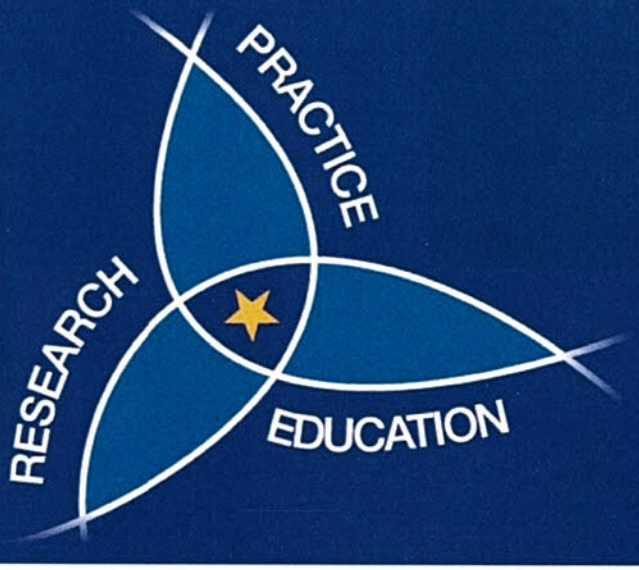


EuroFM
EUROPEAN FACILITY MANAGEMENT NETWORK

EuroFM Journal

International Journal of Facilities Management

Research Papers
Advancing knowledge in FM

PROMOTING INNOVATION IN FM

March 2014

www.eurofm.org

ISBN/EAN 978-94-90694-06-7
ISSN 2211-4467.67

Research Papers

Advancing knowledge in Facilities Management:

PROMOTING INNOVATION IN FM

Editor:
Professor Keith Alexander, CFM, Manchester, UK

March 2014

Published by the European Facility Management Network (EuroFM)

ISBN: 978-94-90694-06-7
ISSN: 2211-4467.67
DOI: 10.14606/
(pdf: available at www.eurofm.org and http://www.efmc-conference.com)

EuroFM Publications
Gooimeer 4
1411 DC Naarden
The Netherlands
Telephone: +31 35 694 27 85
Email: eurofm@eurofm.org
www.eurofm.org

A EuroFM Publication

EUROFM RESEARCH PAPERS

Advancing knowledge in FM
PROMOTING INNOVATION IN FM

March 2014

Organising Committee

Prof Keith Alexander (Chair)	CFM, Manchester	UK
Prof Michael May	HTW University of Appl. Sciences, Berlin	Germany

Scientific Committee

Prof Keith Alexander	Centre for Facilities Management	UK
Prof Per Anker Jensen	CFM Realdania, DTU	Denmark
Prof Mark Mobach	Wageningen University	Netherlands
Dr Susanne Nielsen	CFM Realdania, DTU	Denmark
Prof Lukas Windlinger	Zurich University of Applied Sciences	Switzerland

Review Panel

Prof Torben Bernhold	University of Applied Sciences Muenster	Germany
Dr Knut Boge	Oslo & Akershus Univ Coll of App Sci	Norway
Prof Siri Hunnes Blakstad	NTNU, Trondheim	Norway
Dr Inês Flores-Colen	IST, TU Lisbon	Portugal
Dr Brenda Groen	Saxion University of Applied Sciences	Netherlands
Prof Keith Jones	University of Greenwich	UK
Assoc Prof Antje Junghans	NTNU, Trondheim	Norway
Prof Kunibert Lennerts	Karlsruhe Institute of Technology	Germany
Assoc Prof Göran Lindahl	Chalmers University, Gothenburg	Sweden
Dr Margaret-Mary Nelson	University of Bolton	UK
Dr Suvi Nenonen	Aalto University, Helsinki	Finland
Dr Theo Van Der Voordt	Delft University of Technology	Netherlands
Dr Matt Tucker	Liverpool John Moores University	UK
Prof Thomas Wehrmüller	Zurich University of Applied Sciences	Switzerland

Moderators

Prof Jan Brochner	Chalmers University, Gothenburg	Sweden
Prof Tore Haugen	NTNU, Trondheim	Norway
Prof Ilfryn Price	Sheffield Hallam University	UK

