ascending order in most medical branches[9], named primary care, decentre, and (national) centre. The former classification of hospitals and their financing weight by the governmental regulations of the 90s are shown in the Appendix 5.2.1..

[9] A 48/2009. (XII. 29.) Ministerial Decree of the Health Care Ministry on the modification of the 60/2003. (X.20.) Ministerial Decree of the Ministry of Health Care, Social and Family Affairs on the necessary minimal professional conditions for providing health care services.

5.2. Figure Theoretical synthesis and change of structure of the Hungarian hospital sector



In analysing the structure of the Hungarian hospital sector and the strategic scope of particular institutions, it is important to take a look at hospital sectors in other countries with respect to the number of levels and institutional groups distinguished in them, the criteria of grouping, and the characteristics pertaining to them. For a short introduction of foreign publications relevant to the analysis, see Appendix 5.2.2.

In this part, my aim is to conduct a cluster analysis in order to examine from a scientific approach which grouping of institutions creates the most homogeneous hospital groups. The essence of differentiation by progressivity level is that hospitals at a particular level must show conformance in the most possible – structural, operational and performance – parameters. Most of the variables included refer to the scale and progressivity level of the hospitals. The analysis was performed with data from 2006 and from 2009 including the same variables, which makes changes comparable.

On the basis of the theoretic background and the research questions the following hypotheses are formulated referring to hospital grouping and cluster-analysis:

1) HYP The acute care hospitals in Hungary – exept specialised institutions as outliers – can be classified into three groups such as town hospitals, county-regional hospitals and national-university institutions.

2) HYP Groups formed on the basis of priority and non-priority hospitals imposed by the Act CXXXII of 2006 on the Development of Health Care System (Eftv) do not reflect the progressivity and volume levels of the hospitals in Hungary.

5.2.2 Types of cluster-analysis and presentation of the variables

From the cluster analysis methods elaborated for the grouping of hospitals in Hungary (Füstös et. al, 2004, p. 178. Székelyi, Barna, 2003., p. 109.). I use hierarchical and non-

hierarchical clustering as well[10]. Non-hierarchical type of cluster-analysis allows changes in the number of groups. On the basis of what is written above, I use three cluster-analysis methods in order to be able to examine the grouping of hospitals from more than one direction. These methods are:

1) Hierarchical clustering
2) K-means analysis, centroid method
3) Two-step clustering.

With the use of different methods, it is possible to test various institution groupings, because Eftv originally did not provide definitions of levels in progressivity and institutional groups. (The definitions of priority hospital and health pole were only incorporated three years later in the Ministry of Health decree on health-care minimum conditions.) For a description of clustering methods in greater detail, see Appendix 5.2.3.

On the other hand, I intend to examine whether the three levels outlined in the above theoretical model can truly be supported by scientific statistical methods. In characterising the homogeneity of clusters, standard deviations within the cluster offer a handle, globally (Wilk's lambda, the higher values of which point to greater homogeneity). I complemented clustering with the simple descriptive statistical analysis and variance analysis (ANOVA), which facilitates to show other values of variables in particular clusters and in their totality. The significance of variables values were tested with the F probe.

Alongside clustering, I also examine the external and internal standard deviations in institutional categories set up by administrative regulation or on the ground of professional conceptions. Less internal deviations indicate greater homogeneity of the groups thus created, in other words, they have parameters consisting of similar elements. The validity of grouping is indicated by the greatest possible external standard deviation between particular groups, which points to greater distances among groups or significant differences between them. In this analysis, the same variables are taken into consideration as in clustering.

[10] During the planning and the preparation of the database for analysis considerable help was given by Anita Oroszné Csesznák.

Characteristics of the database and presentation of the variables used for cluster-analysis

The units of the analysis are Hungarian hospitals with acute in-patient care profile financed by the NHIFA. The number of units is 132. Hospitals with basically rehabilitation profile were taken out, so 121 really acute profile institutions were kept as units of the analysis. The national hospital database contains all data on acute care in-patient hospitals for the years 2006 and 2009. The sources of the data are the NHIFA, the Strategic Research Institute on Health Care (ESKI), Ministry of Health and the Federation of Hospitals. 30 variables are formed on the basis of these data, from which 14 are used for the analysis (the rest of the variables refer to indebtedness, participation in consolidation, characteristics of ownership and leaders and to the territorial situation of the hospitals). For a detailed description, average values and minimum-maximum values of the variables see Appendix 5.2.4. The classification of the institutions used since 1993 by the NHIFA (IntTip) has been modified into Own Institutional Types *(own IntTip).* The method I followed for this modification was that dimensions referring to ownership structure or to the differences between capital city and provinces were ignored, and hospitals were classified exclusively on the basis of scale, progressivity level or specialisation. Capital city hospitals were divided into two groups according to their characteristics and the function they perform in care: 1) big hospitals with priority qualification or / and hospitals with more than 800 beds were classified as county-regional hospitals (like Szent János Kórház, Szent Imre Kórház); 2) while smaller hospitals were listed among town hospitals (Margit Kórház, Nyírő Gyula Kórház).

The first 14 variables formed the basis for cluster-analysis, while variables reflecting institutional classification (15., 16., 18. és 19.) were used for variance-analysis and hypothesis testing.

Standardisation of the variables

Before starting the analysis categorical and continuous variables had to be separated, continuous variables had to be standardised in order to assure that the model takes all dimensions with the same weight when it comes to homogenisation of the groups (Székelyi-Barna, p. 114.). (So we can assure that some sets of data do not become overweight in comparison to another, like the NHIFA incomes with a value of 15-20 billion compared to the number of specialities, not more than 34). The database created departing from the national database in 70% contains variables which can be considered as continuous variables. Analysis is based on these continuous variables, while later on I

examine which values categorical variables (like institutional types or characteristics of the ownership) take in the clusters created.

5.2.3 Cluster-analysis results

Herein I present the results of the process of hospital grouping by the three types of clustering. I show how group average and variance is changing with regard to the variables included. Clusters are tested with varying cluster numbers and using different methods.

Hierarchical clustering with continuous and standardised variables

In the hierarchical clustering I could include data of 114 acute profile hospitals for the year 2006 and 98 for 2009. 3 to 7 cluster groupings were tested. Results show that the Semmelweis University formed a separate group in 2006 in case of 5, 6 and 7 cluster numbers, while using lower cluster numbers this institution is classified among other medical universities. In case of 3 and 4 clusters this group was complemented by the Jósa András County Hospital of Nyíregyháza in 2006. In 2009 in case of 6 or 7 clusters Semmelweis University returned to the university group, while the BAZ-Megyei Kórház in Miskolc and the State Health Centre (ÁEK) created of five state institutions classified into this group. Results show that the boarderline that separates universities and county-regional hospitals with considerable capacity and high progressivity level is blurred.

Another spectacular result of hierarchical clustering is that the National Institute of Cardiology (Gottsegen György Kardiológiai Intézet – GOKI) and the National Institute of Neurosciences (Országos Idegtudományi Intézet – OITI) formed a separate group in all the 5 hierarchical clustering processes in 2006 and also in 2009. Such institutions can be considered as outliers for their special situation, and are treated as a separate group. They use relatively small bed numbers for high technology treatments of high CMI (4,1 és 3,8) and cases with high progressivity rate (50 %) and its income (82,3 %). The National Institute of Reumathology and Fiziotherapy (Országos Reumatológiai és Fizioterápiás Intézet – ORFI) and the MÁV Hospital in Szolnok also form a separate group, but the reasons are different: their rehabilitation and rheumatology profiles result lower CMIs.

5.2. Table Average values of the two main hierarchical clusters based on data from 2006 and 2009

Clusters	*Income from the NHIFA*	*Average acute bed number*	*No of specialities*	*DRG case number*	*CMI*	*Rate of progressive DRG cases*	*Rate of progressive DRG income*
2006.	22,1 billion HUF	1779	32-33	124.672 thousand	1,558	15,5 %	51,1 %
1 Medical Universities 2009.	19,7 billion HUF	1744	30-31	79,4 thousand	1,430		
2006.	3,85 billion Ft	479	12	19.200	0,975	3,9 %	17,6 %
2-Hospitals 2009.	3,84 billion HUF	602	10-11	19.000	0,977		

Cluster 2. included more than 100 institutions in 2006 and 83 in 2009, so differences within the group are great. Acute bed numbers ranged from 36 to 1768 in 2006, case numbers from 936 to 80.000 and CMI from 0.7 to 1.7. Therefore, this group is far from being homogenous, and for later analysis forming of sub groups will be necessary. For the year 2009, when the university group was joined by some county hospitals, the values, the average case number, the number of specialities and the average income decreased.

In case of 4 or 5 clusters hierarchical clustering still does not create subgroups, but separates ORFI and MÁV hospital in Szolnok from the others. Number of group members: 5 – universities and Jósa A. MKh, 2 – GOKI and OITI, 1 - ORFI and the other national, capital city and town hospitals, 106 institutions.. Only if 6 or 7 clusters are allowed there starts to be some spreading. Such results indicate that cluster analysis is extremely sensitive of extreme values. It is possible that it takes 100 institutions as a homogenous group against one or two institutions with very special profiles. This difference or separation is illustrated by the diagram on the relationship between bed numbers and CMIs in 2006, which is found in the Appendix 5.2.4.

Obvious grouping starts to become visible at 6 or 7 clusters as we descend on the dendrogram analysing subgroups (as opposed to aggregation). At this level Semmelweis University formed one group, ORFI another and GOKI and OITI a third one. The 23 members of Cluster 3 are more progressive institutions: county hospitals, some capital city hospitals (Uzsoki u., Bajcsy-Zs. Kh, Központi Honvédkórház, MÁV hospital). The rest of 83 hospitals is not divided by the model, including some national institutions as well (OGYK, ONKI, Korányi, OBSI).

5.3. Table Average values of the 6 cluster groups of the hierarchical cluster analysis for some of the variables, using data from 2006

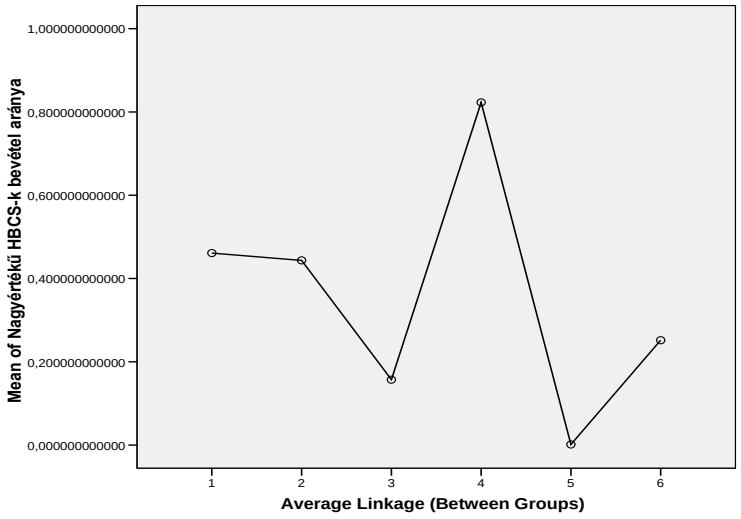
Clusters*	*Income from the NHIFA Billion HUF*	*Acute bed numbers*	*Number of specialities*	*DRG case number*	*CMI*	*Rate of *DRG cases*	*Income rate of high value DRGs*
1 - Medical Universities (except S.E.) + Jósa And.	**18,38**	**1 701**	**32**	**75 993**	**1,45**	**16,8 %**	**44,4 %**
2 –progressive hospitals - 23	**7,74**	**1 214**	**22**	**38 817**	**1,055**	**9,8 %**	**25,2 %**
3 – other hospitals - 83	**2,55**	**423**	**9**	**13 382**	**0,96**	**5,7 %**	**15,7 %**

*Data of three other groups are not shown because two of them contain only 1 institution (SE and ORFI) and the third group only two (GOKI, OITI).

The table clearly indicates that the institutional groups formed by clustering considerably differ in the main parameters. High value DRGs and DRG incomes are essentially separate. In the case of average case numbers values are tripled from town hospitals to county-regional institutions, and the difference is sixfold compared to the universities. According to ANOVA analysis the acute care variables are significant at 99%, which means that the values of standard deviation and their stability are proved.

The Figure below shows the rates of high value DRGs. The Figure is interesting to observe: group 4 is protruding due to the values of OITI and GOKI, while group 6 (leading county and capital city institutions) should follow group 1 (SE) and group 2 (university clinics). At last we have group 3 with 83 town hospitals and group 5 with ORFI.

5.3. Figure Average values of high value DRGs rates in hierarchical cluster analysis (2006)



At the end of this chapter this 6 scale model will be compared to the ANOVA analysis of the Eftv groups. The comparison will show which type of institutional clustering is able to create more homogenous groups (with low standard deviation within the groups and

high standard deviation among the different groups).

K-means clustering using continuous variables

This type of cluster analysis was run more than once. The run on the whole institutional group gave the results that at cluster numbers between 3 and 7 the GOKI and the OITI were separated, while at a greater cluster number even the ORFI formed a separate group. These institutions are outliers because of special profile, low case numbers and high CMI. In order to avoid distorting effects, these three institutions were left out of the analysis.

Relationship between bed numbers and CMI in acute inpatient care institutions

K-means analysis was also processed using 3-4-5-6 and 7 groups. One of the results was that at cluster numbers 3 and 4 Jósa András Megyei Kórház (Nyíregyháza) joined the group of four universities, while at 5, 6 and 7 clusters the university group dissolved, and first the University of Szeged, and later the University of Pécs changed position into another cluster.

K-means cluster analysis without outliers with 4 cluster groups (2006)

Let us revise the 4 cluster group after having left out some institutions with special characteristics (OITI, GOKI). All variables on acute care seem significant (significance level below 1%). Group 1 is dominated by the universities and the Jósa András Hospital, in Group 2 we find 22 county hospitals (and one town hospital, the Semmelweis Hospital in Miskolc) and some capital citz institutions (MÁV kórház, KHK, Szent László kh), while Group 3 is formed by 71 town hospitals. Group 4 contains 8 special profile institutions, like OGYK, ONKI, Korányi, OBSI, Uzsoki u. Kh, Bajcsy zs. Kh, Szent László Kh. and BIK. This latest group is characterised by lower case numbers with a relatively high CMI and higher progressivity level. These hospitals report on DRGs and high value DRGs at a rate that surpasses the values of university clinics.

5.4. Table Group characteristics for K-means clustering without the outliers listing four clusters (2006)

Clusters	Average acute bed numbers	Average number of specialities	Yearly acute case numbers	CMI	Proportion of *DRG cases	Proportion of high value DRG cases
1 – University group (5)	1777	33	84330	1,45	16,9 %	13,2 %
2 – Progressive group (22)	942	23	39135	1,03	9,1 %	5,54 %
3 – Common hospitals (76)	314	9	12514	0,92	3,7 %	2,98 %

Clusters	Average acute bed numbers	Average number of specialities	Yearly acute case numbers	CMI	Proportion of *DRG cases	Proportion of high value DRG cases
4 – Specialised (national) institutions (8)	529	13	23935	1,39	27,5 %	9,56 %

K-means cluster analysis with 5 clusters (2009)

For the year 2009 I chose to use five clusters. Group 1 includes university clinics (5), group 2 the county-regional institutions with some capital city hospitals (18), group 3 the bigger town hospitals and smaller capital city institutions (37) and group 4 the 37 small town hospitals.

After a detailed analysis of the results it is interesting to notice that in the groups of 'elite' institutions two hospitals changed place from 2006 to 2009, and the BAZ-Megyei Kórház ascended to the first group of the four universities, while the Jósa András Hospital in Nyíregyháza descended into the group of county-regional hospitals. Another remarkable result is that there is a sharp cleavage between the group of county hospitals and capital city hospitals. This high progressivity level group includes capital city hospitals like the Bajcsy-Zs. Hospital, Szent János Hospital, Péterfy S. u. Hospital and the unified Szent István-Szent László Hospitals. Some county hospitals became part of the group 3 of the bigger town hospitals, like the hospitals of Tatabánya, Salgótarján, Eger (Markhot Ferenc.), Kistarcsa (Flór Ferenc), Szekszárd and the capital city hospitals Jáhn Ferenc and Szent Imre.

5.5. Table Main group characteristics for K-means clustering without the outliers – analysing 4 clusters (2009)

Clusters*	Average acute bed numbers	Average number of specialities	Average number of progressive technologies	CMI
1 – University group (5)	1 564	31	8	1,51
2 – County-regional hospitals (18)	910	24	5	1,16
3 – Common hospitals (37)	397	10	2	0,97
4 – Small hospitals (32)	130	3	0,6	0,89

Cluster 5 includes two specialised hospitals: the Irgalmasrendi in Budapest and the MÁV Hospital in Szolnok, which are classified as outliers on the basis of their special profiles.

There is a clear decline in progressivity level from universities to small town basic care hospitals. The number of specialities, CMIs and number of progressive technologies are

all decreasing by levels. An institutional grouping like this seems excellent for future analysis of efficiency and for planning health policy regulations and development.

In case of fewer clusters 24 institutions were classified in the progressive category, two national institutions formed a group apart (OKI and OITI) and the other 76 institutions are represented in one single group (in case of 3 clusters this group was joined by the OGYK in 2006). Some capital city hospitals like Szent István kórház, Bajcsy Zsilinszky and Uzsoki utcai Kórház form part of the first cluster.

K-means clustering results also show that all the variables are significant both in 2006 and 2009, except for the acute bed numbers which indicate the scale of the chronic-rehabilitation background but do not relate directly neither to the development level of acute care nor to the progressivity level, but reflect the peculiarities of the local environment.

