Journal für Facility Management

Wissenschaft trifft Praxis

Heft 18/2019

ISSN 2415- 1858

Journal für Facility Management

Heft 18/2019

ISSN 2415-1858

www.ifm.tuwien.ac.at

Preface of the publisher

18. Journal for Facility Management: Science meets Practice

During the last months, I visited several international conferences. Most of them concentrated on Real Estate and Facility Management others were more generally focusing on topics like risk and change management, but also on emerging technologies in general. The presentations of the real estate conferences took up the topic in their headlines but tried to prove that digitalisation is not a topic that will have a big impact on this industry. All other conferences were looking into the possibilities of disruptive changes, the efficient usage of emerging technologies to gain strategic advantages, offer new human centric services and products and the new possibilities for their industries. Most impressive was a real estate agent that told me it is too much effort for him, to give human centric services and the WOW effect to all his clients. My question to this is easy. WHY is this impossible or too expensive? Just look up the client in the social media and look at his or her likes, comments etc. This takes 5 to 10 minutes and give a first glimpse of the demands, wishes, social environment etc. This information can be used to select more precise the objects that the real estate agent suggests and the approach to the client. This will automatically provide the WOW effect. This is not rocket science but low level use of the new technologies. But it takes us out of the bailer room, and enables us to take up the management part of our job. Therefore we selected also more strategic papers for this issue of our journal.

This issue of Journal für Facility Management provides you with several insights into these topics:

- Flexibility and Wellbeing for Office Performance
- Facility Management Strategies in Hospitals
- Energy Efficiency Improvement of Buildings by Using Linear Programming

The first paper gives an insight into the strong relations between the facilities and business performance. The main part of the paper is to evaluate the level of performance and wellbeing of people from Romanian companies that already have introduced new ways of working as flex / home office and co-working plus the general awareness for this topic.

The second paper describes the current use of FM-strategies in Swiss acute hospitals. Based on theory about corporate strategy, health care and facility management, a quantitative online survey addressed to FM leaders (C-level) was compiled. It was determined for which FM areas

strategies were formulated and which contents they cover. The research provides an initial systematic overview of how Swiss hospitals use FM-strategies. This overview should encourage hospitals to develop their own FM strategies and refine them. Although this research relates to Switzerland, it can be assumed that numerous results also apply to other countries

In the third paper, a linear programming model of IMSCP is proposed to construct an energy efficiency improvement plan for buildings. The main aim is to choose the actions, which give the desired labels at minimum cost. An illustrative example is presented to demonstrate the applicability of the proposed model. Solution results prove that this model is appropriate for energy efficiency improvement of buildings.

The suggested solutions of the papers can be used directly by practitioners to solve day-to-day problems or to offer new services. At this point, I want to thank all international researchers who sent us numerous abstracts and papers for the double-blind review. The decline rate was kept high with more than 50%. The high quality research handed in enabled us to increase the quality of the IFM journal over the last years. Thanks for your help, and we are looking forward for your future support. I also want to thank the members of the editorial and the scientific board for their terrific work. They supported me in reviewing first the abstracts and then the full papers and gave a lot of input to the authors.

The high decline rate, the high reputed members of the editorial and the scientific board and the supporting universities ensure that the articles are not only having a high scientifically quality, but also that practitioners can put them into practice easily.

I also want to thank my team, especially Claudia Höhenberger and Larissa Locsmandy without their personal engagement, the journal would not be available in this high quality.

I wish you all the best from Vienna, an enjoyable read, a lot of input for your research and/or for your daily work. I look forward to a lot of new abstracts and papers for the next call for papers for the 12th IFM Congress 2019.

Yours

Alexander Redlein

Head of Editorial Board

To my family Barbara, Caroline Sidonie und Alexander David

Scientific Committee

Prof. Dr. Alexander Redlein
Institut für Managementwissenschaften, Immobilien und Facility Management, TU Wien, Österreich

Prof. Jan Bröchner
Department of Technology Management and Economics, Chalmers University of Technology, Göteborg, Schweden

Prof. Roscoe Hightower, Jr., PhD
Florida Agricultural and Mechanical University, USA

Prof. Wolfgang Kastner
Institut für Rechnergestützte Automation, TU Wien, Österreich

Prof. Dr. Iva Kovacic
Institut für interdisziplinäres Bauprozessmanagement, Industriebau und Interdisziplinäre Bauplanung, TU Wien, Österreich

Prof. Dr. Kurt Matyas
Institute of Management Science, Industrial and Systems Engineering Division, TU Vienna University of Technology, Austria