Facility Management in West- and Eastern Europe

Alexander Redlein
Vienna University of Technology, IFM
alexander.redlein@tuwien.ac.at

Michael Zobl
Vienna University of Technology, IFM
michael.zobl@ifm.tuwien.ac.at

ABSTRACT
Facility Management (FM) coordinates a wide range of facility services and the management of which can contribute to the success or partial failure of an organizations business in different countries. Since 2005 the Vienna University of Technology analyze the demand side of FM on a yearly basis in different European countries such as Austria, Germany, Bulgaria and Romania. The goal is to determine the value added of the use of FM respectively FM departments and the parameters influencing the magnitude with the help of scientific models and methods. Areas of savings and increase of productivity, and reasons for these effects are derivate directly from a statistical sounded sample. The populations for the surveys were the Top 500 companies in the different countries (ranking is sales driven). The research is based on the Mixed Method Approach and the Mixed Model Research.

Keywords
Facility Management, value added, mixed method approach, statistical analysis

1 INTRODUCTION
Facility Management (FM) is a key function in managing facility services and working environment to support the core business of the organization. A lot of companies have recognized FM as an important management strategy capable to reduce costs of facilities (Chotipanich, 2004). A discussion is taking place about the added value of FM as a function within organizations and the services they provide. A clear expression of this is the large number of FM-related studies that have been conducted focusing on different aspects of FM and their added value for primary processes, quality, time, risk and relationship quality (Kok et al., 2011). An article by Pathirage et al. focused on knowledge management in FM. Two articles (Chau et al., 2003, Hui et al., 2008) are focused on value enhancements of refurbishment and therefore on economical value. Other studies focused on the importance of organizational issues in the value adding process. Improving productivity and decreasing costs turned out to be the most discussed areas of adding value by corporate real estate management. Some authors raised the issue of flexibility as a significant aspect that can add value to corporate business (Jensen et al., 2012a). Wauters (2005) is focusing more on benchmarking than on added value and provides examples of combining cost benchmarking with indicators for user satisfaction, performance and service quality (Jensen et al., 2012b). Jensen et al. developed the FM Value Map which was presented at the research symposium during EFMC 2009. The FM Value Map is a conceptual framework to understand and explain the different ways that FM can create value for a core business as well as the surroundings for the benefits of multiple stakeholders: owners, staff, costumer and society. The aim of this research was to select exemplary cases of FM adding value in the companies and to find convincing ways to present them to make FM interesting for managers (Jensen, 2010). An article by Appel-Meulenbroek (2010) is about added value of facilities by

knowledge sharing through co-presence in open plan office areas (Jensen et al., 2012a). According to different publications it is possible to save between 10 and 30% of the costs of buildings through the (efficient) use of FM. In most cases, figures about the economic effects/benefits of FM are based on the study of a single company or the data presented is not specified in detail. In both cases, data cannot be used for a general proof of the economic efficiency/value added of FM (Zechel et al., 2005, Scharer, 2002). The figures are also subject to large variations. Therefore there is a need to determine the value added of the use of FM respectively FM departments and the parameters influencing the magnitude with the help of scientific models and methods.

Since 2005 the Vienna University of Technology (TU Vienna) analyze the demand side of FM on a yearly basis in different European countries such as Austria, Germany, Bulgaria, Romania Turkey and the Netherlands (companies were selected randomly). The researches have been based on a (standardized) questionnaire survey. One of the attempts to prove the profitability and efficiency of FM was performed by Susanne Hauk in "Wirtschaftlichkeit von Facility Management" (Hauk, 2007). Another research project at the TU Vienna analyzed if there is a difference whether a separate FM department has been established or not. The author's also defined additional parameters that have influence on the efficiency of FM. Examples for these parameters are: areas of cost saving and availability of cost and building data and usage of CAFM (Computer Aided Facility Management). The study proved that companies with an own FM department tend to achieve savings within more Facility Services (Redlein and Sustr, 2008). This research paper shows further results of the actual surveys. The authors used statistical models to prove if there is an (significant) correlation between different variables/parameters.