One of the characteristics of the K-means clustering is that the cluster centre is formed by iteration. Processing the data on 2006 was carried out in 7 steps resulting in 4 clusters, the ANOVA analysis of which was used for the comparative variance analysis (see Appendix 5.2.6). A peculiar feature of the ANOVA analysis is that for some variables the within group variance (35-45%) almost reaches the values of the between group variance (like in case of income from the NHIFA, DRG weight number, performance). In case of the variance of progressive DRG incomes the within group standard deviation is even higher than the between group one (Between Groups: 1,15, Within Groups: 1,20). This result reveals that cluster 2 is a big group including a great variety of institutions. However, some variables show considerable differences in variance. The between cluster differences mostly cover the variance (75-80 % of it), and the within group differences represent a minority case (number of specialities, CMI), which is due to proper cluster formation.

ANOVA analysis results, significance levels per variable and p-values are listed in Appendix 5.2.6. P-values below 5% (in every case except 2 variables) indicate that cluster centres differ significantly. This means that the clusters of the K-means analysis are significant in case of incomes from the NHIFA, bed numbers, progressive income, etc. On the other hand, there is no significant difference according to acute/total bed numbers and DRG based income. Such result have little relevance to my study, as hospital profile is not influenced by having or not rehabilitation, nursing or chronic care units within the institution, or if these services are provided by others.

ANOVA analysis of administrative grouping

Parallel to cluster analysis and using data from 2006 I examined the external and internal standard deviations of the institutional categories established by administrative regulations and health policy conceptions. In an ideal case internal deviation is supposed to be low, meaning that groups are homogenous, containing elements of similar parameters. Meanwhile, external deviation is supposed to be high, indicating the differences of the groups. The same variables were considered as for the cluster analysis. Most of the variables proved significant, so the results are consistent.

Examination of the deviations for some selected variables show the following results: internal deviation of the institutional groups formed according to administrative regulations represents a much higher rate compared to external deviation, than in the case of institutional groups formed on the basis of the emergency conception and in the case of the two clustering method (Appendix 5.2.7.) For example, the standard internal deviation for the income rate of high value DRGs is 89,1 %, while for other groups it is 53,8%, 47,7% and 43,5% respectively. Therefore, my hypothesis is supported by the results.

5.2.4 Summary of the cluster analysis of the hospital sector and hypothesis testing

None of the applied cluster analysis methods using data from 2006 and 2009 gave as a result the same or similar institutional grouping that was imposed by the Act CXXXII. of 2006 (Eftv). The applied statistical method recurrently classified universities and national institutions as a separate group or groups. At higher cluster numbers (4-5-6) even county-regional institutions form a cluster that is separate from the set of town hospitals. A general result is that all methods classify capital city hospitals into more than one group according to their progressivity level.

Hypothesis testing

1) HYP The acute care hospitals in Hungary – except specialised institutions as outliers – can be classified into three groups such as town hospitals, county-regional hospitals and national-university institutions. (FALSE)

Results make it obvious that it is difficult to create stable and homogenous groups in the Hungarian hospital sector. Different cluster analysis methods give different results, meaning group content changes by the years (2006 and 2009.) The reason is that

national institutions, capital city hospitals and also county hospitals differ considerably in profile, case numbers and other characteristics. There is a marked tendency of splitting in the case of former county hospitals and capital city hospitals. Some institutions ascend to the county-regional group, characterised by a wide range of high progressivity activities and by using technology elements which previously characterised exclusively the top national and university institutions. Another part of the institutions is classified among the big town hospitals being a stable basis for the Hungarian health care sector. An important factor is the existence of parallel or complementing care structures in the same town or region. Existence of such structures imply higher level of specialisation, otherwise one institution is forced to provide massive routine care as well as progressive care. In case of specialisation and sharing of tasks institutional profiles are not full scale. Hospital grouping should be précised by using more dimensions, including institution scale and progressivity level of care.

2) HYP Groups formed on the basis of priority and non-priority hospitals imposed by the Act CXXXII of 2006 on the Development of Health Care System (Eftv) do not reflect the progressivity and volume levels of the hospitals in Hungary. (TRUE)

Comparing cluster analysis and ANOVA analysis results my hypothesis proves right, evidencing that grouping on the basis of scale and progressivity level is more homogenous than the former grouping based on administrative and legal regulations. The results show that administrative regulations established highly heterogeneous institutional groups (priority hospitals and non-priority hospitals), where analysis involving various parameters results in higher standard deviation within the groups then among the groups. Such result clearly indicates that the regulations of the Eftv did not reflect the reality of institutional grouping, while caused serious instability and insecurity in the hospital sector. For proper hospital grouping more than one variables should be considered, such as scale, progressivity level of care, geographical situation, and not only one parameter (within 50 km) as the Eftv did. Cluster analysis supports the statement that a four-group, four progressivity level system is proper for the Hungarian hospital sector, the groups being national university institutions, county-regional institutions, multi-care town hospitals and basic care small town hospitals.

In order to achieve more precision of analysis and the results it is recommended to include further variables and to process cluster analysis on data from other years as well

(2004-2005). Practical benefits of the analyses can be improved by using variables describing territorial and availability aspects for the analysis of institutional clustering.

The cluster analysis was processed in repeated rounds with increasing cluster (institutional group) numbers from 3 to 4, 5, 6 and 7. Bigger cluster numbers make identification of outliers possible (such as National Institute of Cardiology - GOKI, National Institute of Oncology – ONKI), where bed numbers, number of specialities and progressivity level do not reflect general trends (possibility of 50-60% of progressive cases on a few beds with high CMI). These institutions occupy a special position in the system and serve as references. In the capital city the huge population allows higher specialisation, therefore some capital city institutions also behave as outliers. Cluster analysis is highly sensitive on such extreme values, so these institutions are to be left out of the analysis, or greater cluster numbers should be applied for both hierarchical and non-hierarchical analysis.

International practice supports that progressivity is always a basic constituent of differentiating between hospitals in financing and development. The hospital sector is consciously analysed and planned, the application of statistical models is not unknown for analysing institutional characteristics like case-mix, case numbers, capacity or utilisation.

Analysis clearly indicates that in Hungary some national institutions and the four university clinics should be treated as a group apart from the rest of the institutions. Another level can be formed by former county hospitals together with bigger capital city hospitals, and a third group can be constituted by traditional provincial hospitals and smaller capital city hospitals.

To conclude, it can be claimed that cluster analysis is an effective tool for the grouping of Hungarian acute care hospitals, even if the possibility of creating fully homogenous groups is faint. This, or similar sort of analysis can serve as a background for the revision of the Eftv, for forming new hospital groups or for future health policy planning.

5.3 Analysis of hospital efficiency: operational efficiency, economies of scale. Method: Data Evelopment Analysis

5.3.1 Theoretical background of efficiency analysis and DEA method

Operational efficiency plays a crucial role when defining the position of the organisation in comparison with its competitors, which is of key importance when elaborating organisational strategies. This analysis focuses on the measurement of operational efficiency which is highly demanded in international level. More and more countries develop a national standard for measuring operational efficiency (by defining input and output variables, publishing health system related outcomes, such as patient satisfaction, data of production). In the literature on health economics more and more studies appear analysing the comparative efficiency of hospitals operating in the same area (region, state, province) and under identical regulative and financing circumstances.

The term efficiency stands for operational efficiency in this chapter. We can talk about operational efficiency under the following circumstances:

1. Producing a certain amount of output while minimizing inputs.
2. Producing the maximal amount of output using the available input.

To measure the differences in efficiency Data Envelopment Analysis (DEA)[11] seemed the most appropriate method. This is a nonparametric, deterministic method.

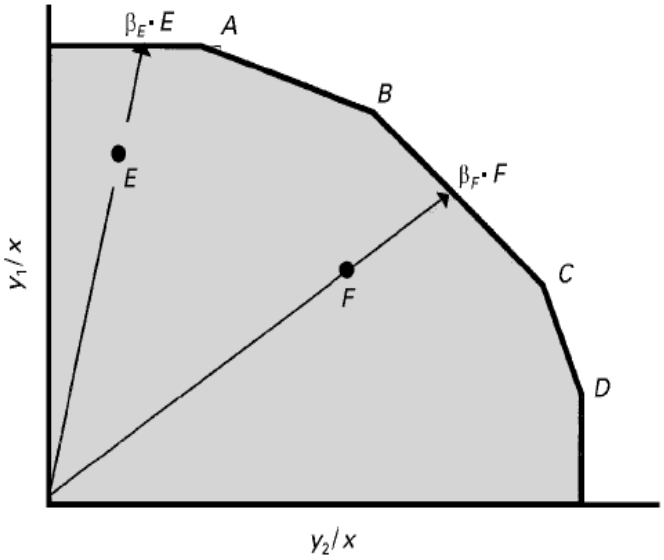
Building on the ideas of Farrel (Farrel, 1957), Charnes, Cooper and Rhodes applied linear programming to the problem (Charnes, Cooper and Rhodes, 1978), see Appendix 5.3.1. The simplest way to measure efficiency is to define the division of the output and the input. The problem is that the production process is characterised by more than one input and output variables. The DEA method offers the following solution to this problem: for each Decision Making Unit (DMU) a "theoretical input" and a "theoretical output" are created by the linear combination of the inputs and outputs, defining the optimal weight for each DMU. So we have the same number of optimizing problems as the number of the DMUs, and furthermore we have to maximize the coefficient of the combinations of the input and output variables.

[11] The most widely applied methods to measure efficiency are DEA (data envelopment analysis) and SFA (stohastic frontier analysis). The main difference between the two is how they define best practice frontier. SFA estimates frontier by linear regression, while DEA uses linear programming. The advantage of DEA is its nonparametric character, while here the definition of the production line is not necessarily required.

The analysis is based on the comparison of the efficiency index of the different DMUs. The unit that achieves the best productive efficiency is considered as a reference point, with its efficiency rate being 1 (100%). The method uses the data of the best units to calculate best practice frontier and the efficiency ratio for the rest of the units. One of the great advantages of the model is that its result make ranking of the institutions viable.

The following chart illustrates how DEA works in case of 2 output and 1 input variables. A, B, C and D show efficient production, while the units represented by E and F can be improved along the lines.

5.4. Figure DEA analysis with 2 output and 1 input variables



*Source: Prior, 1996

The aim of the analysis can be twofold. (Charnes, Cooper és Rhodes, 1978). If the aim is to examine how to produce a certain output with the least possible input we talk about an input-oriented model. If the aim is to determine how to produce the most output using a given amount of input we talk about an output-oriented model. Therefore, in case of input-oriented models we intend to minimise input for a fixed output, while output-oriented models aim at maximising output using a fix amount of input.

A distinction is made between Constant Returns to Scale (CRS) (Charnes, Cooper, Rhodes, 1978) and Variable Return to Scale (VRS) (Banker, Charnes, Cooper, 1984, Banker, 1984) models. CRS model considers equally efficient a productive unit producing 1 output unit by using 1 input unit and another unit producing 2 output units by using 2 input units, as the output/input proportion remains unchanged. As opposed to

this, VRS model counts with changing proportions, where the input/output ratio considered as 1 changes for each scale cathegory. In this case the efficiency frontier is approached by a discrete linear function. In this function the efficiency frontier is determined by a convex linear combination of the units with are approximately of the same scale as the unit we examine. (Appendix 5.5.2.)

Another efficiency index is the Scale Efficiency, the quotiens of the indexes resulting from CRS and VRS models. This index is supposed to estimate the inefficiency resulting from inappropriate scale.

The advantages of the method is that its reduced input (input-oriented case) or its increased output (output-oriented case) are not normatively given values, but they are in fact produced by certain units, in this case hospitals. Reliability of the results depends on how precisely the input-output combination describes the production function, which is not explicitly given.

5.6. Table Types of DEA analysis with reference to the literature

DEA type	Input-oriented	Output oriented
CRS model	Input-oriented CRS model K. S. Lee, 2008 – South-Korea Steinman, 2003 – Switzerland	Output oriented CRS model Vitikainen, 2009 – Finland Ferrier, 2006 – USA
VRS model	Input-oriented VRS model Aletras, 2007 – Griece	Output-oriented VRS model Vitikainen, 2009 – Finland

Part of the variables developed in international literature and listed in subchapter 5.2 of the present dissertation can easily be adapted to the Hungarian context. Such is the case for bed numbers or case numbers, eg. However, another part of the variables, such as number of physicians and skilled ancillary workers, quantity of materials, implantations, equipments or total operational cost, are not available in the Hungarian statistics, and could be provided only by individual data collection methods. Unlike in other countries, where equipment and machine registers are continuously updated, in Hungary only fragmental information on technological background and diagnostic equipment are available.

Literature points out that DEA-based efficiency analysis methods form part of a strategic context. (For a systematic review of DEA analysis methods see Appendix 5.3.3.) DEA methods do not only explore efficiency differences between hospitals in a certain period characterised by certain parameters, but they also analyse the results in a certain context, like: has efficiency improved after a certain financial regulation or not?

Is there any difference in efficiency of the institutions of different kind of ownership structures? Are there any differences between county hospitals, which operate as monopolies, or town or city hospitals that are working in a competitive environment?

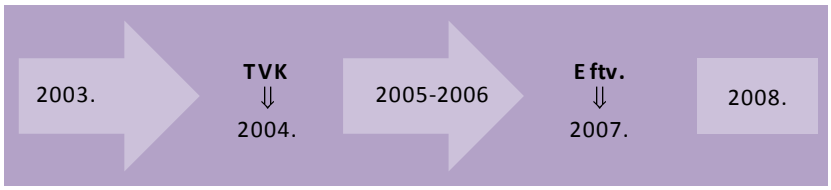
It is important to point out that such analysis cannot be used for making direct comparisons, as different hospitals use different input and output variables to calculate with. Only indirect comparision is possible, but only if the structure of the health care systems of the countries compared are fairly similar. Such comparison was made between Finland and Norway (Linna, 2006). The results highlighted that in Norway the efficiency of the hospitals were 17-25% lower than of those in Finland.

5.3.2 DEA analysis in the Hungarian hospital sector

Before presenting real-life analysis, I offer a description about which aspects of hospital efficiency can be examined in Hungary, and I list the variables that I consider the most appropriate to carry out the analysis in question.[12] The efficiency analysis shows two main tendencies that are illustrated in Figure 5.6. This chart illustrates the efficiency analysis methods used for hospitals of different progressive care groups.

On the one hand, we can examine how technical efficiency changes in time, and how it is influenced by legal regulations (horizontal analysis) (Figure 5.5.).

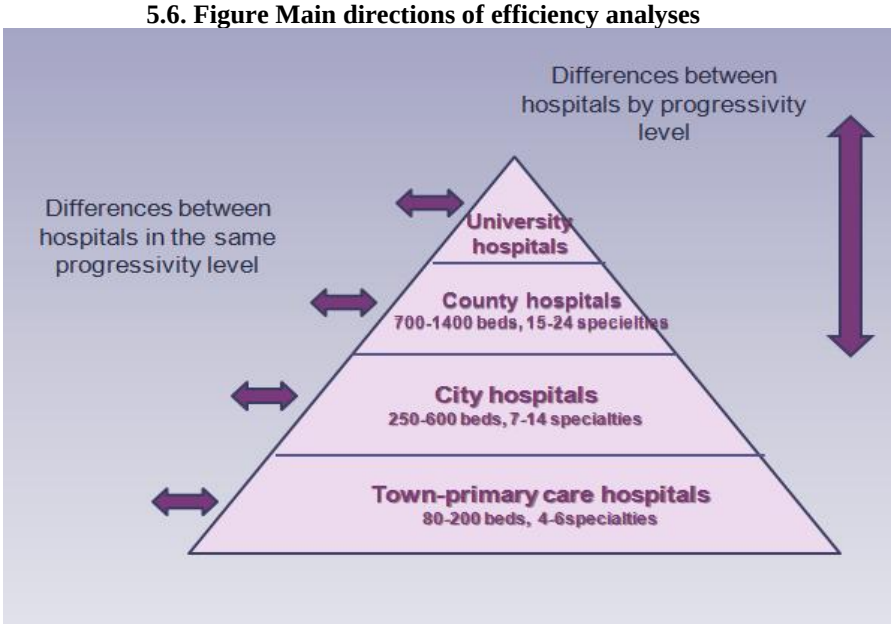
5.5. Figure Time scale



In this study I examine the effects of the introduction of Performance Volume Limit (PVL) and Eftv, supposing that hospital efficiency is influenced exclusively by the changes in the regulations, as under the present circumstances it is hardly detectable wether changes in hospital efficiency are induced by regulatory changes or by management decisions.

[12] During the planning and the preparation of the database for analysis considerable help was given by Adrienn Ecseki.

5.6. Figure Main directions of efficiency analyses



On the other hand, I analyse the similarities and the differences between groups formed on the basis of main variables (vertical analysis). In this study a relatively few groups have been established, as I did not plan to explore which variables are the most appropriate to differentiate among hospitals in Hungary. The groups subject to examination are: priority and non-priority hospital groups by ownership structure (state, ministry, municipality), and groups by progressivity level (small town basic care, town multi care, county or regional hospital and university clinics).

Parting from the theoretical background described in the previous chapters the following hypothesis will be tested in the forthcoming chapters on empirical analysis:

HYP 3) The efficiency of county hospitals has improved between 2003-2008.

a) The input-oriented DEA model (CRS, VRS) reveals greater efficiency differences during the period before the PVL than after;

b) The input-oriented DEA model (CRS, VRS) reveals greater efficiency differences in the period before Eftv than after.

HYP 4) There is no relationship between the efficiency differences according to

a) whether hospitals are situated in the capital city or in the provinces;

b) progressivity level (wether they are small town basic care hospitals, town multicare, county-reagional hospitals or university clinics);

c) priority or non-priority hospitals.

Possible variables in Hungary

The variables that are most usable in the Hungarian hospital sector are listed below.

