

**UNIVERSITY OF WEST HUNGARY**  
**FACULTY OF ECONOMICS**  
**THEORY AND PRACTICE OF ECONOMIC PROCESSES**  
**DOCTORAL SCHOOL**  
**BUSINESS ECONOMICS AND MANAGEMENT SUB-PROGRAMME**

**HOW TO IMPROVE PRICING IN HUNGARY'S DISTRICT  
HEATING INDUSTRY?**

**Thesis Booklet of Doctoral (PhD) Dissertation**

Prepared by:

**Gábor Tamás Németh**

Supervisor:

**Dr. Lajos Juhász PhD**

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# HOW TO IMPROVE PRICING IN HUNGARY'S DISTRICT HEATING INDUSTRY?

## 1. Subject

Hungary's energy sector including the district heating industry **will face major challenges** in the future. Although economic theories and management practices applying to district heating companies are special due to the natural monopoly position of such players, the **current and future challenges of the industry tend to be approached from a purely technical perspective.**

Without questioning the significance of technical factors, I consider it essential to explore and understand the unique operational features of the industry and district heating suppliers to ensure the survival of district heating. With **high price being the main concern** about district heating, non-technical factors impacting the price level of district heating services should also be considered. **In addition to the diversity of their structure and operational features, Hungarian district heating companies also tend to have different service price structures and pricing mechanisms.** As a result, the **operational efficiency of different companies cannot be reliably compared** which makes it difficult for both consumers and owners, mostly local municipalities, to evaluate the pricing of district heating in their community.

One should be very careful evaluating the present and the future of this industry, as **there will be no viable alternative to replace district heating over the next 15 to 20 years either in economic or in technical terms.**

## 2. Objective

This dissertation focuses on issues related to the operation of pipeline utilities in a **natural monopoly position** with special respect to one of the key crisis segments of today's energy market: district heating. Although district heating is a local service in the traditional sense of the word, it plays a critical role in **national energy and economic policies**.

The **global objective** of this dissertation is to **identify and analyse the features** of district heating and provide guidelines on **potential future alternatives** – with special respect to the **special pricing** of district heating services. The importance of this issue is **obvious**, even if we ignore the author's personal interest and involvement and the energy policy environment and challenges of our age. This paper approaches district heating from a non-technical perspective focusing on the essential components of **efficient business**. Industry players consider flat-based metering and control, the reduction of heat loss and the implementation of state-of-the-art generation equipment to be the most important criteria to ensure the future viability of district heating.

Without questioning the significance of technical issues, **this dissertation considers it essential to evaluate also non-technical components and activities at least as important for business operation as technical ones.**

This dissertation seeks to answer the following **questions**:

- Do **Hungarian district heating companies meet the challenges of our age and** do they satisfy customer requirements?
- **Are district heating companies run efficiently?** What opportunities do they have to **improve operational efficiency?**

- Do district heating companies have **viable pricing and underlying corporate costing systems**?
- Can the **vision and potentials** of district heating companies be reconciled with the national energy policy?

Based on the above questions, this dissertation has the **main research objectives** as follows:

- Introducing key trends in the **relevant literature** with special respect to the **economics of monopolies, corporate pricing and costing**.
- Introducing the emergence, history and challenges of district heating through an **in-depth analysis** of the industry with special respect to future alternatives to ensure the **sustainability of this service**.
- Comparing **theory** published in Hungarian and international literature with **Hungarian corporate practice**. Supporting theoretical hypotheses with empirical evidence.
- **Adapting a methodology relying on qualitative and quantitative techniques in a combined manner** in order to understand the above relationships and collect relevant information.

### 3. Methodology

In order to answer the above questions, it seemed to be appropriate to conduct research using an **inductive research logic**. In qualitative research, the personal involvement of the researcher and the lack of quantitative methods may question

the reliability of results, and it is also difficult to draw general conclusions based on purely qualitative research data. In order to best eliminate the weaknesses of individual methodologies I decided to **combine qualitative and quantitative methods** in my research.

**Empirical research** focused on **two key areas**: 1) the **operational features of district heating companies, changes in their environment** and their response to them; and 2) the **pricing and costing methods** used by companies covered by the survey.

The above questions and hypotheses already make it clear that the **basic unit of this research** is a **company**. Companies were selected for the research based on the initial **hypotheses' information requirements**. I decided to perform a **questionnaire survey** involving Hungarian district heating companies and supplement the material with **in-depth interviews** made with the representatives of the companies in the sample.