2 METHODOLOGY AND STATISTICS

In literature, three major research paradigms to collect the required data can be found: Quantitative Research Method, Qualitative Research Method and Mixed Research. Both, quantitative and qualitative methods have particular lacks of strength. So the authors used the research method "Mixed Research". The Mixed Research is a general type of research in which quantitative and qualitative methods, techniques, or other paradigm characteristics are mixed in an overall study. The two major types are the Mixed Method Research/Approach and the Mixed Model Research (Johnson and Christensen, 2007). The Mixed Method Approach combines quantitative surveys with qualitative data collection methods e.g. personal interviews, expert groups, focus groups with professionals and content analysis (Jensen et al., 2012a). The researcher uses the qualitative research paradigm for one phase of the study and the quantitative research paradigm for another phase of the study (Johnson and Christensen, 2007). Its logic of inquiry includes the use of induction (discovery of patterns), deduction (testing of theories and hypotheses) and abduction (uncovering and relying on the best of a set of explanations for understanding one's results). Taking a mixed position allows researchers to mix and match design components that offer the best chance of answering their specific questions (Johnson and Onwuegbuzie, 2004). Based on the Mixed Method Research, the studies include quantitative and qualitative research phases. The qualitative studies (literature review, brainstorming, expert interviews and group discussions) were used primarily for the collection of the potential benefits and efficiency/value added of FM and the parameters influencing the magnitude of the effects. Based on the quantitative studies (facility management surveys since 2005) the results of the qualitative studies were analyzed and validated. Each year the results of the previous studies and expert's interviews (qualitative step) are used to optimize the new questionnaire. Then the survey is carried out (quantitative step). Questions are rephrased if necessary, added or deleted (Hizgilov and

Redlein, 2011). Also the Mixed Model Research was used. The qualitative and quantitative approaches are mixed within a research phase. The questionnaire included summated rating scales (quantitative data collection) and open-ended questions for qualitative data collection (Johnson and Onwuegbuzie, 2004).

The standardized questionnaire for the survey with closed and opened questions was subdivided into the main areas:

- the general part (which includes for example questions about the industry of the company, number of employees, turnover, number of sites)
- the part about FM organization (questions about the availability of a FM department, number of employees and the position in the hierarchy of the company etc.)
- value added (e.g. cost drivers and savings through the introduction of FM, increase of productivity through the use of FM)
- the way of service provision (number of external service providers etc.)
- IT support (e.g. used IT systems for example ERP and CAFM systems, areas of IT support)
- Sustainability (e.g. what contribution can FM deliver to sustainability, CSR)

In the questionnaire/survey productivity was defined as: Increase in productivity = More output with the same input e.g. staff; respectively increase of output per unit of input. Depending on the answers there are up to about forty questions. The populations for the surveys were the Top 500 companies (ranking is sales driven) in the different countries. These companies were selected randomly in each country. Interviewees were the internal Facility Managers or the persons responsible for all FM tasks according to the European Norm EN 15221-1. Tools for the surveys were phone and/or E-Mail and personal face-to-face interviews. The phone interviews with the Facility Managers respectively the persons responsible for all FM tasks of the different companies were carried out by one researcher, thus the manner of questioning was always the same. This was done to secure the data quality. To ensure the plausibility and validity of the data the results of the different research steps were compared with each other and with other studies in this research field. The data (answers) were entered in a MS Access database and afterwards exported into statistical programs and analyzed and evaluated. As mentioned before the questionnaire included also questions with open answering possibilities. That means that answers need to be reviewed, if necessary renamed and afterwards clustered to make findings comparable. The renaming and clustering was double checked to ensure correctness. In addition, the results are validated by questioning the outliers, retracements and changes in trends. Additional points were validated through internet research.