5.7. Table Input and output variables for DEA analysis of the Hungarian hospital sector

Character of variable	Input variables	Input-output variables	Output variables
Capacity and utilization index	Acute inpatient bed number Number of professions Average of nursing days	Acute inpatient case number Case number per bed Number of operations, type Number of outpatient visits	Weight number Case Mix Index (CMI) Total number of days of care
Financial indexes	Total operational expenditure (Total cost)		
Human Resource indexes	Number of physicians and skilled ancillary workers	Stability of personnel, fluctuation	
Indexes of usage of assets, materials, medicines	Amount of medicines, implantations, materials		

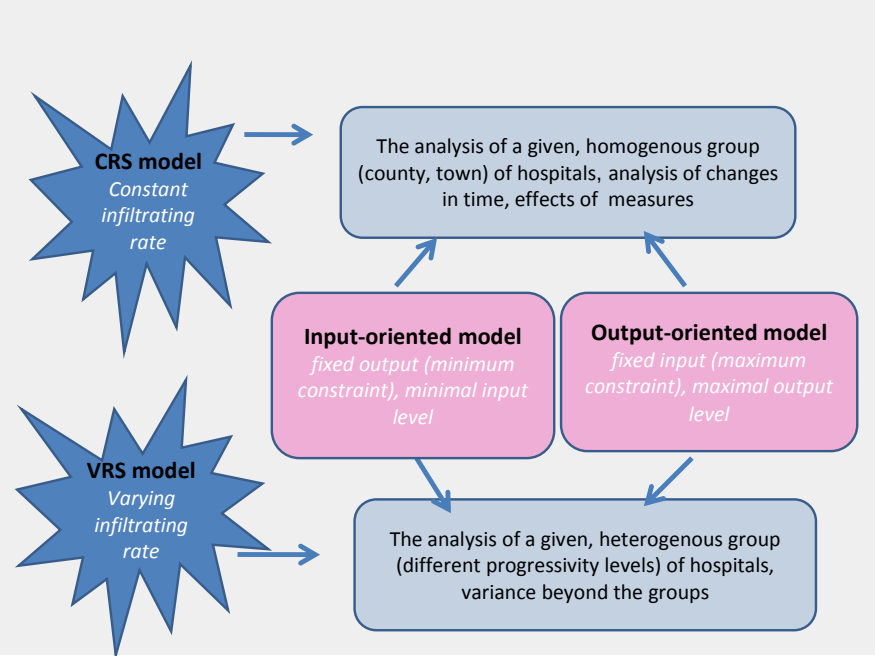
Source: own elaboration

In DEA analysis some variables can be handled either as input or output variables, depending on the procedure. Such variables are, for example, the Case Number of Inpatient Care, which is considered as an output in relation to the Number of Physicians, but considered as an input in relation to the Weight Number or the CMI. By the same logic, the number of operations is output in relation to the amount of materials used, but input in relation to the weight numbers and the number of cured patients.

Types of DEA analysis

The type of DEA model (CRS or VRS, input oriented or output oriented) matching each hypothesis is illustrated in 5.7. Figure.

5.7. Figure Types of DEA analysis



Limitations of the analysis

One of the limitations of the DEA analysis presented below is that it applies a limited number of variables. Exact number of nurses, physicians and other hospital employees would be important indexes, as well as data on valid financial indexes. The lack of data on these input variables makes the described "production structure" only a first approach result. A further problem is that instead of standardising, I worked with raw bed numbers and case numbers. In further analysis this failure needs correction. It is important to notice, that it is not possible to make direct comparisons between the yearly results, because for each DEA procedure the efficiency frontier is established using the data of the year in question. The efficiency changes of the reference units have a great influence on the indexes calculated on the basis of such changes. The results only make us possible to calculate the differences between the technical efficiency of the hospitals and to define which hospitals can be considered as most efficient on the basis of the variables used.

Analysis according to ownership structure has no relevance in Hungary, in my opinion. The hospitals with different ownership structures provide different types of care and have different progressivity levels (universities are tertiary providers, state institutions are mostly specialised, private and parochial hospitals are rare, and they mostly provide only a few professions). The number of private hospitals has grown since 2006, but they are mostly small town institutions, and have not provided sufficient data for analysis.

The first year of operation is not representative, and the reforms in 2009 brought about the failure of many such institutions, which resulted in the lack of consolidated data lines.

Characteristics of the DEA model, description

The hospitals

The units of analysis are hospitals with active profile in Hungary. During the model construction I carried out a grouping of the hospitals according to the hypothesis. (Appendix 5.5.4: DEA analysis, list of hospitals.) 21 county and reagional hospitals are included in the first phase of the analysis. These hospitals were analysed for the years 2003, 2006 and 2008.

To check the second part of the hypothesis I chose the year 2008. The National Institute of Oncology was excluded from the analysis, because this institution is characterised by low bed numbers and higy DRG weight numbers. Specialist institutes and pediatries were also excluded. Altogether 102 hospitals were analysed. By progressivity levels this includes 4 university hospitals, 36 small town hospitals, 42 town hospitals, 20 county hospitals, 22 hospitals in the capital cityn 80 rest normal and 37 priority hospital, rest 65 non-priority hospitals.

List of variables

I paid special attention to select input and output variables. Although beforehand I have given a list of possible variables, lack of data sources, excessive standard deviation of variables and other theoretical considerations have lead me to include the following input and output variables: active Operational Bed Numbers as an input variable, and DRG Case Number, DRG Weight Number as output variables.

Type of the model and method of analysis

I chose to construct an input-oriented model (both VRS and CRS), because in the present context of financing and reduction in resources this model seems to have more relevance. The analysis tends to explore how the actual output level (DRG case numbers, DRS weight numbers) could be achieved by using less input (active bed numbers). The statistically relevant differences between groups and years are examined by non-parametric tests of Mann-Whitney and Kruskall-Wallis. To construct the model the software DEAFrontierFree was applied.

5.3.3 Results and analysis of efficiency in county hospitals

First, the basic statistics related to county hospitals are presented for the years in question (2003, 2006, 2008). The effects of Eftv and PVL have been examined in relation to county hospitals for the periods 2003-2006 and 2006-2008, analysing the differences in technical efficiency. To test the HYP 2 relating the vertical efficiency differences was based on data from 2008.

As a result of the Eftv in Hungary active bed numbers were reduced by 27%, case numbers and weight number by 10% from 2006 to 2008. On the other hand, as a result of hospital close-downs, average DRG case number and average DRG weight number increased. The average DRG weight number was 20 673 in 2003, while 22 704 in 2008 (Table 5.3)

5.8. Table Basic data for statistic DEA analysis

	2003 HunDRG cases	2003 HunDRG weight	2003 acut care beds	2006 HunDRG cases	2006 HunDRG weight	2006 acut care beds
Town (progress)	5173 (2957)	4947 (3176)	139 (96)	4985 (3091)	4680 (3297)	137(95
Country (progress)	18676 (7079)	18586 (8803)	444 (154)	18545 (7437)	17612 (9261)	444 (158)
County (progress)	41678 (13106)	42757 (14852)	984 (302)	41657 (13968)	41613 (15857)	977 (309)
University (progress)	64729 (36773)	95131 (51636)	1471 (788)	68973 (37938)	100299 (54027)	1444 (801)
Priority	37887 (21656)	42676 (31714)	875 (474)	38393 (23053)	42382 (34115)	876 (483)
Non-priority	11725 (21656)	11525 (31741)	289 (474)	11722 (23053)	11083 (34115)	291 (483)
Rural	18799 (18061)	19709 (23202)	449 (411)	19223 (18914)	19532 (24118)	457 (415)
Capital	21195 (19932)	23505 (25764)	499 (428)	20943 (20553)	22876 (27217)	490 (440)
Total	19408 (18548)	20673 (23936)	461 (416)	19681 (19379)	20422 (25024)	466 (422)

	2008 HunDRG cases	2008 HunDRG weight	2008 acut care beds
Town (progress)	4673 (3440)	4597 (3881)	105 (89)
Country (progress)	17387 (10044)	16738 (11511)	359 (184)
County (progress)	44079 (11577)	47928 (15317)	896 (226)
University (progress)	68934 (36607)	99941 (52237)	1302 (659)
Priority	39071 (11059)	45042 (1171)	783 (218)
Non-priority	10482 (22485)	10182 (33769)	221 (414)
Rural	19432 (19283)	20691 (25421)	404 (382)
Capital	25345 (26201)	29708 (34251)	489 (476)
Total	20752 (21170)	22704 (27893)	423 (406)

The white boxes serve as information, these dimensions were not used in the analysis.

DEA analysis for county hospitals between 2003 and 2008

To test HYP 1 I included county hospitals, adding some capital city and state institutions with similar profile and scale (MH Honvéd Kórház, Szent Imre Kórház, Szent János Kórház). The CRS model was applied to test the technical efficiency of these institutions, considering that the working proccess of county hospitals are mostly homogeneous. These institutions are similar in progressivity level and in providing emergency care, taking apart some priority specialities like neurosurgery, oncoradiology, invasive cardiology. The results of DEA testing is shown below in Tables 5.9. and 5.10.

5.9. TableTechnical efficiency of county hospitals (CRS model)

	CRS-efficiency			
	Average	Deviation	Min	Max
2003.	70,96%	6,93%	54,30%	86,47%
2006.	70,27%	9,86%	50,19%	93,78%
2008.	85,20%	9,25%	68,84%	100%
Total average	-	11,12%	50,19%	100%

5.10. Table Technical efficiency of county hospitals (VRS model)

	VRS-efficiency			
	Average	Deviation	Min	Max
2003.	77,43 %	8,83 %	65,44 %	100%
2006.	78,27 %	11,15 %	60,90 %	100%
2008.	87,92 %	9,35 %	73,62 %	100%
Total average	-	10,91 %	60,90 %	100%

Efficiency rates of the VRS model are 3-6% higher, due to the characteristic of the VRS model that it allows more than one optimal efficiency rates, while CRS operates with only one possible optimal input/output combination.

There was no change in hospital efficiency after the introduction of the PVL ($p>0,1$), as PVL system decreased (limited) tha maximal output level using the same amount of input. Deviation also raised, which indicates a raising difference in efficiency from 2003 to 2006. The technical efficiency of the hospitals was 70 % according to the CRS results, which means that the given output level could have been reached in 2003 and 2006 by reducing bed numbers by 30 %. On the other hand Eftv raised hospital efficiency significantly ($p=0,00$). In the year 2008 the average efficiency rate was 85%, which means an increase by 15%. Deviation rates decreased slightly by both CRS and VRS from 2006 to 2008, which indicates that efficiency differences remained constant

despit the repeated measures by the government. (For Mann-Whitney test results see Table 5.11.).

5.11. Table Mann-Whitney U-test results showing county hospital efficency trends

	Test statistics		p-value	
	CRS	VRS	CRS	VRS
2003. és 2006.	191	213,5	0,46	0,86
2006. és 2008.	58	101,5	0,00*	0,00*

Statistical test indicates that the values in the years 2003 and 2006 do not show significant differences, while CRS and VRS model results differ significantly.

Among county hospitals the Szent Imre Hospital in the capital city resulted "best practice". Its efficiency value for 2008 was calculated at 100% by both CRS and VRS. In this year the hospital treated 34 604 cases on 541 beds (DRG weight numbr 31 479). In the previous years the efficiency of the hospital was also among the highest ones (80%). Other hospitals with excellent efficiency levels (100% efficiency by both CRS and VRS models) are the county hospitals of Zalaegerszeg and Miskolc, Kecskemét, Nyíregyháza, all with efficiency rates above the average (80%). Szent Rókus Hospital in Pest county achieved nearly 100% by VRS model. The results are shown in the table of the Appendix 5.3.4.

To conclude it can be said that the introduction of the PVL in 2004 did not generate significant changes in the efficiency of the hospitals, although some cases even showed a slight decrease in performance. This result is due to the fact that most institutions failed to reduce bed numbers when reimbursable maximum case numbers and weight numbers became lower or could not be increased. This measure limited institutional choice to increase case numbers or weight numbers in order to achieve economies of scale. On the other hand, technical efficiency improved as a result of Eftv, though it was through administrative intervention. Eftv resulted in the reduction of active bed numbers by 27%, while case number and weight number increased by 6% and 10% respectively. The average efficiency rates of the institutions improved by 15% according to the CRS and by 9% according to the VRS model.

Results of the analysis by groups of institutions

According to HYP 3 I will examine whether there are efficiency differences between the hospital groups and how significant these differences are. The groups are the following: hospitals at different progressivity levels, capital city and provincial, and priority and non-priority institutions. The year examined is 2008. Basic statistical data

reveal considerable differences between hospitals of different progressivity and priority levels. While average bed number was 105 for small town hospitals, it was 1302 in university clinics. Therefore, in for the latest group I applied the VRS model (using different returns to scale), while due to the homogeneity of the capital city-provincial institutions I chose to work with the CRS model in case of this group (see Table 5-8).

5.12. Table VRS-model results (2008)

	number	VRS-efficiency			
		Average	Deviation	Min	Max
Small town basic care	20	78,68%	14,99%	56,02%	100%
Town	38	72,82%	11,84%	51,65%	100%
County-regional	20	81,69%	9,64%	66,72%	100%
University	4	98,69%	2,27%	94,76%	100%
Non-priority	45	75,31%	13,06%	55,82%	100%
Priority	37	80,55%	13,22%	51,65%	100%
Provincces	65	76,44%	12,79%	51,65%	100%
Capital city	17	85,65%	14,42%	55,82%	100%
Total	**82**	**77,67%**	**13,39%**	**51,65%**	**100%**

5.13. Table CRS-model results (2008)

	number	CRS-efficiency			
		Average	Deviation	Min	Max
Small town basic care	20	71,01%	16,04%	50,14%	100%
Town	38	63,98%	11,14%	44,75%	95,91%
County-regional	20	73,08%	7,93%	59,17%	85,94%
University	4	95,91%	3,17%	91,14%	100%
Non-priority	45	66,73%	13,03%	47,48%	100%
Priority	37	72,81%	13,77%	44,75%	100%
Provinces	65	68,21%	13,13%	44,75%	100%
Capital city	17	77,63%	14,51%	47,48%	95,91%
Total	**82**	**69,47%**	**13,71%**	**44,75%**	**100%**

VRS model results show that if each hospital had functioned along the 100% efficiency rate line in 2008, they could have reached the same weight number and case number by using 23% less input (bed number). According to the CRS model the average efficiency of the hospital sector was 69,47% in 2008. The worst practice hospital was the town hospital of Karcag by both the CRS (44,75%) and the VRS (51,65%) models. The significant deviation of the efficiency values indicate that there is a considerable strategic potential within the frameworks of a publicly financed structure.

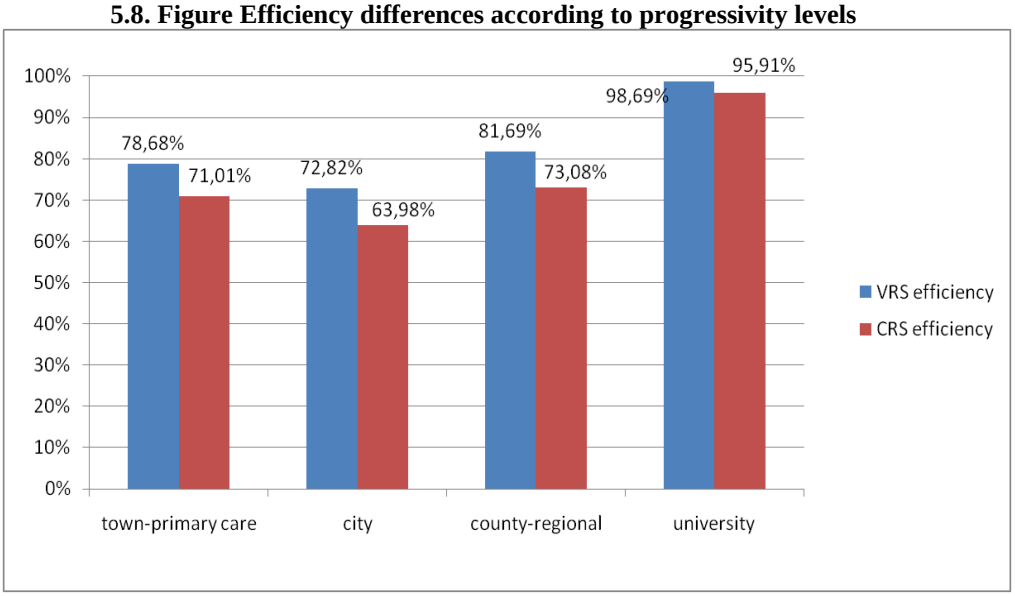
The best practice hospitals are shown in the Table below:

5.14. Table„Best practice" hospitals (VRS-modell)

Hospital	Capital-provinces	Progressivity	Priority
Debreceni Egyetem Orvos- és Egészségtudományi Centrum	Provincial	University	Priority
Pécsi Tudomány Egyetem Ált. Orvostudományi Kar	Provincial	University	Priority
Semmelweis Egyetem Orvos-Gy. Kar, Budapest	Fővárosi	University	Priority
Fővárosi Uzsoki Utcai KH-RI	Capital	Town	Priority
Fővárosi Szent Imre KH-RI	Capital	County	Priority
Városi KH-RI, Keszthely	Provincial	Small town	Non-priority
Siklósi Kórház Kht	Provincial	Small town	Non-priority
Városi KH-RI, Bonyhád	Provincial	Small town	Non-priority
Városi KH-RI, Mór	Provincial	Small town	Non-priority
Margit Kórház-RI, Pásztó	Provincial	Small town	Non-priority

According to VRS model results the efficiency rates of the University hospital of Pécs, the county hospital of Mór and the Margit Kórház in Pásztó were 100%. Town hospitals had the lowest average efficiency rate (64%), which means that these hospitals could have reached the same output by using 36% less input. Universities have the highest efficiency rates (99%), while the average for county hospitals is 82%. The following table shows the efficiency differences according to progressivity levels:

5.8. Figure Efficiency differences according to progressivity levels



* CRS and VRS models cannot be compared due to methodological defferences

On the basis of the indicated input and output variables the DEA analysis (by both CRS and VRS) results show that universities are the most efficient, being 15-17% ahead of the rest of the institutions. Then come the county-regional institutions, but then there is a great gap between them and small town basic and multi care hospitals.