Prof. Sergio Vega
Universidad Politécnica de Madrid, Spain

Dr. Joseph H. K. Lai
The Hong Kong Polytechnic University

Herausgeber / Editorial Board

Prof. Dr. Alexander Redlein (Head of Editorial Board)
Institut für Managementwissenschaften, Immobilien und Facility Management, TU Wien, Österreich

Prof. Dr. Dr. h.c. Dr. h.c. Jörg Becker, Professor h.c.
Chair for Information Systems and Information Management, WWU Westfälische Wilhelmsuniversität, University of Münster, Germany

Prof. em. Dr. Wolfgang Janko
Department of Information Systems and Operations, WU Vienna University of Economis and Business, Austria

Organisation

Dipl. Ing. Claudia Höhenberger und Larissa Locsmandy
Institut für Managementwissenschaften, Immobilien und Facility Management, TU Wien, Österreich

Vielen Dank an alle KollegInnen des IFM für die Mithilfe bei der Organisation!

Inhaltsverzeichnis / table of contents

Science meets Practice I:

Workplace Management

Flexibility and Wellbeing for Office Performance on the Romanian Market

PhD Sebastian Capotescu (AUT)

Project Director at GreenForest S.R.L. Romania

Abstract

In the contemporary organisations the human resources and the facilities that have are two majors driven forces for performance. In my own PhD research, conducted between 2007 and 2012, I was demonstrated that there are strong relations between the facilities and business performance. In 2018 I started a new research, more focused on the impact of new ways of working on the organisational performance and the relation between them and wellbeing. The main part of the current project is a case study from the Romanian branch of an Austrian Insurance Company where we investigate the possibility to reduce the office space for 340 people keeping the same activities and number of employees but introducing new ways of working. Another research part called "Office Flexibility" has the purpose to evaluate the level of performance and wellbeing of people from Romanian companies that already have introduced new ways of working as flex / home office and coworking plus the general awareness for this topic. Office Flexibility research is based on an electronic questionnaire that was applied to a number of 94 office workers. Both elements of the research show that Romanian office workers know well concepts of the New Ways of Working and they consider that are suitable solutions to improve the level of personal wellbeing and the level of organizational performance.

Keywords: workplace, flex office, wellbeing, office performance

1. About Office Performance and Facilities

Office facilities spaces include material resources and services that employees need to carry on their activity. This category includes office furniture, office equipment, electrical infrastructure, IT&C, Systems, security, HVAC systems, lightning systems, etc.

A definition of Facility Management I developed in my own PhD research "The Influence of Facilities on the Office Performance" conducted between 2007 and 2012, in order to highlight the relations between facilities and performance. My definition is:

"Facility Management is the integration of design and maintaining activities of buildings, workspaces and workplaces as well as other support services in order to achieve a maximum ratio between organizational and individual performance on the one side and the costs of initial investment and operating costs on the other side".

Examples of support services are: communications systems, security systems, maintenance services, catering services, cleaning services. All these services need to be developed, improved, maintained and updated throughout the entire life of the building.

The main model of my PhD research "The Influence of Facilities on the Office Performance" is developed from the basic model "balanced scorecard" [BSC]. The BSC model offers a general overview about the global performance of any business or organisation and it is focused on managing the implementation of the strategy and operational activities with a mix of financial and non-financial data items organised in four main directions: financial, customer, internal business processes plus learning and growth of people.

Acording with Norton and Kaplan the BSC elements are available for any kind of business or organisations from anywhere but in the contemporary society a business or organisation that starts to have a certain level of complexity and number of people in order to run need to have a frame where we can consider two polar elements: Information Technology and Communication [IT&C] infrastructure – hardware and software, on the one hand, and the space facilities - building, workspaces, workplaces (fit out, furniture, ambient), on the other hand. This main model developed and called "The Influence of Facilities on the Office Performance" [IFOP] in the PhD research work as an electric motor. The BSC elements are the moving part – rotor and the IT&C and space facilities elements is the basic magnet field pole – stator, Fig 1.

Fig. 1: "The Influence of Facilities on the Office Performance" [IFOP] model

The topics of IFOP model development are the space facilities (fit out, furniture, ambient) where three important categories are to be considered: buildings, workspaces and workplaces.

A. For the **building** analyse we have to consider the following elements: building classification, lighting and electro faculties, security facilities, location, HVAC.
B. The **workspace** elements considered in the IFOP model are: number of employees per square meter; types of office spaces, furniture and interior design quality, price per square meter of space, initial and recurrent costs of facilities.
C. The **workplace** elements are: type of workplaces (personal, rotated work places – flex office, mobile and non-territorial workplaces, but can be also a classification between operative, executive and managerial workplaces), chairs quality, desk quality, storage facilities.