SPSS is used to evaluate the data and to set up statistical models. An equivalent test was used for comparing the average performance of two groups to verify if there is a difference between two populations on the basis of the random sample from these populations (Dodge, 2008). The basis of statistics is parameter estimation, i.e., when an attempt is made to estimate the parameters (mean and standard deviation) of a population from a random sample. Most statistical techniques rely on the underlying distribution being of a particular type, such as the normal distribution, for inferences made from the relevant statistical tests to be valid. Where the underlying data is non-normal a different set of statistical techniques, the nonparametric statistics, can be fruitfully applied to understand data. These techniques are distribution-free since they make no assumptions about the underlying distribution of the data (Boslaugh and Watters, 2008).

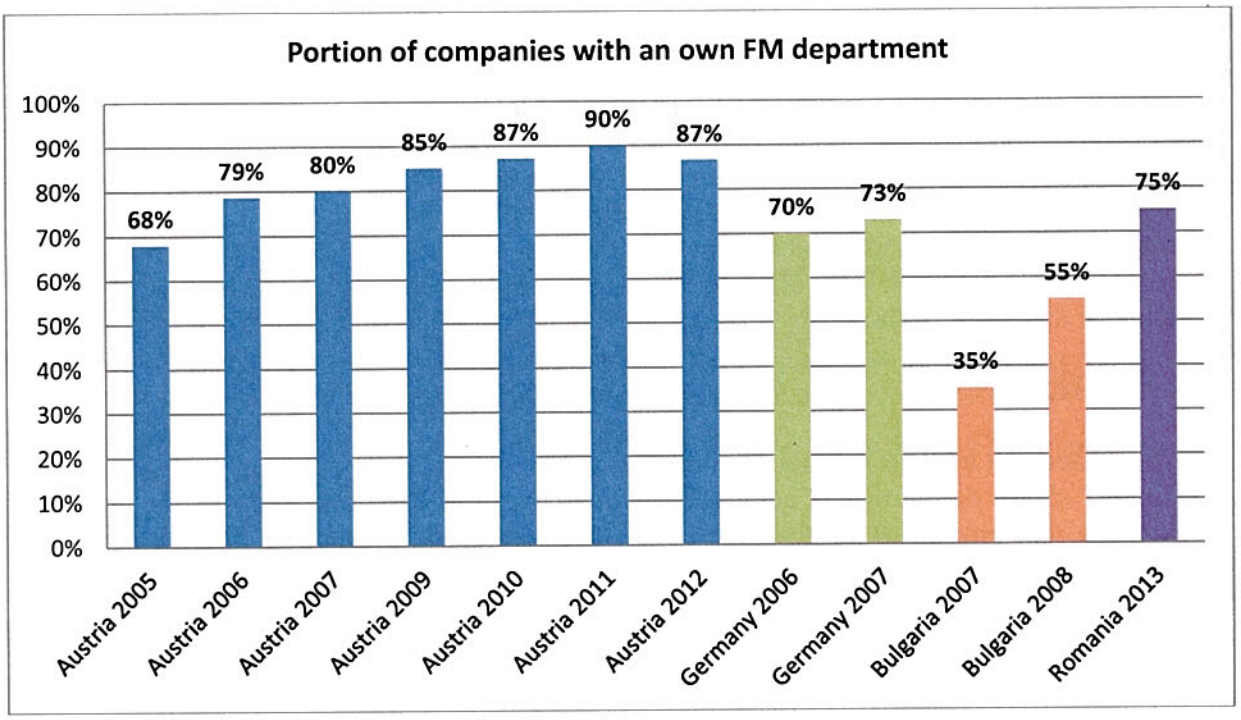
Most commonly used nonparametric procedures are the median test, the Mann-Whitney U test, the Wilcoxon Test, the Kruskal-Wallis test and the Friedman test. Because of the non-normal distribution of the data the authors used the Wilcoxon Test to verify if there is a difference between two populations on the basis of the random samples from these populations (Dodge, 2008). The Wilcoxon Test can be used as a nonparametric replacement or substitute for the t-Test. Most nonparametric methods use statistics, such as the median, that are resistant to outliers and skewness. If the data are measurements at the ordinal level in the first place, as with sets of rank, or nominal data, a nonparametric test is obligatory (Kinnear and Gray, 2008).