5.15. Table Results of the Kruskal Wallis and Mann-Whitney tests

Institutional groups	VRS-efficiency		CRS-efficiency	
Small town basic care	78,68%	0,00*	71,01%	0,01*
Town	72,82%		63,98%	
County-regional	81,69%		73,08%	
University	98,69%		95,91%	
Non-priority	75,31%	0,08**	66,73%	0,03*
Priority	80,55%		72,81%	
Provinces	76,44%	0,048*	68,21%	0,038*
Capital city	85,65%		77,63%	
Total	77,67%		69,47%	

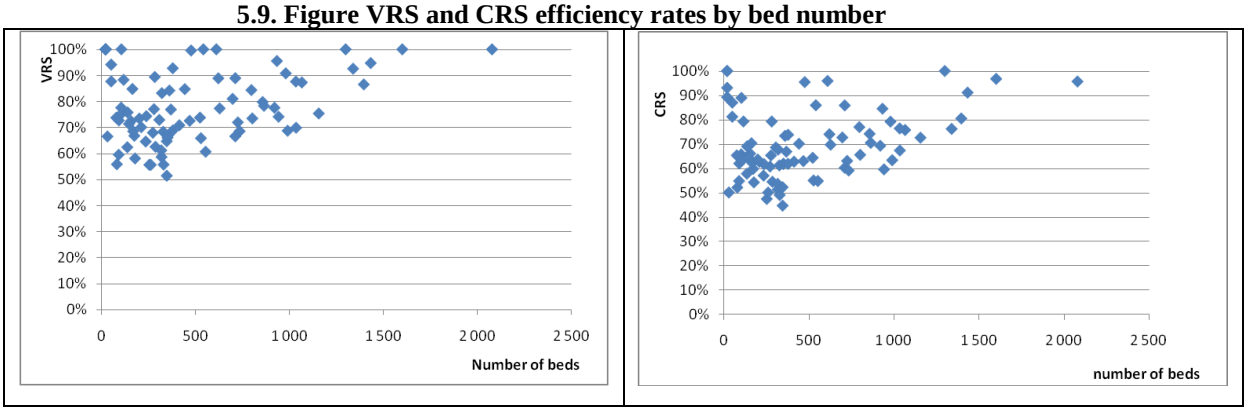
* 5% significance level, **10% significance level

There are significant differences in the technical efficiency rates between the groups according to progressivity levels, capital city or provincial, and priority. Therefore, the hypothesis resulted false, as for all the three groups there were significant differences between the groups.

The results require further analysis on the basis of the interviews with the management, because the weak results of county and small town hospitals can be the consequence of systematic differences in the patients' groups, especially in their use of emergency care.

The following Figure shows efficiency values according to active bed numbers:

5.9. Figure VRS and CRS efficiency rates by bed number



This illustration of VRS analysis shows that the situation of the dots and the efficiency rates of the different groups moves upwards. The Figure for the CRS model see Appendix 5.5.5).

5.3.4 Summary of the DEA-based analysis of efficiency and hypothesis testing

DEA analysis is an efficient and modern tool for measuring performance. This research is the first attempt in Hungary to use DEA to investigate the efficiency of hospitals and also the changes in efficiency by comparing hospitals in the periods before and after the introduction of PVL and Eftv and also examines hospitals of different progressivity levels.

DEA results are excellent to evaluate the efficiency of established systems. However, DEA cannot explore why a certain hospital becomes 'best practice'. However, results clearly indicate certain tendencies. First of all I would like to highlight that the significant results of the Table 5.15. reveal unquestionalble differences between the institutional groups. The significant efficiency differences (eg. between town hospitals and universities) in this simple VRS and CRS model can reach the 20-25%. The deviation rates within the groups requires subgrouping analysis in future research.

HYP 3) The efficiency of county hospitals has improved between 2003-2008.

a) The input-oriented DEA model (CRS, VRS) reveals greater efficiency differences during the period before the PVL than after. (FALSE)

b) The input-oriented DEA model (CRS, VRS) reveals greater efficiency differences int he period before Eftv than after. (TRUE)

Results do not support the 3rd hypothesis as a whole. Looking at the results in detail it can be said that my HYP 3.a) was false, because efficiency values stayed stagnant over years. With respect to the variables that I analysed significant changes can be observed after Eftv from 2007. The effect of Eftv on efficiency is obvious, the results support the part 3.b) of my hypothesis. There is a slighter but still significant efficiency difference between priority and non-priority hospitals in favor of the priority ones.

HYP 4) There is no reletionship between the efficiency differences according to

a) wether hospitals are situated in the capital city or in the provinces; (FALSE)

b) progressivity level (wether they are small town basic care hospitals, multi-professional town hospitals county-reagional hospitals or university clinics); (FALSE)

c) priority or non-priority hospitals (FALSE)

Empirical data disproved a) b) and c) elements of HYP 4. In all the three respects I found slight but significant relationship between hospital character and efficiency. Capital city hospitals, university hospitals and priority hospitals had better efficiency values, and they give the 100% efficiency rate best practice institutions, leaving behind provincial, county and non-priority institutions. Data show considerable standard deviation, which implies that institutional sub-groups should be created for further analysis, and that DEA should be processed again including more input and output variables.

This study is meant to serve as a guide for health policy decision makers, analysts and hospital management. There is a great need of measuring efficiency in order to enhance a more efficient health care system. It is advisable to extend DEA-based analysis to outpatient care clinics as well.

It is also advisable to carry out further analysis where we group institutions in different ways. Performance of priority and non-priority hospitals should be examined before and after the legal intervention of 2007. Further research based on DEA are to be conducted using number of physicians (number of skilled ancillary workers) as an input variable, and analysis is needed where the focus is set on some specialist area, like oncology, surgery or cardiology. To improve validity of DEA hospital characteristics should be standardised, distortive factors deriving from differences in case numbers, in technologies and therapies and in emergency vs. non-emergency care cases should be filtered. However, such analysis requires data from controlling systems that use mostly the same methods.

5.4 Analysis of hospital indebtedness and the soft budget constraint in the Hungarian hospital sector

One of the pillars of successful institutional strategy is consciousness in financial decisions. The phenomenon of the soft budget constraint reveals the lack of such consciousness. An example can be when the management hesitates to take necessary but unpleasant decisions. In this chapter I identify such negative examples and analyse the consequences.

The theory of soft budget constraint (SBC) was formulated by János Kornai (Kornai, 1978, 1980, 1986). Kornai examined the phenomenon in enterprises in the socialist countries. The findings of the SBC theory are the following: if enterprises can rely on a

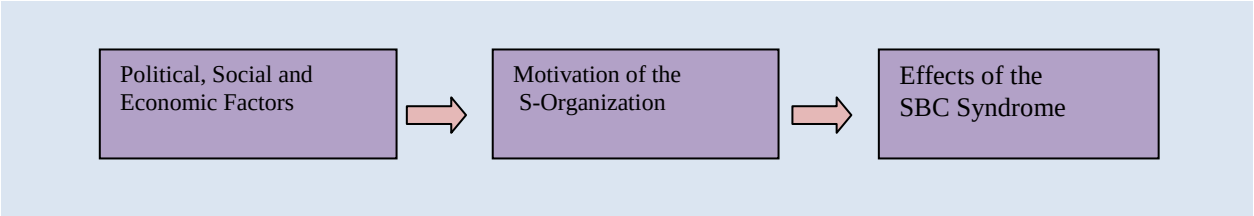
future financial help they do not pay attention to effectiveness. In our times the phenomenon is obvious in almost every country and both in the private and the public sectors (municipalities, banks, hospitals). You can find more about SBC theory in Appendix 5.6.1.

Bailouts have strong political motives in most countries, and to understand these motives we should examine the interests and political relationships of each hospital decision maker. The present study is based on analysis conducted within the hospital sector. The most important studies on SBC phenomenon that I examined were made in the USA, Norway, Italy and China. (Eggleston, 2009, Tjerbeo, 2009, Bordigon, 2007, Eggleston, 2002, Yu-Chu Shen, 2009).

5.4.1 Review of international literature on SBC analysis

The SBC syndrome is created by the political and social environment. The formation of the SBC syndrome is shown in a chain of causality in the figure below:

5.10. Figure Chain of Casuality of the SBC syndrome



Source: Kornai et al., 2003

In the hospital sector factors like how the central government defines the budget or what prices it sets influence considerably the measure of indebtedness. Another definitive factor is the motivation of the supporting organisation and the influence of the SBC syndrome on behaviour (on which my analysis is based). The institutions the management of which expects bailout in the future take less cost-curbing measures and are more easily indebted. The literature I researched is grouped according to this system.

5.4.2 Analysis of the SBC syndrome in the Hungarian hospital sector

In this sub-chapter I analyse the SBC phenomenon in the Hungarian context. I examine which factors exercise influence on hospital indebtedness, and that to what extent indebtedness level is due to the macro-financing situation and to what extent to managerial decisions. For a detailed description of the macro level characteristics of financing see Chapter 2.

As the first step in my analysis of the SBC syndrome in the Hungarian hospital sector, I made a comprehensive analysis of the financial situation of hospitals and the medical–preventive fund along János Kornai's professional guidelines. I prepared a list of bailout and exit types characteristic of the sector, which is indispensable for, and forms the basis of, subsequent analyses.

To analyse the phenomenon of soft budget constraint in Hungary the following hypothesis are to be tested (numbers continues according to the previous chapters):

HYP 1) Hospital indebtedness depends on macro level of the financing situation and on management decisions.

HYP 2) Among hospitals with the same characteristics can be found indebted and financially stable institutions.

HYP 3) The way of handling hospital indebtedness can be described by the theory of the SBC. The Soft Budget Constraint bailout of indebted hospitals results efficiency loss in the system.

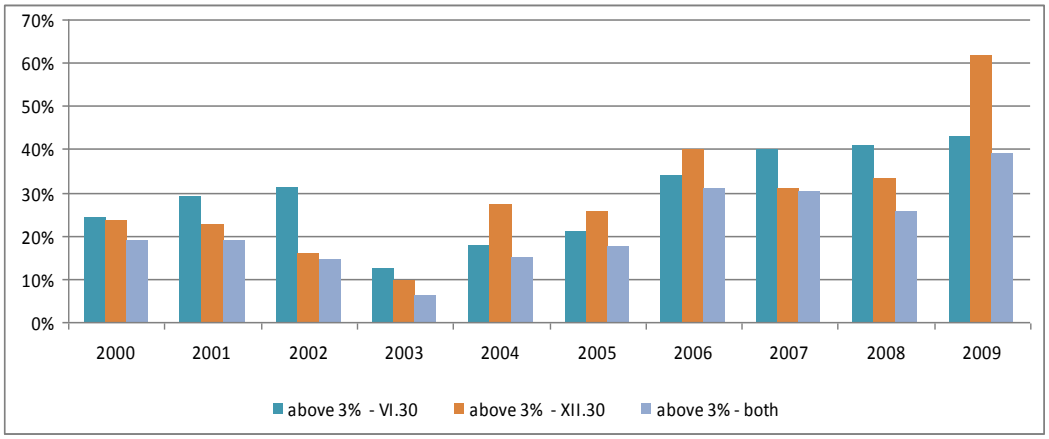
HYP 4) Hospital indebtedness and debt management depends on management, ownership and political actions, instead of objective characteristics (provinces, capital city, small or big hospital, specialist or not, competitive environment vs monopoly).

5.4.3 General analysis of hospital indebtedness

I apply descriptive statistical methods to analyse the extent and the ratio of indebtedness, its yearly changes, and the frequency of bailouts and exits. The database created on the basis of a questionnaire on indebtedness by the Ministry of Health included 1181 observations in the period between 2000 and 2009 (causes of exclusion are listed in Appendix 5.4.3.a).

Mid-year (VI. 30.) to year-end (XII. 30.) debt-to-suppliers ratio was examined (debt), and the results served to group hospitals into mid-year or year-end indebted categories. As the first step I examined the scale of indebtedness at the lines of 3%, 5% and 10% of indebtedness, seeing how many hospitals are more or less indebted. The table below shows the ratio of hospitals with above 3% debt.

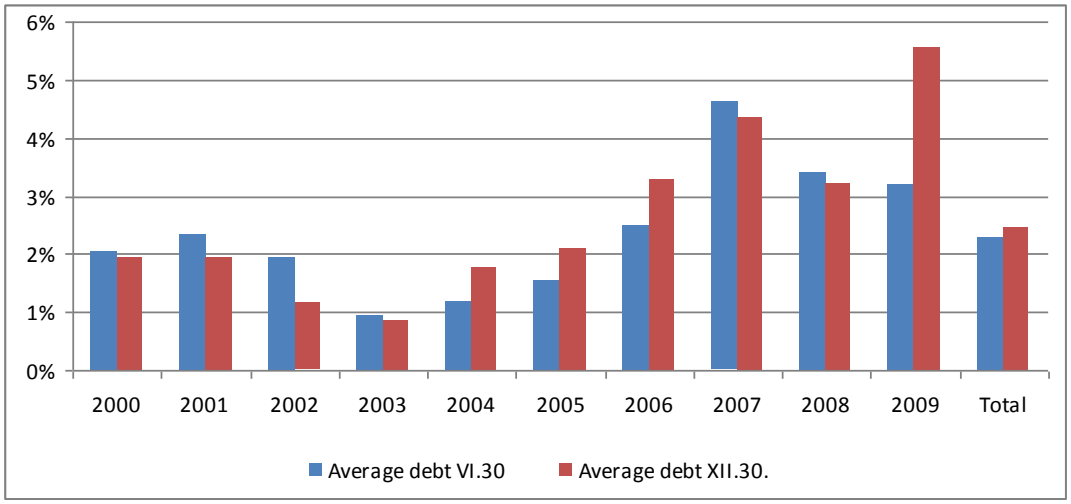
5.11. Figure Percentage of public hospitals with above 3% outstanding supplier stock of more than 60 days at mid-term and at the end of the year



*Source: own elaboration based on Ministry of Health questionnaires on indebtedness

It is to be noted that even in the hardest period several institutions could operate with no outstanding debt to suppliers. In contrast, there were hospitals heavily indebted even in the best-financed year, 2003. At the end of the year 2009 more than 60% of the hospitals were to above 3% indebted, which is by 20% more than in 2006, the year from which hospital indebtedness level continuously increased. While during 2000 and 2006 only 4% of the hospitals were to more than 10% indebted (with a maximum of 7% at the end of the year), in 2009 at mid-year 23% and at the end of the year 29% of the hospitals reached this indebtedness level.

5.12. Figure Year-end (30. Dec) indebtedness to the total yearly expenditure from 2000 to 2009.

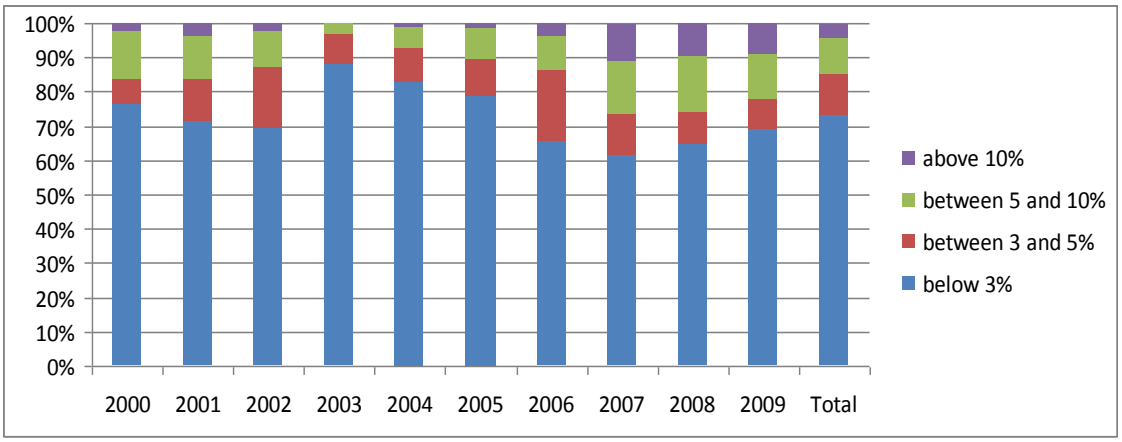


*Source: own elaboration based on Ministry of Health questionnaires on indebtedness

Figure 5.3. shows hospital mid-year and year-end indebtedness by years, while Figure **Hiba! A hivatkozási forrás nem található.**shows the spreading of indebtedness ratios in comparison to the whole hospital sector. The figure below clearly indicates that the average debt surpassed 5.5%. The deterioration of the financial situation is also shown

by the fact that from the end of 2006 there have been no indebtedness ratio below 3%. (For more details see Appendix 5.6.2.b.)