**Corporate in-depth interviews** focused primarily on the **pricing methods of the involved companies**. Nevertheless, they **also covered subjects such as the structure and operation of these companies**. This information was required to obtain a full picture on the pricing practice of the individual players. As one of the aims of the questionnaire survey was to identify differences between Hungarian district heating companies, I also highlighted the related findings of in-depth interviews. The research covering **four leading Hungarian district heating companies and their pricing methodology** tackled many issues – included in the theoretical and questionnaire-based parts of the dissertation – to support **research hypotheses**.

In terms of methodology, it did not seem to be reasonable to separate the two parts as the **two research methods often provided overlapping results**. I believe the questionnaire survey and the corporate interviews have mutually reinforced each other in support of the initial hypotheses. For this reason, the same questions and issues are often tackled both by the questionnaire and the interviews.

#### **4. Hypotheses**

The main hypothesis of the research questioned the **uniformity and viability of costing and pricing systems** used by district heating companies. During the research approaching the subject in a **complex way** several new issues related to the subject were identified. As a result, research hypotheses and theses were classified into two basic groups. The **first group of hypotheses** concentrated on **the operational features of Hungarian district heating companies and the changed Hungarian economic environment**, while the **second group of hypotheses** focused on **the costing and pricing methodology** of district heating companies. Hypothesis **H1** was related to differences in the operational structure of Hungarian district heating companies. This hypothesis was supported **both by questionnaire results and by the identified operational features of the four companies under survey**. The dissertation outlines the different ownership structures of these companies and highlights differences in their core activities. It pays special attention to the different technical facilities of district heating firms that are mostly related to reserve capacities and distribution/supply systems. Companies involved in in-depth interviews all had different pricing mechanisms and operational features including heat generation technologies and ways of purchasing. In light of the above, **hypothesis H1 has been confirmed** by the research. Hypothesis H1 can be translated into a research thesis as follows:

**T1: Hungarian district heating companies are not uniform in terms of operational structure. This means that the ownership structure, company form, organizational structure, technology and financial management systems of these companies are different from each other despite their identical profile.**

**Hypothesis H2** aimed to describe the HR resources of district heating companies. It was a basic assumption that **since the senior managers of district heating companies predominantly have an engineering degree, the economic problems affecting the industry are not given an appropriate weight in developing corporate strategies.** The dominance of mid- and C-level managers holding an engineering degree was proved by research results, but it turned out to be very difficult to prove a direct relationship between this fact and the overly technical approach to company matters.

In light of this, **hypothesis H2 was only partially proved and it has to be modified to provide a basis for the following research thesis:**

**T2: Since the senior managers of district heating companies predominantly have an engineering degree, it can be assumed that economic problems affecting the industry are not given an appropriate weight when developing corporate strategies.**

**Hypothesis H3** is related to the varying response Hungarian **district heating companies gave to** changes in their economic and political environment **in the past few years.** Since district heating services essentially have a technical profile, it seems to be **justified to assume a direct relationship between environmental changes (input) and technical development activities (output).**

The surveyed companies are different in terms of the value and composition of their investments. This way, environmental factors further increase the existing operational differences. Given that companies with a technical profile tend to assign a higher priority to technical development, **hypothesis H3 is acceptable if slightly modified:**

**T3: Hungarian district heating companies responded with different technical development activities to hectic changes in their economic and political environment.**

Based on **hypothesis H4, Hungarian district heating companies share no uniform vision on the future of the industry.** This hypothesis was partly confirmed already under T3 as competent managers always try to align technical activities with their future vision. Hypothesis H4 **was also confirmed by other unrelated findings:**

**T4: The companies surveyed do not generally share the same a uniform vision on the future of the industry.**

**Hypothesis H5 claims that not all district heating companies recognize the financial and welfare-related benefits of partial or full privatization, and many of them do not even consider privatization a viable option.** Research findings supported this hypothesis and made it clear that the industry has **less than expected experience with and idea about potential future privatization.** Since in this research only one side (companies) was interviewed, **hypothesis H5 should be narrowed down** as follows:

**T5: The managers of district heating companies usually do not recognize the financial and welfare-related benefits of the industry's partial or full privatization, and in many cases they do not even consider privatization a viable option.**

The last hypothesis (H6) of this group was based on assumptions related to the future use of primary sources of energy. Results confirmed this hypothesis, because district heating companies proved to have very different views about the future potentials of primary sources of energy.