3 RESULTS

3.1 General Facts (Organization of FM)

Figure 1 shows the portion of companies with an own FM department in Austria, Germany, Bulgaria and Romania. In the last years the portion of companies with an own FM department is growing. The slight decrease of companies with an own FM department in Austria from 2011 to 2012 can be explained by the random sample. In 2012 more small companies participated in the Austrian survey. Statistical models support the hypothesis that this decrease of the percentage of FM departments is due to the change of the random sample. For example the statistical test shows that with an increasing number of office employees there's an increasing tendency towards an own FM department within the company. However, the share of companies with an own FM department is on a high level. Especially in Bulgaria there was a huge increase in the portion of companies with an own FM department from 2007 to 2008. This trend can also be found in Romania. The importance of FM departments is underlined by its organizational integration within the company's hierarchy. The bandwidth of FM departments organizational integrated as staff unit ranges from 19% in Germany to 35% in Austria. The share of FM departments integrated as line function ranges from 33% in Bulgaria to 67% in Romania. The increased awareness for FM is also evident in the rise of companies having a description of tasks for the FM area. Most of the surveyed companies (75% or more) in the different countries had a task description. Companies having a description of tasks for the FM department frequently have assigned the tasks to specific persons. Even FM does not equal outsourcing, outsourcing is an important method within FM. The most outsourced facility services are cleaning, winter service, waste management, technical maintenance and heating/ventilation/air conditioning.

Figure 1 Portion of companies with an own FM department (Austria, Germany, Bulgaria, Romania)



3.2 Value Drivers

Value as a concept has different meanings and usages (Jensen et al., 2012b). In the past added value was seen as a combination of price and quality. Nowadays added value is considered as a complex concept that can be studied from different perspectives (Kok et al., 2011). The concept of value has become popular in some of the literature on management. An example is Porter's theory on value chains, which relates to exchange value. Another example is the strategic thinking by Teece about non-tradable assets like knowledge, brands and service concepts, which relate to use value (Jensen et al., 2012b). There appears to be broad consensus about added value being the ratio between benefits and sacrifices for the costumer. Risk is also mentioned as a separate aspect. The assessment of and decision about added value involves a trade-off and a choice between different criteria – benefits, costs and risks – which in themselves are difficult to compare (Kok et al., 2011). Whereas some years ago the main purpose of FM was cost savings, nowadays purposes and demands of FM have changed. Aspects like the improvement of the market position became more and more important. Moreover, qualitative aspects like higher satisfaction of the employees which result in higher motivation and productivity are also consequences of the introduction of FM. It is still not possible to quantify all benefit effects. While the cost savings and the productivity improvement can be calculated, the strategic competitive advantage is only decidable (Hauk, 2007). In our studies value added of FM includes cost savings and increase in productivity on the one side and on the other side cost drivers (Mierl, 2012). Cost drivers require differentiated cost planning and cost control. They are measures of cost causation and resource use and output (Leidig, 2004).

The biggest cost drivers of the surveyed countries (number of mentions) include areas such as energy, maintenance/repair, safety, cleaning and launching new software. The most relevant areas of cost savings (number of mentions) were areas such as energy, cleaning, maintenance/repair and personnel. Savings were mainly possibly through new type of contract, rates, technical upgrade, reorganization and utilization of synergies. The most named areas in which an increase in productivity could be observed (number of answers) are: administration, personnel, safety, maintenance/repair and data. Reasons for an increase in

productivity are: process optimization, work utilization, utilization of synergies and personnel/employee workload optimization.

Based on the data several hypotheses concerning savings through the use of FM could be validated. One hypothesis is that companies with an own FM department tend to have a higher number of facility services with savings (areas of cost savings) than companies without an own FM department. An own FM department allows better management of facility services (e.g. cleaning, maintenance/repair) and guarantees the best realization of an optimal real estate management. As a result, economic optimizations in different facility services can be performed (Hauk, 2007).