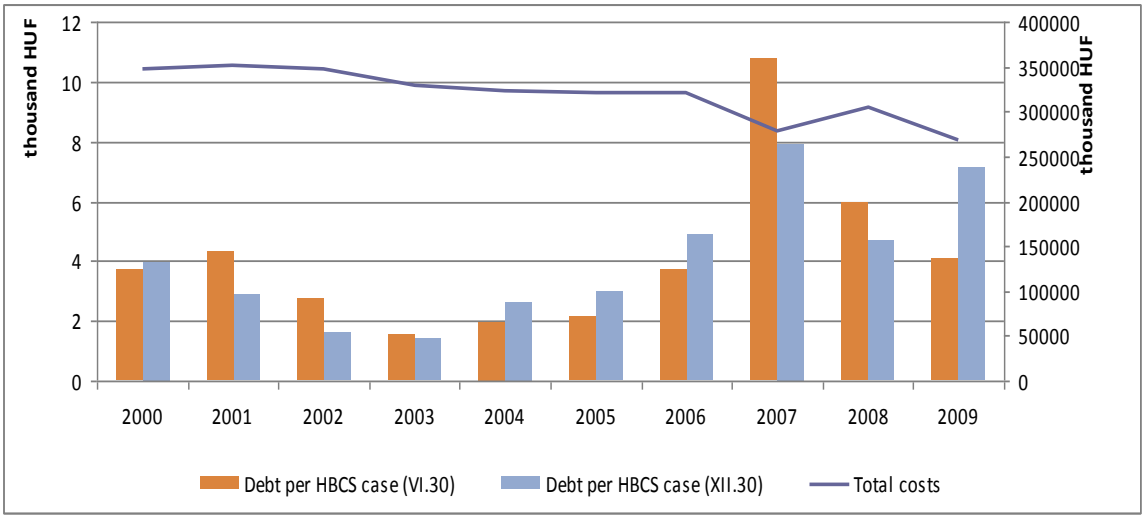
5.13. Figure Distribution of hospitals by year-end (30 Dec) indebtedness between 2000 and 2009.



*Source: own elaboration based on Ministry of Health questionnaires on indebtedness

The most favourable period was 2002 and 2003 when 80-90% of the hospitals could keep its operation financially stable and its rate of indebtedness below 3%. On the other hand, the number of hospitals with less than 3% indebtedness was the lowest in the second half of 2009 (47%), when 25% of the hospitals were 5-10% indebted, and 15% had more than 10% rate of indebtedness. As Eftv in 2006 reduced average bed numbers by 27%, while yearly case numbers decreased by 10 % as a result of hospital visitors' fee, and the average indebtedness also raised by 1-1,5%, there was a considerable growth in the debt per bed and debt per case ratio by 2007.

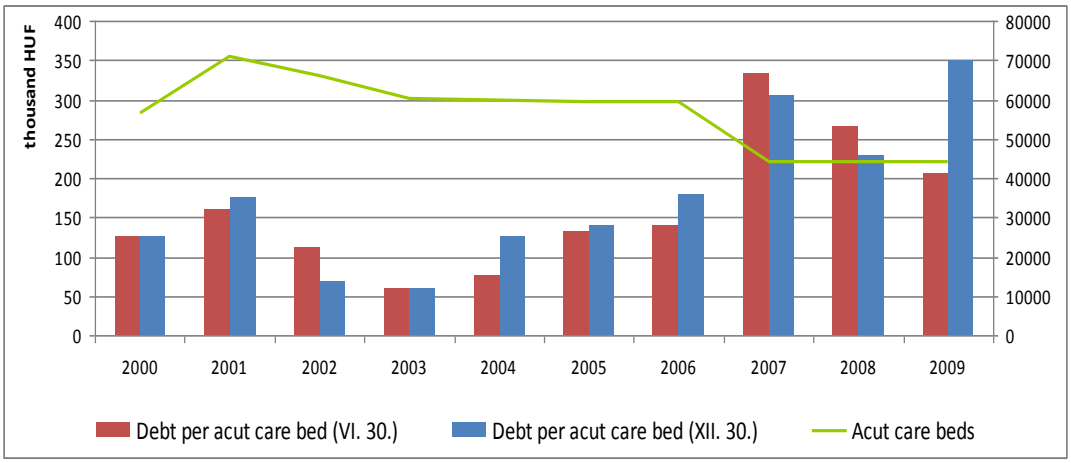
5.14. Figure Debt per case ratio at mid-year and year-end*



*the indebtedness is corrected with the rate of increase of the inpatient care

The debt per case was the highest in the first half of 2007 and decreased until the second half of 2009.

5.15. Figure Debt per bed*



*the indebtedness is corrected with the rate of increase of the inpatient care

Debt per bed increased to 2007, as bed numbers decreased by 20% as a result of Eftv, while nominal value of debt increased.

5.4.4 Detailed analysis of the indebtedness of hospitals in the light of government measures

Analysis of bailout types

In case of Hungarian hospitals bailout described in literature (Kornai, 2003) is not unknown. I distinguish five types of bailouts: 1: consolidation; 2: ownership subsidy with no investment allocation; 3: indebted and later exit hospitals with investment; 4: refinement of DRG codes; 5: individual financing allowances, year-end payments. (For detailed description of bailout types see Appendix 5.4.3.c.).

The most obvious way of bailing out is consolidation from government budget, a measure applied in 1996 and 2002, when 52 hospitals were subsidised. In 1996 38 institutions were given 4 billion HUF as consolidation, which was equal to the 6% of the NHIFA financing. In 2002 30 institutions were granted 2,84 billion HUF in the form of (in theory) refundable grant, the municipality owners granted 708 million HUF as own share, so the total sum of the consolidation was 3.5 billion HUF, which is equal to the 3.8% of the NHIFA financing for these institutions.

In Hungary there is a specific form of bailout, when deficiently operating hospitals are over-compensated by investment aimed at reconstructions.

The frequency of bailouts decreased by the end of the decade, and strict budget constraint became more widely spread. Diósgyőri Városi Kórház is a typical case of how budget constraint became stricter with years (Table 5.16.). The hospital participated in both consolidation programmes, while during a couple of years it

belonged to the group of indebted hospitals. At last it came into fusion with the other hospital of the town in 2007-2008. (EXIT type 2), with considerable reduction of acute capacity.

5.16. Table Bailout and fusion of the Hospital of Diósgyőr belonging to Miskolc

1994-1995	1996	1997-2001	2002	2003-06	2007-08
Indebtedness	**Bailout**	**Indebtedness**	**Bailout**	**Indebtedness**	**Fusion**
	I. consolidation 51,5 M HUF	206 M HUF (2001) 306 Mft (2002 I. semester)	II. consolidation 186,9 M HUF	43 million HUF (in 2006)	

The 2008 situation of the hospitals that participated in both consolidation programmes are illustrated in Table 5.17. Other hospitals that participated in both programmes are: Semmelweis University, which chose a new management in 2003 and since then its operation is stable; the University of Pécs, with after changing management but increasing indebtedness; Dunaújváros (with the same management); Szent Imre Hospital – new management brought about stability; Péterffy S. Hospital – new management from 2003, stability for 5 years; Esztergom – indebted, with frequent changes in management; Semmelweis Hospital of Miskolc – stability in the management, no changes until 2008. The hospital was strongly subsidised, given investment grants, HEFOP grants (typical case of too big to fail), it is the prestige hospital of the city; Kalocsa – small town hospital, saved its acute profiles until 2007, despite several periods of indebtedness; Veszprém – management was not changed despite recurrent indebtedness. New management from 2006 could stabilise debt, from 2009 indebted again for reasons of reductions in financing.

5.17. Table The situation in 2008 of those 52 hospitals that took part in both consolidation programmes (in 1996 and in 2002)

Situation	db
They ceased to be independent entities (closed down, integrated) beintegrálódott)	10
Financing situation stabilised by considerable support from the maintainer	14
Financing situation stabilised (rationalisation, change of operational form, change of management)	8
Indebtedness level stabilised	5
Change of profile, reduction of acute profile, shifting towards long-term care	4
Increasing indebtedness	5
More than 10% of indebtedness rate	6

In this chapter I analyse hospital indebtedness from three aspects. First, I investigate what happens to the hospitals after they become indebted. Second, I analyse EXIT hospitals examining whether they had been indebted in the previous years, and what relationship is there between exiting and indebtedness. Third, I try to identify the factors that affect indebtedness.

The future of indebted hospitals (path analysis)

In this phase I examine what happened to those 42 hospitals that had indebtedness above 3% at mid-year term in 2002. I use the path analysis and the probability-calculation method presented by János Kornai et al (Kornai, Maskin, 2003) (for more about theoretical background to SBC see Appendix 5.4.1). According to Kornai hospitals may see one of the following possible futures:

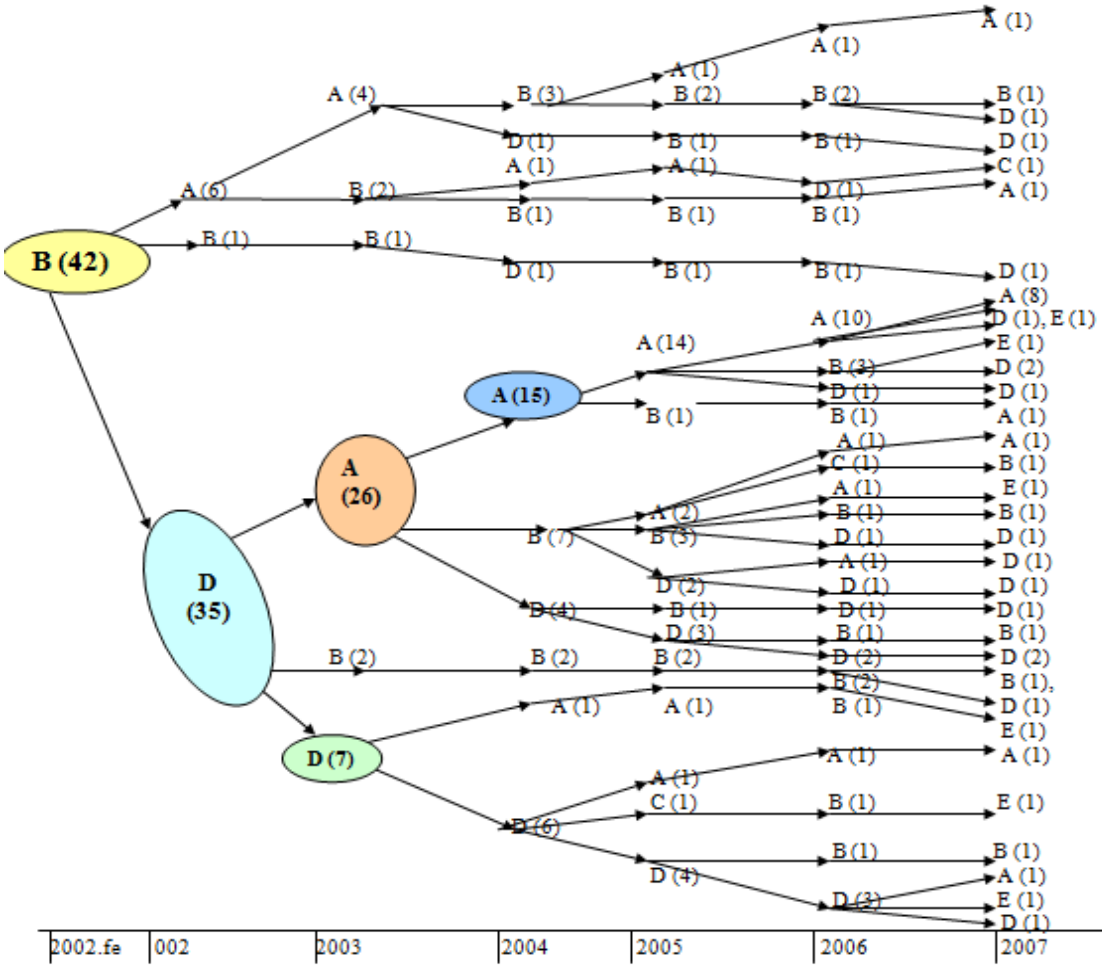
If indebted at a time t0, in what situation it was at t1, t2, t3, etc.

A. Financial troubles continue, significant indebtedness;
B. Loss-making operation corrected by internal measures layoffs, measures of constraint, small shifts of profile);
C. Exit: closure or merger with other institution (in some cases the owners or the form of operation was changed);
D. Bailout, external financial support.

Internal measures comprise significant layoffs, reduction of the number of premises and pavilions, reduction of material expenditure by strict budgetary framework, strategic change of structure, and reorganisation (see Subchapter 4.2 in detail). Herein I examine the situation of the hospitals in the years that follow the appearance of debt (2000-2007) (see Appendix 5.4.4).

40 % of the institutions had already been in trouble during 2000 and 2001. Another 40% did not reach the critical level, while 20% probably had some financial problem, but received significant (above 3%) bailout from the maintainers. From the end of the year 2002 tangible improvement took place in the financial position of the institutions (except one institution), due to the hospital consolidation programme and an average 50% rise of the wages in the hospital sector. In 2003 30 out of the 42 hospitals were financially stable, 26 of which could maintain stability after 2002 bailouts, while 4 institutions could maintain stability even without grants and bailouts. From the 30 institutions only 8-9 (among them 2 county hospitals and one from the capital city) were able to keep constant financial stability. The results are illustrated in the following Figure:

5.16. Figure Trends in the financial situation of indebted hospitals (2002-2007)



As it is shown in the Figure above hospital histories are quite diverse and they had gone through a great variety of stages till they reached their present financial position.

Taking the year 2007 as a basis 7 institutions had became EXIT since 2002 (closure, merger, fusion, profile change), 14 institutions are stable, 16 institutions had had problems but received bailout from the maintainers in 2007, and further 6 institutions have serious financial problems for lack of support from the part of the maintainer.

The following Table shows the number and ratio of the hospitals that were in trouble (indebted above 3%) during 1, 2, 3 or 4 years among those 42 hospitals that had already been indebted in 2002.

5.18. Table Hospitals in troubled financial situation between 2003-2007 (based on path analysis)

	db	Ratio
For 1 year	8	19%
For 2 years	6	14%
For 3 years	2	5%
For 4 years	4	10%

Analysis of indebtedness, search for relationships (logit model)

Herein I use the logistic regression model to find out relationships between capacity and performance characteristics and indebtedness in 2008.[13] This year was chosen because it was free of random interventions, when hospital indebtedness was generally high and it is a year for which the greatest number of variables is available.

The dichotomous logistic regression model was used to analyse emergence of indebtedness. The basis of the model is the odds that expresses the ratio of the probabilities of a hospital to get into the group with below ($1-p_{3\% \text{ alatti adósság}}$) or above ($1-p_{3\% \text{ feletti adósság}}$) 3% of indebtedness (year-end outstanding supplier stock in percentage of the total costs).

$$\text{odds} = \frac{p_{3\%\text{felleti adósság}/X}}{p_{3\% \text{ alatti adósság}/X}} = \frac{p_{3\%\text{felleti adósság}/X}}{1-p_{3\% \text{ feletti adósság}/X}},$$

where X is a vector for independent variables, and in this case the independent variables are capacity and performance features. This model supposes that the logarithm of the odds ratio (logit) depends on the linear combination of the variables:

$$\ln(odds) = a + b_1x_1 + b_2x_2 + b_3x_3 + \cdots b_nx_n,$$

where n stands for the number of variables.

According to my expectations hospital indebtedness is highly dependent on management and owners, and also on political actions, while objective institutional characteristics play little role in indebtedness. To test this hypothesis I analyse the complex effect of the following variables (see Appendix 5.4.4.b.):

- Financial indexes: *percentage of other incomes to the costs,* the percentage of the incomes from the NHIFA in the total costs; and *the index of the percentage of allowances by the maintainer in the costs, and the percentage of investments in the costs*.
- Capacity indexes: *DRG case number* (for 1000 cases), *CMI, proportion of *DRG cases, number of progressive technologies (0-9), number of clinical specialities.*
- General features: *in which region is the hospital is situated, priority or non-priority hospital; small town hospital, town hospital, county hospital, hospital with a special profile; monopoly or not?* I call it monopoly if the institution has

[13] During the elaboration of the regression model and the planning and the preparation of the database for analysis considerable help was given by Adrienn Ecseki.

no competitor with the same or higher progressivity level within 25-30 km (in the case of Budapest within the same district).

In 2008 data was available on 98 hospitals: 29 (30%) of which were up to more than 3% indebted (according to year-end data). (For the variables included in the model see Appendix 5.4.4.b.).

From the variables examined the following were selected after a 4 step iteration process (SPSS-Binary logistic Forward LR): region, priority or non priority, hospital with special profile, DRG case number (for 1000 cases). Using these variables the model offers correct classification for 75.5% of the hospitals (Appendix, Table 5.4.4.d).

Hospital indebtedness is influenced by region. I use the Dél-Alföld region as reference. Compared to this region, hospitals are less probable to become indebted in all the other regions, except for the Közép-Magyarország central region. Results show that indebtedness level is lower in case of hospitals with special profile and in case of priority hospitals, while high DRG case numbers go parallel with higher level of indebtedness.

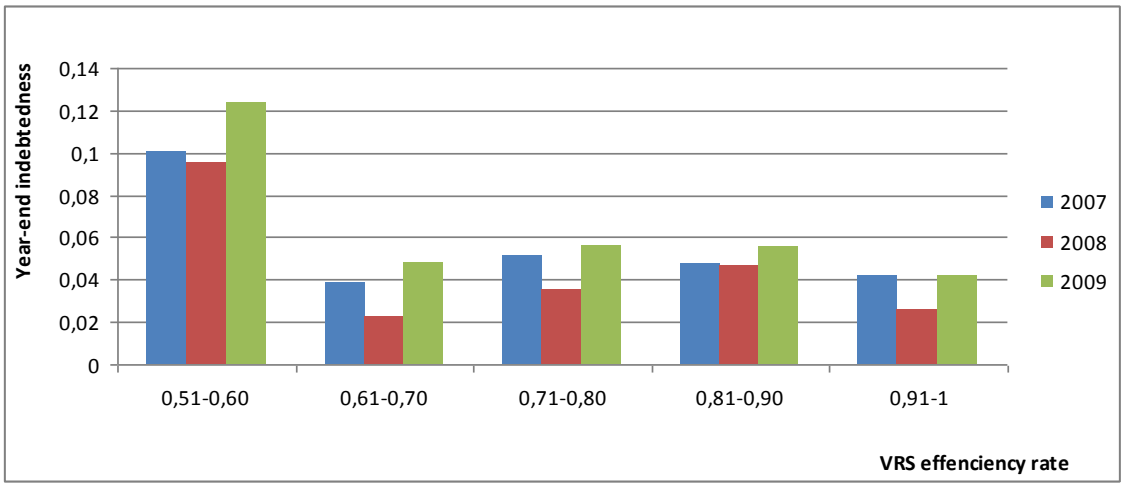
The explanatory power of these variables for indebtedness level was 34% according to the Cox and Snell index, and 50% according to Nagelkerke R^2. (For the coefficients of determination of the model see in Table 5.4.4.e. of the Appendix).