**T6: District heating companies have differing views on the potential use of primary sources of energy available in the future.**

The second group of hypotheses concerned the costing and pricing methodologies of district heating companies. Although these two factors are closely interrelated, hypotheses have been drawn separately for them. Assumptions were evaluated based on questionnaire answers and the findings of in-depth interviews.

Hypothesis H7 assumed that Hungarian district heating companies have different price structures. This hypothesis seems to be justified as the tariff items used by the various companies are different both in terms of their structure and technical/economic content.

**T7: The price structures of the surveyed district heating companies are largely different, consequently, they cannot be reliably compared or regulated in a uniform way.**

**Hypothesis H8** was based on a **shortcoming in the pricing strategy of district heating companies, namely, that they fail to integrate industry-specific investment and depreciation features into their pricing strategy.** This hypothesis was difficult to prove, as both questionnaires and in-depth interviews rendered results in conflict with common practice. Although most companies said they were aware of the fact that funds required to replace worn assets are accumulated gradually through a depreciation system, their business and investment data did not reflect this awareness. The thesis modified accordingly is as follows:

**T8: The pricing practice of district heating companies does not always reflect an appropriate consideration of industry-specific investment and depreciation features.**

**Hypothesis H9** was based on the assumption that district heating companies **calculate their costs in an outdated and non-uniform manner.** The results of empirical research confirmed this assumption. Hungarian district heating companies are severely underdeveloped in terms of using costing (e.g. ERP) systems satisfying modern management needs (and pricing requirements). **Hypothesis H9 is acceptable with a slight modification:**

**T9: Not all district heating companies have a state-of-the-art corporate cost calculation system and they tend to follow different costing practices.**

The last hypothesis (**H10**) of this dissertation **questioned the role of municipalities as a regulator enforcing operational efficiency among district heating companies.** Based on answers given to the questionnaire and findings of

in-depth interviews, companies have reservations about the administrative and price regulatory function of local municipalities, but these reservations are not always related to efficiency. In many cases, they cause technical problems or capacity constraints. Consequently, **hypothesis H10 cannot be accepted with its initial content. I propose that it should be reworded as follows:**

**T10: In many cases, local municipalities do not properly function as a price authority to regulate district heating services which makes it difficult to evaluate the efficiency of district heating companies.**

I am confident that **the empirical research has reached its objective to introduce the Hungarian district heating sector.** Like any other research, it could **provide but partial results** because every identified problem and answered question raised new issues. **Having evaluated research results I find that continued research is required to develop a profound understanding of reform processes in the Hungarian energy sector including district heating.** It thus seems sensible and appropriate to repeat the same research with an extended breadth and depth later, since economic and political changes affecting the sector are still underway.

## **5. Summary of research results**

This **dissertation** focuses on the **key features of the Hungarian district heating sector,** more particularly on **corporate pricing.** **Reviewing literature on the economics of natural monopolies, corporate costing and pricing** provided a good basis for empirical research and the in-depth analysis of the pricing methods of the four companies covered by the survey.

**My research explored two main directions.** One of my objectives was to **evaluate the economic content and cost components of prices**, while the other one was to **identify and explain differences between Hungarian district heating companies**. To enable an understanding of operational features in the district heating sector, it is essential to **introduce the industry in detail** – and outline its history from its inception to date – as **many current problems are rooted in the past**. The dissertation includes a detailed description of **price subsidies, ownership structures**, as well as issues such as **metering-based settlement, disconnection from the district heating network and fuel cross-financing problems**. Although district heating plays an **important role in the Hungarian energy market** (and political system), it had been **ignored** for many years. The **negative consequences of this approach** – primarily **high prices** – **are now suffered by consumers using district heating services**. In order for district heating to have a role and public acceptance compared to that in more developed countries, a **major paradigm shift is required in the sector**.

The service price is **approached by the dissertation from two sides**. From **the technical side**, ways to reduce energy consumption were assessed (control, system upgrades, etc.), while **from the economic side, options for standard service unit prices and related pricing methodologies were evaluated**. **Technical and economic factors** were considered throughout the dissertation, because this combined approach is required to **get a comprehensive picture of the district heating sector**. **Price implications were mentioned in each and every hypothesis to highlight the complexity of the subject**.