The number of facility services with savings (areas of cost savings) was analyzed in detail. As a hypothesis it was stated that the existence of a FM department (yes/no) has an influence on the number of facility services with savings. In detail, the Wilcoxon Test was used for comparing the average performance of two groups to verify if there is a difference between two populations on the basis of the random samples from these populations (Dodge, 2008). The data for Romania 2013 and Austria 2012 will be considered. The null hypothesis (H_0) states that, in the population, the two medians are equal, which means that there is "no effect". The alternative hypothesis (H_1) states that there is a difference between the two medians, which means that there is an "effect". The Wilcoxon Test is said to show significance if the p-value is less than the significance level ($p < 0.05$). Then the null hypothesis (H_0) is rejected and the alternative hypothesis (H_1) is supported (Kinnear and Gray, 2008).

The null hypothesis is:
H_0 = Companies with an own FM department tend to the same number of facility services with savings than those without an own FM department.
The alternative hypothesis is:
H_1 = Companies with an own FM department tend to have a higher number of facility services with savings than those without an own FM department.
Tested Variable(s):
Number of facility services with savings (number of nominations, e.g. energy, cleaning, maintenance/repair) for Austria 2012 and Romania 2013
Variable of Grouping:
FM department (yes/no) for Austria 2012 and Romania 2013

Table 1 Number of Facility Services with Savings – FM department

Number of facility services with savings - FM department				
	Austria 2012		**Romania 2013**	
	FM department	Without FM department	FM department	Without FM department
N	63	8	10	1
Mean*	1.86	.88	1.70	1.00
Median*	2.00	1.00	2.00	1.00
Std. Deviation*	.998	.641	.674	-
p - value	→ validated with 0.000000025466 → H1		→ validated with 0.011412 → H1	
* FM services with savings (number of mentions)				

The significant results ($p < 0.05$) of the test show that there is a difference between the two medians, which means that there is an effect (H_1). Companies with an own FM department tend to have more areas of cost saving than companies without an own FM department. An own FM department manages the different facility services better. In addition, through the central management of facility services synergies between the different services can be used. This model proves that an own FM department allows better management of facility services and therefore economic optimization and cost savings in different facility services such as cleaning or maintenance/repair can be performed.

Another hypothesis is that companies with an own FM department tend to have higher annual savings than companies without an own FM department.

The null hypothesis is:
H_0 = Companies with an own FM department tend to have the same annual savings than those without an own FM department.
The alternative hypothesis is:
H_1 = Companies with an own FM department tend to have higher annual savings than companies without an own FM department.
Tested Variable(s):
Annual Savings (%) for Austria 2012 and Romania 2013
Variable of Grouping:
FM department (yes/no) for Austria 2012 and Romania 2013

Table 2 Annual Savings – FM department

Annual Savings (%) - FM department				
	Austria 2012		**Romania 2013**	
	FM department	Without FM department	FM department	Without FM department
N	43	3	7	1
Mean*	12.26	.67	16.00	15.00
Median*	10.00	.00	15.00	15.00
Minimum*	.00	.00	5.00	15.00
Maximum*	30.00	2.00	30.00	15.00
Std. Deviation*	8.098	1.155	8.485	-
p - value	→ validated with 0.000000028316 → H1		→ validated with 0.011513 → H1	
* Annual Savings through FM (%)				

The significant results show that there is an effect (H_1). Companies with an own FM department tend to have higher annual savings than companies without an own FM department. An own FM department guarantees the best realization of an optimal real estate management. The expert knowledge of an optimal management makes it possible to achieve savings through the use of FM. For example, clearly arranged real estate documents, contracts and floor plans at one central place help to identify cost saving potentials (Redlein et al., 2007).

4 CONCLUSION AND NEXT STEPS

The share of companies with an own FM department is on a high level all over Europe. FM is a very important tool to achieve an increase in (annual) savings and productivity. According to the statistical analysis based on the data of the studies an own FM department had positive effects on annual savings, such as energy and cleaning. FM also leads to an increase in productivity. Most named areas were administration, personnel and maintenance/repair. The study proved that companies in Austria and Romania with an own FM department tend to achieve savings within more facility services in contrast to companies without an own FM department. An own FM department also leads to higher annual savings. In both cases the Wilcoxon Test shows a significant result. That means that there is a (statistical) significant difference between the two groups (FM department yes/no) and the tested variables (annual savings, facility services with savings). Further studies can include an investigation of "soft factors" and more detailed analyses of different industries and/or countries are possible to gather more information and an expansion of the data. In addition, a comparison of this study with similar ones from other countries would help to gather more information about this research field.