Indebtedness vs. technical efficiency

I compared data on indebtedness to DEA results in order to examine to what extent efficient hospitals were indebted and whether more efficient hospitals were less probable to become indebted or not. To answer these questions I created 5 groups on the basis of the VRS model. The efficiency index of group 1 was between 0.5 and 0.6, of group 2 between 0.61 and 0.7, etc, and the efficiency index of group 5, which characterises the best practice hospitals, had indexes between 0.91 and 1.

I did not find any significant relationship between DEA indexes and indebtedness. Although the least efficient hospitals (efficiency index between 0.5 and 0.6) had the highest indebtedness level in each year that we examined, the rest of the groups showed no relationship between efficiency and indebtedness. (See Figure 5.17) (For the comparison to the values during the year see Appendix, Figure 5.4.4.g).

5.17. Figure Comparison of year-end indebtedness with VRS efficiency values



Analysis of exit types

Closure of hospitals is a phenomenon well observable in the Hungarian hospital sector. Exit types can be analysed at several levels and classified in several categories. By EXIT I not only mean closure, but also the phenomenon when a hospital with active profile remains out of public financing or when its capacity decreases considerably (by 35%) from one year to another. According to this 7 EXIT types are described: 1: Closure, total physical elimination; 2: fusion; 3: Change of profile towards outpatient care and/or one day surgery; 4: change of profile towards rehabilitation, chronic care and nursing; 5: significant decrease in acute capacity; 6: change of operational form; 7: change of owner or maintainer (for details see Table 5.4.3.). Category 5 has more than one interpretation: can be understood as exit, like in the present study, but measures can be interpreted as a result of adaptation to a changing market and financial environment. The Table below shows EXIT cases by categories in the period analysed.

5.19. Table EXIT types by years in Hungary between 2002 and 2008.

Exit type	2002	2003	2004	2005	2006	2007	2008	Total
Closure (1)		1				3		**4**
Fusion (2)		1	1	1	1	11	1	**16**
Profile change to out-patient, one-day care (3)						5	4	**9**
Profile change to rehabilitation, long-term care (4)						13	1	**14**
Significant decrease in acute capacity (5)						8		**8**
Change of operational form (6)	1		1	4	2	5	3	**16**
Change of owner or maintainer (7)					2			**2**
Total:	**1**	**2**	**2**	**5**	**5**	**46**	**9**	**69**

Real closure was rare in the period (Országos Gyógyintézeti Központ (OGYK), Csepeli kórház, Schöpf-Mérei Kórház, Budai Gyermekkórház). The following EXIT types were typical: fusion (16), change of operational form (16) and Profile change to rehabilitation and long-term care (14). Such changes started at the beginning of the decade or even before in the '90s (Fusion of the hospital of Vásárosnamény with the hospital of Fehérgyarmat, fusion of Merényi hospital in Budapest with Szent István hospital, or the fusion of Erzsébet Hospital with Péterfy Street hospital). An important wave of fusions and changes in the operational form was induced by the application of Eftv in 2007 together with the withdrawal of resources due to the convergence program from 2006.

The SBC analysis requires data on the financial situation of the institutions during the period 3 to 5 years before they had become EXIT. Data should refer to whether they had been indebted or not, and if so, to what extent during this period. In the following I examine to what extent EXIT type hospitals had been indebted in the years previous to their exit. To examine indebtedness I use a basis other than the 3%, because EXITs occurred in different years when indebtedness levels were not homogenous (after the consolidation in 2002 indebtedness decreases, then increases again). This lack of homogeneity makes comparison between years difficult. Therefore, it seemed relevant to focus on whether a hospital was indebted above the average or not.

5.20. Table Rate of Indebtedness during the years before EXIT

	Exit type	t-3	t-2	t-1	Number of hospitals
1	**Closure**	75%	75%	50%	4
2	**Fusion**	31,25%	50%	56,25%	16
3	**Profile change to out-patient, one-day care**	44,44%	55,56%	66,67%	9
4	**Profile change to rehabilitation, long-term care**	21,43%	35,71%	64,29%	14
5	**Significant decrease in acute capacity**	50%	50%	37,5%	8
6	**Change of operational form**	25%	37,5%	25%	16
7	**Change of owner or maintainer**	50%	0%	100%	2

Table 5.20 shows that for EXIT types 3 and 4 indebtedness is rather high, 67% and 65% respectively. In the case of category 4 indebtedness rate shows an increasing tendency.

In case of type 2 indebtedness had been increasing during the period before fusion took place. In case of type 6 no relationship was found between year and level of indebtedness.

5.4.5 Summary of the analysis of Soft Budget Constraint and hypothesis testing

Analysis results prove that government measures such as consolidation in 2002, wage subsidies, the introduction of PVL in 2004 or the elimination of degression in 2006 have a great influence on the totality of the hospital sector. Analysis should be further developed, because according to the results there were indebted hospitals even in during the financially most favourable macro environment, while during the times of strict economic constraints there were also institutions with a financially stable operation. We can presume that differences in the level of indebtedness and in the efficiency of the hospitals are mostly due to the qualification and competence of the hospital management.

The following hypothesis is tested to explain the SBC phenomenon in Hungary:

> HYP 5) Hospital indebtedness depends on macro level of the financing situation and on management decisions (TRUE)

Descriptive statistical data in Figures 1.1.-1.4. show that macro financing greatly affects average level of indebtedness as well as the proportion of seriously indebted institutions. Still, in every period there are institutions that do not fit into the ruling tendencies, but either become indebted despite favourable financing conditions, or stay stable despite hard restrictions. (I made case-study interviews in some of these stable institutions, presented in Subchapter 5.5.).

> HYP 6) Among hospitals with the same characteristics can be found indebted and financially stable institutions (TRUE)

Background tables with detailed data on indebtedness show the standard deviation of the indebtedness levels by years within hospital groups. An illustrative example for hospitals belonging to the same progressivity level is the situation of university clinics. One of the institutions (DE OEC) was never indebted during the 12 year period I examined, while another university clinic (PTE) was continuously indebted in the same period, and has been in a serious dept spiral in the past 4-5 years. An example between the two extremes is the Semmelweis University of Budapest, which participated in the consolidation program of 2002 and where a new management nominated in 2003 could stabilise the institution. Among county and capital city hospitals examples for such

great differences are the financially stable Bajcsy-Zsilinszky Hospital, the Szent Imre Hospital, the County Hospital of Zalaegerszeg, versus the recurrently indebted hospitals of Győr, Székesfehérvár, the Kenézy Gyula Hospital in Debrecen or the Szent Rókus Hospital in Budapest.

> HYP 7) The way of handling hospital indebtedness can be described by the theory of the soft budget constraint. The bailout of indebted hospitals results efficiency loss in the system. (TRUE)

I could not test this hypothesis appropriately. Analysis of the periods before and after bailout shows that most hospital management relies upon the expectation that either central or local politics will bail out the institution, without demanding changes in the structure of the services or forcing them to take any attempt to stabilise their financial situation. Examples to this attitude are the small town hospitals of Szikszó and Pásztó, Péterffy Sándor utcai Kórház, PTE university clinic. These hospitals participated in either the first or the second consolidation programme, some received earmarked investments, and therefore they could conserve or even develop their acute care structure for a while, but later their acute profile was eliminated.

> HYP 8) Hospital indebtedness and debt management depends on management, ownership and political actions, instead of objective characteristics (provinces, capital city, small or big hospital, specialist or not, competitive environment vs monopoly). (partly TRUE)

LOGIT-model results indicate that only some of the variables related significantly to the indebtedness level, while the explanatory power of the variables also resulted low. According to the results of the model there is weaker relationship between indebtedness and capital city, non-priority and high bed number hospitals.

As an overall evaluation of the various debt situations we can conclude that as a result of external factors like strict cost-containment policies most hospitals could not avoid having to face a strict budget constraint. Even hospitals that still expected bailout at the beginning of the decade had to face strict budget constraint at the second half of the decade, or they became EXIT by closure, fusion, or by reducing acute capacity (like Szent Margit Hospital in Budapest, the town hospital of Diósgyőr, the town hospitals of Csorna, Pásztó, Siklós and Szikszó).

The phenomenon called “too big to fail” (Kornai et al., 2003) is still present until our days. The term means that if an institution is too big or too important for local or central

political powers (eg. it offers monopoly services) then it is not closed but bailed out, even if it had been indebted for years. Typical examples are PTE and SZTE or some county and capital city institutions (Győr, Székesfehérvár county hospitals, Szent János Hospital in Budapest). In case of PTE and SZTE university clinics were threatened in its existence, while in case of the second group of hospitals it was the position of the management that was in danger, but not the institution as a whole. From a managerial point of view instable situations could not have been maintained in either of the situations. In some cases hospital management was not changed for 6-8 years, although the institution was repeatedly indebted.

Further quantitative research is required to reveal differences in capacity and performance indexes. Further qualitative research should be carried out focusing on concrete measures applied by the management and to describe the characteristics of management views. It is suggested to further analyse indebtedness using a sample extended by the methods of path analysis and probability calculation. The analysis of bailout types, bailout practices and the mechanisms of bailout effects can open new research fields to the understanding of the Hungarian hospital sector.

5.5 Analysis of the strategic management of the hospitals

5.5.1 The importance of the analysis on strategic management

The Subchapter on cluster analysis highlights that there is no fixed boundary between the different institutional groups. Professional profile, types of care, the development of technologies are not structurally determined in the publicly financed Hungarian hospital sector. This implies that there is a wide range of possibilities for the institutional management to reach a higher progressivity level by introducing strategic planning or by support from local or national politics (examples are the Bajcsy-Zsilinszky Hospitral in Budapest, the haemodynamic laboratory of the Jósa András Hospital in Nyíregyháza and the Hospital of Kaposvár with its oncoradiology centre). In the same time poor management and weak political background may lead to the deterioration of the institutions and they may end up merging with a bigger or stronger central institution (see the closure of pediatric hospitals, fusion of the Honvéd Hospital in Pécs, the fusion of Diósgyőr Hospital with Semmelweis Hospital).

Efficiency analysis based on DEA method proves that there are significant (20-25%) efficiency differences among the institutions, which implies a broad field of possible strategic options. Such circumstances are favourable to the introduction of strategic

programmes and strategic development, as there is a considerable possibility to improve if we keep in mind the performance of benchmark institutions. Analysis of indebtedness and soft budget constraint offers an even closer view of the possible choices of institutional strategies: survival strategies, agony, debt spiral without strategy or a conscious mid-term and long-term planning (with the aims of stabilising operation, human resource management, etc.) The analysis also reveals that the most important determining factors are, firstly, the real value of macro level financing and, secondly, the central policies and the measures taken by the NHIFA. Therefore, in Hungary the circumstances are less favourable for individual organisational strategies than for the adaptive ones that intend to adapt as much as possible to the changing environment. Examples for this strategy determined by the resources are the creation of emergency units, or the adaptation of building centralisation programmes following the trends of EU strategies and tenders.

In the following subchapter I focus on how strategic challenges described in chapters 2, 3 and 4 are reflected in the concrete institutional strategies, and how environmental changes affect strategic plans and concrete measures taken by the management.

5.5.2 The method for analysing hospital management and the sample

In analyses of the behaviour, strategy development and implementation of business and public service organisations, the combined use of qualitative and quantitative methods are widely used. In their study, Hitt and co-authors analysed strategic management researches from the aspect of the methodology employed across several decades, from the dominance of quantitative methods to the combined use of quantitative and qualitative methods (Hitt et al., 1998). Balaton based his study on the strategy development of Hungarian organisations both on surveys by questionnaire and extensive interviews with business managers (Balaton, 2005). He elaborated the strategic management of Opel Hungary in a separate case study. The strategic case studies prepared by qualitative methods in *The Strategy-focused Organization* by Kaplan and Norton demonstrate strategy implementation with balanced scorecard through several examples of companies (Mobil, Cigna, Motorola) (Kaplan, Norton, 2002). In his comprehensive work *Strategy Safari*, Mintzberg elaborated several company case studies (Mintzberg et al., 2005. In their study, Prahalad and Hamel examine company core competence and its development through the example of two large enterprises, Honda and Chrysler. In their large-format work, Porter and Teisberg

introduce several case studies on health providers (e.g. Cleveland Clinic Heart Center, M.D Anderson Cancer Center, Mayo Clinic) to support their theory (Porter and Teisberg, 2007). Swayne and co-authors elaborated 20 strategic case studies on the basis of interviews and field studies, including several hospitals (e.g. Vietnam International Hospital, Cooper Green Hospital, Cabarrus Memorial Hospital) in their comprehensive book on the strategic management of medical institutions. An important publication for the subject of this dissertation is the study by Lozeau and co-authors on the corruption of managerial techniques by organisations (Lozeau et al., 2002), in which, among others, the case of a hospital in crisis is examined from the aspect of strategic planning.

Herein I also use the combination of quantitative and qualitative methods. As shown in Chapters 2 and 3 and in the subsequent analyses described in Subchapters 5.2–5.4, I aim to support the examination of strategic choice by the widest possible range of macro-level sector-wide analyses. Hospital case studies and strategy development trainings help explore individual or group managerial techniques, the logical and causal connections behind macro-level phenomena (differences in efficiency and performance); the degree of consciousness in the strategic management of institutions; the awareness on the part of hospital managements of their strategic scope in a sector that is strongly overregulated and exposed to financial pressures. In the interviews and case studies I seek answer to questions as to how widespread the strategic planning methods are, how exacting the prepared documents are, and whether the objectives set in institutional strategies and development plans are supported by decisions on organisational and financial resources.

In the course of 2007–2009 I participated in the strategy development of eight hospitals in (Budapest, town and county hospitals). Alongside strategy development trainings, I made extensive interviews with 10 additional hospital managers (9 hospitals and an outpatient care institute). The interviews usually took 90 minutes (for a draft of the interviews, see Appendix 5.5.1.). The interviewees are selected on consideration that they include managers of both Budapest and rural institutions, of town, county, Budapest and national, of university clinics and, as potential competitors, of some out-patient specialised clinics.

In analysing the interviews, I aim to explore and analyse:

– the spread of the practice of strategic planning and management in Hungarian health-care institutions;

- major methods and analysis techniques used in preparing institutional development plans and strategic plans;
- the course and major phases of the preparation of plans and the circle of managers and contributors participating; and lastly,
- the course of the implementation of strategies, the standard of action plans, and the progress of implementation.

Some institutional case studies will be introduced in the dissertation. In answering organisational strategy questions, I use qualitative analysis methods (interviews, text analysis and elaboration of documents and materials of managerial strategy meetings). The base documents of qualitative analysis on hospital strategic developments are the strategic planning documentations, materials of strategic trainings accumulated over years, and of the interviews with high managers of health-care institutions provide the background for the qualitative analyses.

Herein I work with a list of questions focusing on the typical characteristics of the institutions and highlighting the typical and atypical examples. In case of many questions the answers were supported by background information found in professional development plans and in the strategic plans of the hospitals.

Main characteristics of the institutions participating in the interviews

For the list of the institutions participating in strategic development and strategic management interviews see Appendix 5.5.2:

Organisational types of the institutions

Most institutions are public. Some changed into public benefit organisations and later into limited companies as forced by legal regulation (Hospitals of Dunaújváros, Eger) or into PLCs (Jósa András County Hospital in Nyíregyháza, the hospital of Veszprém). There are also examples of a holding-type structure together with other inpatient care institutions.

The ownership structure of the institutions

The institutions participating in strategic interviews are mostly owned by the municipalities. There are also two university clinics, a state institution and an outpatient care unit involved.

Qualifications and expertise of institutional leaders

In most cases hospital leaders are physicians (14 of 17 leaders) that obtained some qualification in health care management, in health insurance or in economics. They usually have 12 to 20 years of management expertise and had worked as mid level leaders before.

Profile and scale of the institutions

Most institutions that took part in the strategic analysis are county hospitals, university clinics together with some town hospitals. The average bed number is 790, the average case number 41 thousands per year, which is above the national average. CMI corresponds to the national average. Among the town hospitals the smallest are the hospital of Sátoraljaújhely with 318 beds, 2 matrixes and 4 specialities, the hospital of Balassagyarmat with 330 acute beds (and 283 rehabilitation beds) with 11 specialities. The two university clinics are Semmelweis University (2086 acute beds) and the Medical centre in Debrecen (DEOEC) (1600 acute beds).

Hospital structure

Hospital structure varies from pavilion structure to unified blocks. Most of the hospitals examined work in pavilion structure, and only some of them have block structure like the hospitals of Dunaújváros and Veszprém. Most hospitals have made steps to change into modern block structure, due to the HEFOP development programmes and to certain grants aming at structural development. As the present day conditions of the hospitals are not optimal, practically all of them have participated or will participate in the EU funded tenders of the NHDP. Institutions intend to decrease the number of their sites and pavilions (Győr, Balassagyarmat, Kaposvár, Dunaújváros, Eger), or create new blocks in order to substitute old pavilions and to centralise technology, emergency care units, operating rooms, intensive care units, laboratories and diagnostic units (see the county hospital of Eger or the town hospital of Sátoraljaújhely).

