

A summary of a doctoral thesis

*“Lean Management in a service district heating companies.
Principles of the conception and practical implementations”*

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The issues considered in the following doctoral thesis were Lean Management principles and tools necessary for successful implementation, as well as their importance to improve the companies functioning and to estimate the intensity of wastes that appear in district heating companies. It was made an attempt to show the types of wastes in a selected value stream of a district heating company.

The way permitting to minimize the waste and at the same time to increase services quality and to reduce the costs of the leadership of the economic activity, seems to be the conception of the Lean Management (LM) in the organization. Lean Management conception is coming from Lean Thinking philosophy, which was introduced to the management terminology by J.P. Womack’a, D.T. Jones’a and D. Roos’a from Massachusetts Institute of Technology. Lean Management conception came into being in Toyota Production System (TPS), in the Toyota Motor Company. It was successfully applied there during the years.

The research subject was the Lean Management conception and its practical implementations, which are dedicated to services organizations. The reason to choose the subject was the need to improve service processes organization in district heating companies. Researches were carried out in district heating companies in Poland – the members of Polish District Heating Chamber of Commerce, the role of which is to send and distribute heat.

Heat engineering is one of the strategic Polish businesses. It is responsible for heat production and its distribution. The district heating development depends on the legal and economical environment and appropriate decisions taken in the company. With small influence on the income size the basic strategy for being competitive district heating companies is cost leadership. The challenge for district heating companies managers is to apply an appropriate method which contributes to cost streamlining process.

Dissertation has a theoretical and utilitarian aims. The theoretical aim was to present Lean Management as a universal conception, which serves for streamlining of reserves used in service organizations. This process requires to determine wastes identification methods, define wastes groups, review and the types of instruments used for waste minimizing and identification success factors of the Lean implementation in district heating companies.

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The dissertation aims were formulated as follows:

1. To demonstrate possibility of application of one of the four value stream mapping types in services environment named *Transactional Mapping* in district heating companies and to show the waste in a chosen value stream.
2. To assess intensity of separate groups of wastes in district heating companies.
3. To assess the importance of Lean Management implementation success factors chosen for the improvement of district heating companies functioning.

Research hypotheses, which result from adopted dissertation aims were formulated as follows:

- H1 *Transactional Mapping* instrument might be applied to mapping value streams as identified in district hosting companies.
- H2 It is in district heating companies that, waste resulting from their employers' passive behaviours appears with the largest intensity.
- H3 District heating companies, functioning on the Polish market, meet Lean Management success implementation factors.

Qualitative researches and quantitative researches were conducted in order to examine the phenomena of the Lean Management application at service organizations. The researches were preceded by the preliminary research of the domestic and foreign management literature as well as bibliographical analysis considering scientific journals databases like: EBSCO, ProQuest, Emerald and auxiliary Google Scholar.

The research procedure consisted of the following stages:

1. defining the research problem, theoretical and utilitarian aims, hypotheses formulating, choosing of the research methods and the object of researches,
2. study of the national and foreign literature from the range of the studied area,
3. analysis of the district heating trade in order to establish the criteria for the selection of cases to undergo the research - *case study research* - and the research test for the diagnostic survey,
4. realization of the first stage of empirical researches, i.e. the qualitative investigation - the multiple case study that contains: defining and designing research, the selection of cases, the preparation of the research, data collection, analysis and conclusions,
5. realization of the second stage of empirical investigations, i.e. the quantitative investigation – diagnostic survey that contains: defining and designing research, the selection of the research test, drawing up the research tool (surveys), carrying out the survey, the analysis and conclusions,
6. summary of the researches, the conclusions and the results presentation.

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Qualitative researches involved multiple case study, made in accordance with the case study research method; there were four cases of district heating companies. Quantitative researches were achieved by the diagnostic survey. There were 225 district heating companies under research.

Dissertation consists of four chapters: two of them are theoretical and the other two are empirical.

The first chapter presents the Lean Management conception as found in literature. Based on academic literature analysis, the types of waste were defined, the areas of using the conception were presented and the review of instruments applied to waste minimizing was made. The chapter closes with the description of Lean success implementation factors.

The second chapter presents Lean Service – the conception to improve service processes and resource managing in an organization. The differences between service and production processes were shown. The waste occurring in service processes was looked into. The review and typology of Lean instruments being used in service environment were made. There were also methods for mapping of the value streams shown.

The third chapter presents heat engineering trade and district heating companies as service organizations. In the chapter there are: an analysis of the companies profitability, a definition of the heat customer, the ownership forms and the organizational-legal forms of district heating companies. What followed was the IGCP presented as an organization which supports the researched trade through the exchange of experiences, lobbying and trainings.

The fourth chapter begins with the discussion on the research procedure and presentation of the empirical researches course. The results of the case studies and diagnostic survey were presented there as well. The synthesis of the deliberations is the lean district heating company model.

The model as presented by the authoress contains Lean principles, implementation stages, the example types of wastes, toolbox and Lean success implementation factors in district heating companies. The fourth chapter contains recommendation of the heat engineering trade transformation program, that can be implemented for more efficient, common-sense managing. The program contains, among others, proposition of making the internet platform, which can be used for communication, trainings and the exchange of experiences for managers and employees of district heating companies.

Within the worked out program, besides the training subjects, principles implementation stages and Lean tools, the benchmarking of the intended aims realization was recommended. The chapter ends with an attempt of the empirical research results synthesis and an attempt to establish the new research directions, arising from the achieved research results.

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The end of this dissertation contains summary of the research results, implications for the further research and directives for the managers, who demonstrate interest in the process improvement of district heating companies.

Theoretical and implementation aims which were formulated at the beginning were achieved. The research hypotheses were not verified negatively.

Hence, the authoress particularly demonstrated, that: the Transactional Mapping tool is used for mapping twelve of the seventeen processes included in the value stream named “Sending and distribution of heat” for the four companies (hypothesis H1 verification) in the tested district heating companies.

The adjustment of the processes was achieved based on the established criteria, i.e.: repeatability activities in the process, which is analyzed from the service supplier’s point of view and the customer participation in the process realization, which shows the frequency of the contact between employer and customer.

With the reference to the hypothesis H2, resulting from the quantitative researches it was found, that with the largest intensity – related to the remaining obtained sizes - in the respondents’ opinion, the waste results from employees’ passive behaviours. The average opinion of this waste occurrence intensity amounted to 2,53 points. It’s worth calling up the assumption that the waste, the estimated size of which is between 2 and 2,99 points, occurs with the average intensity.

In the process of the hypothesis H3 verification it was assumed that, if the 80% of Lean success implementation factors (according to the assumed criteria) had a great significance for tested organizations, then those organizations met Lean principles success implementation factors. The result was 83%.

Researches demonstrated that processes realized in analyzed trade are not free of waste. The list of Lean instruments prepared in the dissertation can be some kind of a hint for managers as to which methods and tools can be used to identify and minimize the waste. Researches also demonstrated that the Lean principles and instruments knowledge in the tested trade is poor.

The IGCP is an important institutional link of propagating the lean district heating company model as well as the heat engineering trade transformation program.

It is recommended to carry out analogous survey research in the future to observe changing dynamics of the tested phenomenon. Considering the survey research results which demonstrated that employees’ behaviours are the sources of waste, it is important to take actions leading to Lean Behaviours implementation in heat engineering trade.

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