REFERENCES

Boslaugh, S., Watters, P. A. (2008): Statistics in a Nutshell. O'Reilly Media: Sebastopol.

Chau, K. W., Wong, S. K., Leung, A. Y., Yiu, C. Y. (2003): Estimating the value enhancement effects of refurbishment. In: Facilities, Vol. 21, No. 1/2, pp. 13-19.

Chotipanich, S. (2004): Positioning facility management. In: Facilities, Vol. 22, No. 13/14, pp. 364-372.

Dodge, Y. (2008): The Concise Encyclopedia of Statistics. Springer Verlag: Berlin, Heidelberg.

Hauk, S. (2007): Wirtschaftlichkeit von Facility Management. Dissertation, TU Wien.

Hizgilov, T., Redlein, A. (2011): Einsparungspotenziale, Produktivitätssteigerungen und Kostentreiber im Facility Management. In: Journal für Facility Management, Vol. 3, pp. 18-25.

Hui, E. C. M., Wong, J. T. Y., Wan, J. K. M. (2008): The evidence of value enhancement resulting from rehabilitation. In: Facilities, Vol. 26, No. 1/2, pp. 16-32.

Jensen, P. A. (2010): The Facilities Management Value Map: a conceptual framework. In: Facilities, Vol. 28, No. 3/4, pp. 175-188.

Jensen, P. A., van der Voordt, T., Coenen, C., von Felten, D., Lindholm, A.-L., Nielsen, S. B., Riratanaphong, C., Pfenninger, M. (2012a): In search for the added value of FM: What we know and what we need to learn. In: Facilities, Vol. 30, No. 5, pp. 199-217.

Jensen, P. A., van der Voordt, T., Coenen, C. (2012b): The added value of Facilities Management: Concepts, Findings and Perspectives. Polyteknisk Forlag, Lyngby.

Johnson, B., Christensen, L. (2007): Educational Research: Quantitative, Qualitative and Mixed Approaches. SAGE Publications, Thousand Oaks, 3th edition.

Johnson, R. B., Onwuegbuzie, A. J. (2004): Mixed Method Research: A research paradigm whose time has come: In: Educational Researcher, Vol. 33, No. 7, pp. 14-26.

Kinnear, P., Gray C. (2008): SPSS 15 made simple. Psychology Press, New York.

Kok, H. B., Mobach, M. P., Omta, O. S. W. F. (2011): The added value of facility management in the educational environment. In: Journal of Facilities Management, Vol. 9, Issue 4, pp. 249-265.

Leidig, G. (2004): Prozesskosten-Management. Arbeitskreis Klein- und Mittelbetriebe (AKM) Eschborn. http://www.rkw-

kompetenzzentrum.de/fileadmin/media/Dokumente/Publikationen/2004_FB_Prozesskosten-Management.pdf (accessed on 07.01.2014)
Mierl, M. (2012): Trends und Status Quo 2011 im Facility Management im Vergleich mit 2010. Master Thesis, TU Wien.
Redlein, A., Schauerhuber, M., Hauk, S. (2007): Parameters for an economic efficient implementation of FM. In: 6th EuroFM Research Symposium, Zurich, Switzerland, 26 and 27 June 2007, Conference Papers, pp. 109-116.
Redlein, A., Sustr, F. (2008): Economic Effective Implementation of FM. Research Paper, TU Wien.
Scharer, M. (2002): Wirtschaftlichkeitsanalyse von CAFM Systemen. Diplomarbeit, WU Wien.
Zechel, P., Bächle, A., Balck, H., Felix, P., Flecker, G., Friedrichs, K., Geertsma, C., Henzelmann, T., Hovestadt, L., Hovestadt, V., Janecek, M., Mende, W. and Neumann, G. (2000): Facility Management in der Praxis: Herausforderung in Gegenwart und Zukunft. Expert Verlag: Renningen.