Hypotheses on the strategic management practice of Hungarian hospitals

Referring back to the questions and to the decision making situations described in Chapter 4 I test the following two hypotheses on the application of strategic management methods in the hospitals:

HYP 9) Health institutions typically elaborate professional development plans but not formal strategies. Important practical elements, such as action plan, detailed list of tasks and timing, indication of resources, are missing.

HYP 10) Most hospitals in Hungary do not develop an individual strategy, but they adapt them to the changing environment. Strategies are highly dependent on the environment and on the strict limitations of capacity and profile set by regulative measures.

5.5.3 Detailed analysis of strategic documentation and interviews

Herein I show the general characteristics of the instittutions following the interview questions and highlighting the typical and the outlier examples. Background information for answering some of the questions was gained from development plans and strategic plans of the institutions. To answer my research questions I used the information contained int he professional development and strategy plans of hospitals. (Appendix 5.5.3. contains a summary of the results of the leadership training programmes carried out in 6 hospitals during 2007 and 2008 within the framework of the Strategic Renewal Programme).

Main characteristics of institutional development plans and strategic plans

In the first years following 2000, in Hungary the publicly financed hospitals elaborated their so called mid-term (5 year) professional development plan according to ministerial regulation (43/2003. (VII.29.) ESZCSM r. 6/A §-a[14]). Only a few institutions among those interviewed had a strategic plan in the traditional sense of the term. The differences of professional development plans and strategic plans are illustrated in the Table below. The main shortcomings of professional development plans are that they do not indicate concrete actions, measures, deadlines, responsibilities and resources, and therefore they cannot guarantee any consequency during the fulfilment of the plan. Usually institutions even fail to establish the necessary organisational structure.

[14] 43/2003 (VII.29.) ESZCSM decree about the regulation of care provider institutions and their leadership structure. **6/A. §** (1) The health provider public institution id expected to prepare a professional plan on quality development. The scope of the plan is 5 years. The institution leaders yearly evaluate the fulfilment of the plan and modifies –if necessary – its content for the next 5 years. (2) The professional plan includes the concepts and financial plans related to:
a) the changes in the components of preventive and curative care
b) the structural changes related to changing objectives
c) development and investments,
d) the development of human resources
e) quality insurance and quality improvement.
(3) The professional plan is approved by the professional leaders of the institution and accepted by the university or by the municipality as the maintainer.
(4) If the institution is obliged to provide care on the basis of a contract with a public services institution this institution also has to appove the professional plan.

5.21. Table Comparison of professional development plans and strategic plans of health care institutions

Features and content	Professional Development Plan	(Mid-term) Strategic Plan
Term	5 years according to the regulations. 1-3 year actions are typical.	3-5 year strategic plans, with a broader conceptual vision for 7-10 years.
Content and scope of the analysis of the situation	Detailed description of the demographic and epidemiologic situation, sometimes detailed according to specialities and deseases.	Analysis of demographic, economic and technologic trends. Analysis of the economic and financial situation, human resources and infrastructure prevails.
Stakeholder analyis	Usually missing.	Detailed description
SWOT **Problem tree**	SWOT is applied. An overall analysis of the problems is missing.	SWOT is present in every document. Some plans contain an overall analysis of the problems (problem tree).
Analysis of options and alternatives	Usually missing.	Present in some cases
Objectives	Listed by specialities, without coherence. Mid-term and long-term objectives are often mixed up.	More coherent set of objectives.
Indicators measuring fulfilment of the objectives	Usually missing.	Elaborated in details in most plans.
Action plan and monitoring	There is an action plan, but fragmented by specialities and by desease types. No concrete deadlines, no responsibilities, no resources indicated. Fields such as financing, communication, human resources are not considered.	All plans include a detailed action plan with responsibilities, deadlines and resources. Plans cover the various fields of hospital operation.
Map of resources	Usually missing, in some plans hinted.	Detailed map of resources missing. Some plans include detailed description of resources from the NHIFA or from NHDP.
Business plan, budget of the programme	Some measures appear with the sum of the costs planned, but costs are usually missing.	In some cases a detailed business plan is adjusted to the strategic plan.

When were the development plans elaborated? For what period? How often are they renewed?

Professional development plans and strategic plans are usually elaborated for a 5-year term according to the regulation. In fact they include short term (1-2 years) and mid term objectives as well. Longer term vision is rare. Planning is adapted to the budgetary terms, sometimes to important changes in the environment or in the regulations, or

governed by concrete tenders or ownership decisions. In the past few years many plans were modified in order to fit into the objectives of certain tenders (Győr, Eger, Sátoraljaújhely, Balassagyarmat, Dunaújváros).

How plans were approved?

As a first round development plans are approved by the high-level leaders of the institutions. Depending on the organisational structure this process may be doubled involving the directory meeting or the directory board and the supervisory board. The final approval is given by the owners. The same process is required for modifications, which explains the scarcity of modification proposals towards the owners. Owners are preferably involved in case of preparing proposals where a decision about own share is required.

Analytic measures applied in strategic plans

The analysis of the demographic and epidemiologic situation is examined by disease groups and by areas of care, while analysis on realistic demand is usually missing. Demographic and epidemiologic situation is presented in a static way without considering main trends.

Economic and financial situation is rarely mentioned in the development plans, and the same is true for the changes in the areas of macro-financing and in the financing from the NHIFA, which is a great weakness of most plans. Institutions do not elaborate mathematically proved trend analyses and incomes are planned in a static way. Some institutions that are functioning as business companies elaborate business plans and they usually support them by a detailed analysis of market trends and of the different income sources (BHC).

In situational analyses alternatives are missing, not elaborated or not formally mentioned, although alternatives may be discussed informally in meetings or informal conversations among leadership. Calls for proposals and feasibility studies in the EU require such analyses, so they may become more widely spread in future development plans.

Main objectives of the institutional strategies

Development plans and strategic plans explore many different specialist areas of the medical profession. These reflect strategic decision options described in Chapter 4., but at the same time they contain a more detailed view of possible development areas in therapy. Many examples have been found to the type of development described in

Figure 4.1 which illustrates the possibilities of vertical and horizontal development according to Swayne et al. (2007). The Figure contains the examples of the development of outpatient care in Törökbálint (upstream), of rehabilitation profiles at MÁGY and at DE OEC (downstream). Examples for differentiating strategy are the developments in the fields of spine surgery and oncology in BHC, the county specialisation in Kaposvár, the involvement of new specialities (like rehabilitation, cardiology, emergency care), the implementation of new therapeutic and operation technologies, implementation of haemodynamics, CT and MRI, development of outpatient care and one day surgery. Improving comfort, creating VIP units and providing hotel services are also typical ideas for development. With a view to the expected requirements of EU calls some plans already include the ideas that aim at concentrating acute care and concentrating pavilion structure (like in Eger, Miskolc, Nyíregyháza, Kaposvár, DE OEC, Balassagyarmat, Dunaújváros).

The content and the main elements of professional development plans and strategic development plans and documents

The extension of the plans varies between 30 and 150 pages. Shorter plans are more draft-like, while those surpassing 80 or 100 pages include a detailed analysis of the situation and a detailed plan. They usually consist of 4 or 5 chapters. A detailed analysis of the demographic situation and a professional programme can be found in the county hospitals of Győr and Eger, in the Bajcsy-Zsilinszky Hospital and in the town hospital of Balassagyarmat. Many plans do not differentiate appropriately between objectives, tasks and actions, but are structured according to medical specialities.

Participants during the elaboration of the strategic / development plan. Participants in the supervision process of the plans.

The institution leader's role: 80-85% of the interviewed hospital leaders are physicians (14 of 17 leaders) that obtained some qualification in health care management, in health insurance or in economics. Some of them are economists or engineers as their first degree (Törökbálint, MÁGY, Makó).

Institution leaders have a crucial role in elaborating and managing development plans or strategic plans. Strong and concentrated leadership is typical together with a consequently top-to-bottom planning process. These charismatic and strong leaders have formed their team of 4 to 6 persons who directly participate in the elaboration and the execution of strategic issues. This team usually comprises of the Medical Director, the Nursing Director and sometimes the Economic Director. Controlling and quality

management leaders are also involved, together with the professional leaders of the priority specialities.

The role of other high level leaders: In some institutions a position of strategic director was created (Semmelweis Egyetem, DE OEC, Győri Megyei Kórház, Dunaújvárosi Városi Kórház). This makes it obvious that beside the General Director the Strategic Director is responsible for strategic planning and execution. Other leaders' role consists of elaborating the details of the strategy. Economic Director's role in the execution of professional programmes and strategy varies greatly according to hospitals. The frequent personal changes in the position of Economic Director and temporary contracts cause that they are usually left out of long term planning (examples are the county hospitals of Győr, B-A-Z Megye).

Low level leaders' role: Top-to-bottom communication is typical, the role of lower level leaders and employees is typically limited to the execution of the programme or strategy. Many leaders emphasised the importance of the role of all the employees in the execution of the strategy, and although balanced score card (BSC) system is practically unknown, leaders are aware that every employee has to do their best to achieve the results. There are some examples of bottom-to-up communication, ideas discussed mostly during nursery leader meetings or department meetings or sometimes informally may become integrated into development strategies.

The communication of the strategic / development plan to the stakeholders, channels, media

Only a few institutions follow a conscious communication strategy. Main goals and achievements are typically communicated towards the employees in yearly conferences or celebrations (Semmelweis Day, Christmas, New Year celebrations). Further communication of the strategy is realised in medical meetings, nursing doctor meetings and department meetings. The evaluation of the strategy is in fact carried out in regular high level leader meetings or extended meetings. The process is sometimes formal, but questions are usually discussed spontaneously, together with actual issues.

Perhaps the weakest point of strategic management is external communication. There is usually no strategy whatsoever to communicate plans and programmes to the other stakeholders. As an exception the case of Mór Town Hospital can be mentioned where an extra booklet and website got prepared about the services of the hospital. The DE OEC organizes a partnership program every year where the results and services of the clinics are introduced to hundreds of participants.

Measures taken in order to regulate the execution and monitoring of the development / strategic plan (responsibilities, organisational units, tasks, deadlines).

Among the 20 institutions only two had a concrete regulation of strategic planning and execution (BHC, 3rd district outpatient clinique). The executive tasks are mentioned only in a few sentences in the document called Organisational and Operational Rules, and some of them form part of the job description of middle and high level leaders. The task list of controlling and quality management personnel is also extended. Despite the lack of formal regulations strategy execution runs successfully in most of the institutions due to strong centralised management, to strong informal relationships, the expertise of the leaders and to good management (the best examples are DE OEC, Törökbálint, county hospital of Kaposvár, 3rd district outpatient clinique, Bajcsy-Zs. hospital). However, in many institutions the lack of concrete deadlines, unclear responsibilities and resources hinder the execution of strategies.

To conclude the results of the examination of the 20 institutions it can be said that strategy pursuit does not depend on the formal regulation of the processes. If high level leaders, mid level leaders and employees feel motivated then the strategy works. Formalisation without motivation would probably not contribute to better results.

Changes carried out in the information system or in the controlling system in order to better measure the pursuit of the strategy

In order to pursue a strategy institutions applied some improvement in their leadership information system. In most cases controlling or quality insurance development provides information that makes monitoring of objectives possible (like data on performance and benefits of new forms of care). In my opinion, this method supports strategic management and is economical, data collection becomes part of the operational routine and there is no need to establish (to buy) a new information system or to employ new personnel. Institutional leaders are planning to amplify the existing information systems and use them to calculate indicators measuring effectiveness of strategy. Financial data supporting strategy planning is gained from the accounts (like incomes, liquidity) and are used for budgetary planning or business planning. Less widely spread is the processing of data on human resources (number of personnel, training programmes) or on performance and costs as a feedback for measuring the pursuit of strategic objectives. Complex indicators based on both data and information are usually missing.

One of the problems of following the objectives and of monitoring the pursuit of the strategy is the lack of detailed external data and information on epidemiology, mortality, care types and financing that would put the performance of the institution into a wider context. The lack of a Hungarian health observatory is evident in this respect. For example, data on the patient maintaining ability of the hospitals or on migration from an area can only be acquired from the NHIFA after a time-consuming procedure and paying a fee for data procession.

Organisational changes (changes in the Organisational and Operational Rules) in order to enhance the pursuit of the strategy

A key factor of strategy pursuing is how the organisation is fitted to the requirements of the strategy (Balaton, 2005, p. 120.; Swayne et al., 2007, p.283.). In most institutions one or two additional personnel were employed to respond for the pursuit of the strategy. New employees usually joined the controlling or quality insurance departments (examples: BHC, DEOEC, Kaposvár, Zalaegerszeg).

In other institutions employees were oriented to other departments in order to support the pursuit of the strategy. Some leaders had the opportunity to enrol employees in strategic management training programmes. (Zalaegerszeg). In MÁGY a new unit called Decision Supporting Unit was established to support strategy fulfilment, and a full time marketing manager was employed.

Some institutions organised management training programmes with the aim of discussing strategy outside the hospital (pl. DE OEC, Eger, Zalaegerszeg, Szent Imre Kh.). During these sessions qualified collegues shared their knowledge with the others. In some cases professional trainers were invited, although scarcity of resources causes that this practice is less widely spread.

Measures taken in the past 2 or 3 years with the aim of pursuing strategy

This block No 4 of the questionnaire deals with the pursuit of the above mentioned development plans and strategies. It is imperative that the documents contain an elaborated action plan in which responsibilities and deadlines are set, and the sources are indicated.

Action plan for the implementation of the strategy, resources, deadlines and responsibilities indicated

In this respect the strategic documentation of the institutions show a great variety. Only in 4 of 20 organisations we found a detailed action plan with deadlines and resources

(DEOEC, BHC, Zalaegerszeg, III. District policlinic). Most institutions have a draft-like plan, but they do not contain responsible persons, deadlines and resources, which hinders timing and cooperation.

How action are organised? Actions and short term tasks usually form part of the yearly budget: if resources are indicated, then they are pursued, but if not, it is difficult to allocate resources during the term. This logic of planning is often condemned to fail in the case of long run projects. If no responsible persons are assigned responsibility falls upon the leader of the profession involved or upon the General Director.

Task-objective matching is almost always missing of the professional or strategic development plans. Therefore, in many institutions there are objectives without concrete measures, which makes fulfilment dubious. Such objectives are: quality improvement, internal communication, maintaining human resources, all without concrete measures and inconsequent realisation.

The setting of strategic goals and of concrete tasks has been highly dependent on the resources during this decade, so they can usually be fulfilled only from supporting grants or involving private capital. Typical examples are the emergency units and centres in Zalaegerszeg and Győr, the oncoradiology centre in Veszprém, block building construction in Kaposvár, Nyíregyháza, Eger, Dunaújváros, Sátoraljaújhely. In such cases modifications of the calls for proposals implied modification of strategy content as well.

Important measures taken in the past 2 or 3 years according to the action plan

Almost all institutions mentioned measures that have been taken according to the development plan or the strategic plan.

Organisational changes: establishment of cardio-vascular surgery in SE Városmajor, outpatient care in Törökbálint, amplification of the rehabilitation unit in Dunaújváros. In MÁGY acute and chronic profiles were separated by sites, in Nyíregyháza the cardiology unit was moved into the renovated central building where a cardiovascular centre had been created from a HEFOP grant. In Debrecen a HEFOP grant provided the resources to move the cardiovascular and oncology centre into one central building.

Implementation of technologies: MRI for the Bajcsy-Zs. Hospital, haemodynamic laboratory in Nyíregyháza, Győr and Szombathely. New equipment in the spine surgery unit.

Development of profiles and therapies: Miskolc onkoradiology, Balassagyarmat stroke trombolisis, Bajcsy Zs. Hospital. gynecology, diabetes centre.

Opportunities for grants: In many of the hospitals tenders are the only resources to finance actions described in strategies. The most common is the development of the emergency units, the creation of diagnostic and screening centres or the changes of hospital structure into blocks. Long preparatory period and effective communication allows institutional leaders to prepare for the proposals for the EU structural founds. Institutions with mid-term and long term strategies are favoured. The most prominent example is the development of the oncology and cardio-vascular centre in DE OEC from a grant of 12 billion HUF in the framework of the HEFOP 4.3. In Nyíregyháza 2 billion HUF were granted from the HEFOP programme which was dedicated to the establishment of a diagnostic and screening centre as part of a long term concept of the institution. In Kaposvár earmarked investments and a pólus grant provided the resources for development fitting in long term strategy and a new operating block was created and the emergency unit renewed.

In 2006 and 2007 the middle run development of the Csolnoky F. County Hospital in Veszprém was mostly based on grants from the New Hungary Development Plan. Modifications of the NHDP caused that the whole institutional development plan had to be revised. Plan was adapted to the new priorities and in 2010 the hospital began the development of its emergency unit (TIOP 2.2.2.), and a proposal was handed in aiming at structural changes (TIOP 2.2.4.). Another proposal is being prepared aiming to create a Regional Oncology Centre (TIOP 2.2.5.). All these changes have led to the necessity of modifying the initial concepts.

Core competences of the institution

The most efficient Hungarian hospitals considered human resources, highly qualified professionals and good teamwork as their core competence. With such human resources at hand they are able to achieve their goals, namely achieve financial stability, professional and technological development, quick and efficient organisational changes. On the one hand, expertise and fame of physicians and therapist teams attract patients, which increases hospital income and stability creating a good background for further development to improve quality. On the other hand, leadership interviews emphasise the importance of human resources in the areas of quality insurance, controlling, financing, IT and technology.

These institutions pay special attention to additional performance-based payments to supplement fix wages. The formulation of a strategy usually brings about the introduction of performance-based payment.

Other core competences mentioned were flexible organisational structure and technological innovation. Flexible organisational structure improves the adaptive ability of the institutions. The most prominent examples are the Szent Imre hospital and Mátrai Állami Gyógyintézet with their matrix structure.