**The empirical research combined two methods**. On the one hand, **the operational structure, HR resources, investment practice, privatisation experience and future vision of domestic district heating companies were studied under a questionnaire survey**. The questionnaire also included

questions on **costing and pricing**, as well as the **regulatory role of owners**. On the other hand, **in-depth interviews** were conducted at **four leading Hungarian district heating companies** to **confirm the results of the questionnaire** and develop an **in-depth understanding of pricing methods**. Empirical research results **confirmed research hypotheses** – in some cases with minor modifications. The four leading and successful companies involved in the research have not yet made the most of available opportunities. That is, there is still **room for improvement in their efficiency, especially in terms of pricing**.

## **6. New scientific results**

New **scientific results** provided by the dissertation include the **identification and evaluation of relationships through a complex review of the industry** – involving a combination of technical and economic factors, with special respect to the relationship between the **companies' operational features, their efficiency and service pricing**. It is a **new idea to promote uniform pricing techniques for the industry as a whole**. The dissertation also offers a **new solution to address the most critical problem of the industry, consumer-side technical modernization**.

## **7. Other research directions, recommendations**

Based on the above results, the key action to improve the sustainability of **district heating** would be to **enhance its public acceptance**. This, however, requires **active cooperation from the managers of district heating companies**. They should be ready to part with the old mindset confining the task of district heating companies to the process between the generation and delivery of heat to households. This old mindset undermines the future of the industry. I firmly believe and suggest that **district heating companies should be transformed into complex energy service providers**. Such transformation would **improve**

**consumption culture from its current very low level.** Companies should seek cooperation with local municipalities, their owners, observing local interests and promoting community-level environmental benefits and energy efficiency. The liberalization of Hungary's gas and electricity markets provides district heating companies with a valuable opportunity to grow from district heating firms into complex energy suppliers. They should scrap the idea that cost-cutting is the only way to improve business efficiency. The service attributes of district heating should be given more weight to provide better service quality to customers. Price is currently a competitive disadvantage for district heating companies, but they can turn this into a competitive advantage if they improve service quality and make consumers aware that these firms sell not only molecules (like e.g. gas suppliers), but also a highly complex service.

District heating companies often complain about the **lack of lobbying power** in the industry. This problem may be due to the large differences between industry players. An industry with standard operative and regulatory principles would have a better chance to enforce its requirements and recommendations. For today's decision makers it is often difficult to find their way among the multitude of methods and principles used in the district heating industry.

This research sends a key message also to **economic and political decision makers.** They should accept the need to preserve the industry for the future and realize their role in its survival. It is a very complex task to reconcile local community-level energy sector objectives (if any), with national (central government) strategy. Since district heating has an important function in Hungary's national energy system, its problems and regulations should not be delegated to the exclusive competence of local municipalities. **Local interests**

**are often in conflict with national policies**, which often limits the freedom of operation of district heating companies. **There seems to be a need to put an end to the current practice of cross-financed gas prices and maximise the environmental benefits of district heating.** Political decision makers should realize their responsibility towards the over 2 million consumers using district heating across Hungary. **Ignoring and abandoning the industry will not help address future challenges.**

Exercising their role as an owner and a price regulatory authority, **local municipalities should consider the special monopoly position of district heating companies, otherwise they risk making unfounded and financially unsound decisions.** It should be their vested interest to protect both their supplier company and their consumers to prevent major social problems. They should also realize that **district heating companies give them a strategic tool to implement their energy policy concept.** This way, they can introduce **service schemes offering benefits to owners, suppliers and consumers alike.**

A **new direction for continued research can be the role of local municipalities as an owner and price regulator of district heating companies.** This research should be completed at the municipalities themselves and focus **on their operations.** The **research can be extended to cover also consumers and economic policy-makers.** It would be interesting to see whether their views on district heating coincide with the assumptions of district heating companies. A third way to extend the research can be to **increase the number of involved companies.** This, however, would inevitably increase the time and human resources required to complete the survey and obtain sufficiently detailed information .

**As an extension of my research I decided to study the practical adaptability of the identified pricing principles at specific companies.**

**This dissertation aimed to take the first step in a new direction of research and identify issues related to district heating, a services industry that will be an essential – and valuable – component of the Hungarian energy sector in the long run.**

## **Publications**

### **Study published in an international conference booklet in English:**

NÉMETH G. [2007]: **Practical experience considering biomass heating in the district heat supply in Szombathely.** Conference on district energy, Portorož, 18-20 March 2007, 119-129. p. ISBN 978-961-90820-9-6

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### **Articles published in Hungarian newspapers:**

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