May I allow a personal remark and mention that according to my experience a key factor of success is the temporary stability of the person of the leader or the leading team. To implement a relevant strategy a stable leadership is needed for at least 6 or 8 years. For complex strategic development an even longer period is required as shown by the examples of Debrecen, Buda Health Centre (BHC) and Törökbálint.

Suggestions for the health care institutions to improve their strategic management

Leaders in the interviews said that training programmes developing strategic management skills and techniques were useful. They claimed that stability of the financing environment would also favour strategic approach.

5.5.4 Summary of institutional strategies and hypothesis testing

In Hungary the publicly financed health provider institutions prepare a 5-year middle run development plan according to ministerial regulations. This is favourable because institutions think over their objectives and strategies and they consider professional development areas.

> HYP 9) Health institutions typically elaborate professional development plans but not formal strategies. Important practical elements, such as action plan, detailed list of tasks and timing, indication of resources, are missing. (TRUE)

Analysis proves HYP 9. One of the reasons is that legal regulation does not contain exact requirements while it basically expects development in the specialist fields from the publicly financed institutions. The examples of prospering and financially stable best practice and benchmark institutions indicate that proper strategic management requires more detailed analysis, consequent implementation, monitoring and feedback, an adjusted organisational structure and proper modifications if needed.

> HYP 10) Most hospitals in Hungary do not develop an individual strategy, but they adapt it to the changing environment. Strategies are highly dependent on

the environment and on the strict limitations of capacity and profile set by regulative measures. (TRUE)

On the basis of the development plans of the 20 institutions it is obvious that the strategic options of the hospitals have become limited mostly by the cost decreasing policies due to the deterioration of macro financing environment. The own resources of the institutions are scarce and they can hardly cover even the cost of the own shares for tender proposals. Its sum is insufficient for any investments or development. The dependence on resources makes strategies dependent on the opportunities offered by the changing environment and on the occasional calls for proposals. On the other hand, inflexible capacity and financing regulation measures and out-of-date medical regulation (competence levels for example) make flexible adaptation difficult for the hospitals.

Considering the above mentioned critical remarks on the weaknesses is important to move forward towards the implementation of traditional strategic plans. Compared to professional development plans strategic plans should be improved in the following fields (referring to the methodology elaborated by the Performance Research Group of the Corvinus University and on the suggestions of Kaplan-Norton).

a) A more detailed analysis of the situation. Future trends in demography and epidemiology should also be analysed beyond the present situation.
b) A broader view of technologic development, data collection and trend analysis in the relevant medical fields (oncology, cardiology, diagnostics).
c) Realistic analysis of the demand: analysis of macroeconomic trends, the extent of public financing, the changes in demand. Analysis of the expectations of all the stakeholders.
d) Analysis of the options and the alternatives: it needs to be explained why the leadership opted for a certain development, which were the other alternatives and why these were rejected.
e) Systematic coordination of the objectives: priorities and relationship between the objectives, hierarchy of goals including various dimensions (financial, organisational, beneficiaries).
f) In each case it is advisable to match indicators to the objectives: it is necessary to elaborate the initial and the targeted values of the indicators, to define data collection methods and assign responsibilities.

g) Prepare a detailed action plan and implement it consequently. A detailed description of the concrete tasks for the next 1 or 2 years, with deadlines, responsibilities and resources.

h) Prepare a matrix of the objectives and actions in order to test which actions support which objective and how the actual functional tasks support the fulfilment of the long-term goals of the institutions.

i) It is advisable to prepare a map of resources indicating what resources are available for performing each task. This makes feedback possible between strategy and proposals.

j) Training programmes for the leaders on strategic management. Promote teamwork and problem-solving techniques.

6 Conclusions

The subject matter under examination in this dissertation is centred on the strategic responses of the hospitals to a changing environment. Rapid and turbulent changes of the internal and external environment require an adequate, flexible adaptation of the organisational system of the hospitals. On the other hand, the framework created by legal regulations makes adaptation harder to achieve.

In Chapters 2 and 3 I offer a brief description of the main elements and tendencies that characterise environmental changes in the period examined. The analysis of the changes in the environment shows that the first half of the years 2000 brought about important changes in the environment and therefore when we describe this period it seems proper to talk about a turbulent environment. Chapter 4 dedicated to strategic decision-making situations describes the possible fields where institutional leaders do have the opportunity to take strategic decisions. In the final Chapter 5 empirical analysis was applied to reveal clusters, efficiency differences and reasons for indebtedness and closures which characterise the different institutional groups. As a final step a field research based on interviews and the analysis of strategic documents of hospitals has been carried out. Empirical analysis results served to support or to reject the hypotheses.

This chapter is dedicated to describe the results and the theses. Besides changes in the environment the institutional sector also has come through some significant changes, although the inflexibility of the regulatory framework continuously hindered adequate adaptation of the institutions. The analysis of the operation of health care institutions highlights that overregulation in a turbulent environment leads to efficiency loss and hinders adaptation, while contributing to the conservation of distorted, non-flexible and non-effective structures.

In Chapter 4 a wide range of real examples were presented to illustrate the possible dimensions and scope of strategic actions available for the publicly financed hospitals in Hungary. Such dimensions are the scale (capacity), specialities, technology and reorganisation (change of profile, restructuring, organisational development, matrix). However, a supportive political environment is needed to make this positive scope of actions a realistic alternative for the institutions. Inhibitive environmental (and political) factors and sudden changes in health policy (with contradicting measures) will narrow

down significantly the scope of possible actions and often break strategic development or even deteriorate operational efficiency.

The most important results of the empirical analysis are as follows:

a) *Cluster-analysis* results show that there are no stable criteria for grouping the institutions according to scale or progressivity levels in the Hungarian hospital sector. This situation allows institutions to achieve a higher progressivity level by conscious development, strategic decision-making and proper political background. However, there is also a possibility of getting to a lower progressivity level. The other field of cluster-analysis was focusing on the group of priority hospitals created by the Act CXXXII of 2006 on the Development of the Health Csare System (Eftv). The results show that rather heterogenous groups were formed as the result of the regulation, where if more parameters were involved standard degression values were higher within the groups than between them. Cluster-analysis gave more obvious groupings based on scale and progressivity level, which indicates that the above mentioned regulation did not reflect the reality of institutional groups. Such incoherence in the regulation lead to instability in the whole sector.

   For the creation of institutional groups it is advisable to include more than one dimensions (such as scale, progressivity level of the activities, situation) instead of relying exclusively on whether the institution can be reached from a 50 km distance or not as the regulation in question (Eftv) does. Cluster-analysis supports that a four-item grouping is adequate for the Hungarian hospital sector. The four groups by progressivity level are: university clinics and national institutions, county-regional institutions, multi-care town hospitals and basic-care small town hospitals.

b) During DEA efficiency analysis I could include only a few input and output variables which questions the validity of these early results. Still, even these results show significant efficiency differences within and between institutional groups. For example, the VRS model reveals a 35-40% efficiency difference among the hospitals providing care at regional level. The efficiency of this institutional group decreased after the introduction of Performance Volume Limit (PVL) and later improved due to capacity reducing measures implemented by the Eftv regulation.

   According to progressivity level (university, county-regional institutions, town and small town basic care hospitals) university hospitals excelled in the fields covered by the variables, while town hospitals showed the weakest results with almost 30% of efficiency reserves. Capital city hospitals and priority hospitals both had better

results (9% and 5% of advantage respectively over non-capital city and non-priority institutions).

c) Although the analysis of the phenomenon of the Soft Budget Constraint (SBC) and of indebtedness can be considered as a rather elementary approach to the topic, some results seem valuable. One of these results is that indebtedness slightly relates to bed numbers, geographical situation and some ownership types. Using the data that is also available for sector leaders path analysis method can detect the characteristics of the recurrently indebted institutions and of the institutions in a debt spiral. The set of variables and categories created to examine exit-types and bailout types may serve for future research on the topic at a sector level.

   At the beginning of the period examined Soft Budget Constraint and the real value increase of the budget could hide the problems caused by structural inflexibility and insufficient financial management. Recurrent debt was paid by money deriving from state or municipal subsidies. From the middle of the period as a result of financial pressure and consequent need for cost-containment measures many institutions became exit (closure, fusion, change of operational form or change of profiles), and deficient operation was no more subsidised and they were rejected bailout.

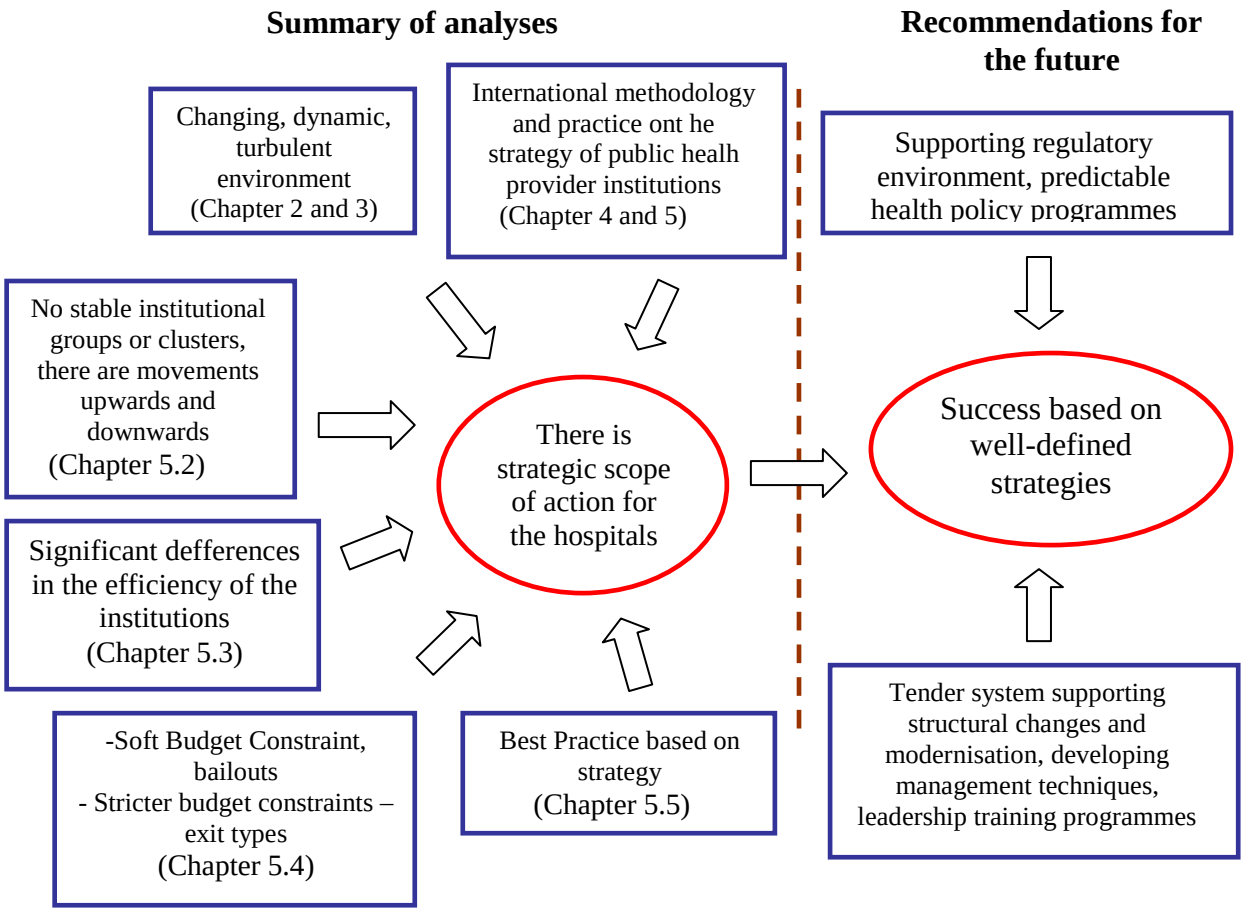
d) *The analysis of the application of strategic management* and of the development plans of the hospitals proved that best practice institutions exist in Hungary, and they can serve as models for the rest of the institutions. Strategic management as a tool for leadership shows a great variability in the publicly financed Hungarian hospital sector. Except for some institutions hospitals prepare detailed development programmes for the different specialities, but most of them fail to transform these plans into concrete action plans, to work systematically on them, fail to monitor them and to give feedback on their execution. Objectives aiming at stabilising finances or developing human resources either present little weight or are totally missing. Another problem is the lack of priority setting between the objectives. It is also to be considered that the alternatives for the professional development plans and the strategic plans were considerably limited by cost-containing governmental measures and by the dependence on external resources provided by tenders.

   Despite all these factors there are a number of health provider institutions – mostly hospitals – that have been able to plan and to execute their mid-term (in some cases long-term) strategies. These successful institutions managed to stabilise their operation, bring about changes in the structure of care and organisation and establish

an up-to-date human resource management, all according to the challenges of the changing environment. These institutions can serve as models for the modernisation of the sector.

The figure below includes the main elements and findings of the thesis and contains the suggestions I offer on the basis of the results. The main thesis statements are highlighted in each box. The analysis of the health provider institutions reveals that in a turbulent environment restrictions and overregulation lead to efficiency losses and weakens the ability to adapt of the institutions. Inflexible regulation and frequent changes in hospital management contribute to the conservation of inefficient, out-of-date structures which hinder proper responses to the changes of the environment.

6.1. Figure The importance of strategic analysis of the environment and strategic management in the hospitals in Hungary



The most important conclusion of this thesis is that strategic planning and strategic management play a crucial role in the operation of the publicly financed hospitals in Hungary. In the period examined the dynamic or even turbulent changes of the

environment provided many decision-making opportunities for hospital leadership. In order to give a flexible and adequate response in such situations it is imperative that the institutions elaborate a set of strategic goals and action plans for middle-term and long-term development. Empirical research proves that such awareness and consciousness characterise only a few hospitals. The reasons for this are the frequent changes of hospital management or the lack of consensus on development issues between the owners and the management.

To conclude, the analyses performed indicate that there are at least two conditions that have to prevail in order to assure a successful and stable operation of the health sector:

1) a stable health policy and a more stable financing environment have to be established, where the objectives are clear and stable at least at a middle-term period.

2) educational programmes and training programmes should be organised to support institutional management. Benchmark examples should be made widely known, and the abilities and knowledge that proved successful in some institutions should be developed in other institutions as well.

Recommendations for further research on the hospital sector

At last I admit the limitations of the statistical analyses, in some cases innovative in the Hungarian hospital sector, which were used for the present thesis. Considering such limitations the following recommendations are made for further research:

1. *Regular analysis of the sector* (capacities, performance distribution and concentration, availability of care, main trends by specialities and by therapy groups).
2. *Efficiency analysis* within the groups and among the groups of out-patient and in-patient care, including a wide range of input and output variables.
3. *Efficiency analysis* using qualitative methods, detailed comparison of positive and negative case studies.
4. Studies on the *decision-making procedure* of the hospital management (and the owners), especially in questions like changing capacities or structure, change of professional profile, purchasing and implementing new technologies, fusions or changes in operational structure.
5. Studies on the distribution of *decision-making competence* between the owners and the management, the way of making strategic decisions.

6. Studies on *why and how hospitals go indebted*, more detailed analysis of the *soft budget constraint* phenomenon.

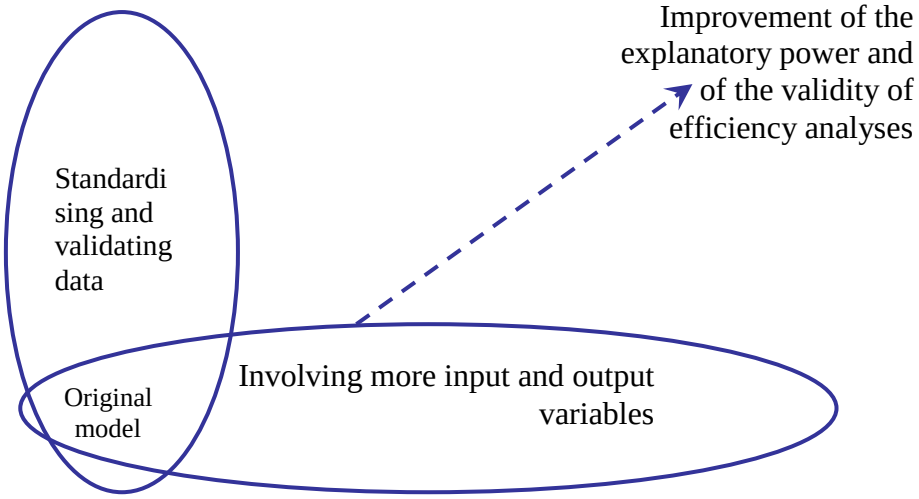
7. *Cause-effect analysis* before government decisions (modelling) and after (analysis of the effects of capacity regulations and financing, analysis of hospital strategic development and reorganisation).

For effective research in the fields described above it is indispensable to develop information systems in the areas listed below:

a) Standardisation of collection and registration of data related to capacity and performance and use of care.
b) Systematic data collection on number of personnel and wages (valid physician numbers as the main input factor in health care institutions)
c) Registering valuable technology and special therapies
d) Collection and registration of further input data (medicines and materials, number and type of implants).
e) Using quality indicators to get a realistic picture of performance (outcome)

The availability of these data is necessary for further studies on efficiency and cost-efficiency in the Hungarian hospital sector. The validity of the research and of the analyses can be improved in two directions: by involving more input and output variables and by standardising data.

6.2. Figure Possible ways of improving the validity of efficiency analysis



To improve the validity of the analysis of efficiency among the institutions it is imperative to standardise data related to specialist profile and case-mix, and the negative effects of PVL, different for the different hospitals, should be excluded.

Appendix

Bibliography

List of relevant publications of the author