2. Flexibility and Wellbeing for Office Performance research methodology

In the current research "Flexibility and Wellbeing for Office Performance on the Romanian Market" [FWOP] I have the purpose to evaluate the impact of flex and home office on the organisational performance and the relation between flex / home office / coworking and wellbeing in the companies on the Romanian market. The main part of the current project is a case study from the Romanian branch of an Austrian Insurance Company [RBAIC] where we investigate the possibility to reduce the office space for 340 people with approx. 20%, keeping the same activities and number of employees but introducing new ways of working as flex and home office. The frame time for this study was between March and July 2018. Another research

part called “Office Flexibility” has the purpose to evaluate the level of performance and wellbeing of people from Romanian companies that already have introduced new ways of working as flex / home office and coworking plus the general awareness for this topic. This part is based on an electronic questionnaire that is applied to the GreenForest clients and partners on one side and in the network of ROFMA (Romanian Facility Management Association) members on the other side. The data was collected between 26 June 2018 and 7 July 2018.

2.1. Methodology of *RBAIC* case study

Parallel with the evaluation of the space efficiency I analysed, with the beneficiary, the opportunity to introduce new ways of working as flex and home office in order to improve the quality of life for employee and them personnel wellbeing on the one hand and to improve the global performance of the company on the other hand.

The case study had the following steps:

A. Methodology preparation and beneficiary primary dates evaluation
B. Beneficiary project team communication and the methodology finalisation
C. Interviews with a number of 35 employee from different departments
D. Data processing and report writing

The case study was based on space, process and people analysis. For the process analysis I applied the Porter’s Value Chain Model, Fig. 2. The process analyse was an important input also for the space planning.

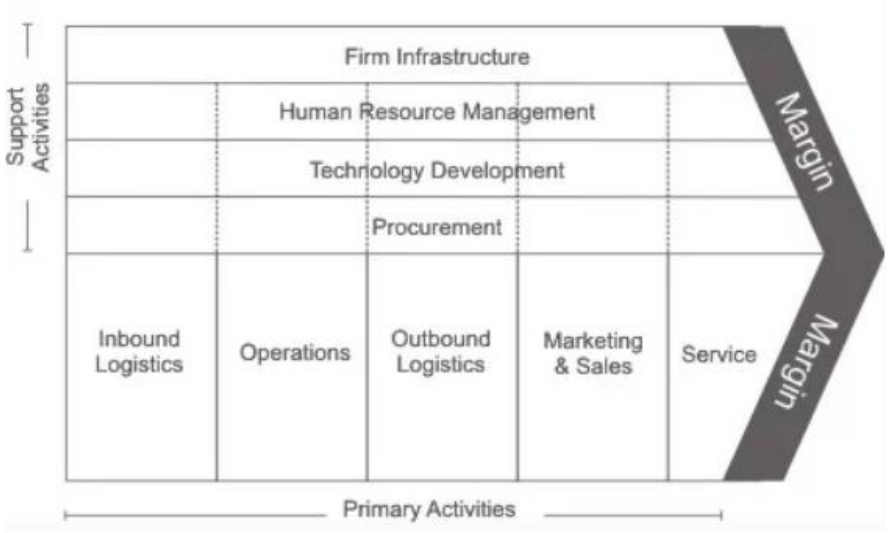

Fig. 2: Porter’s Value Chain Model

The people analysis was based on individual interviews and interviews with 2, 3 or 4 people at the same time. People got an invitation by e-mail where the name of project "Flexibility and wellbeing for the *RBAIC* community", the purpose "to evaluate the opportunity of introducing new ways of working as flex office and partial home office" and the interview main topics mentioned. I used a guided interview developed from the „Hygiene factors and motivators" model, author Lister, Kate; Harnish Tom (2016) "Work on the move 2: Well-being in the workplace" IFMA Foundation and published also in the ISS 2020 Vision - Future of Work, Workforce and Workplace - Capstone White Book, Fig. 3.

Records made during of interviews had the following topics:

- A general overview to understand what wellbeing at work means to them
- Evaluation of RBAIC's people perception of workplace ergonomics, temperature, lighting, noise, privacy, healthy, safety, food facilities and life / work balance
- Process evaluation as input, transformations and output
- Communication methods as direct meetings, phone conversations, call and video conferences
- Key Performance indicators [KPI] relevance and adequacy for "work from home"
- People learning and growth perspective, collaboration and level of self accomplishment
- Feedback for partial "work from home" and flexible / non-territorial workplaces potential implementation

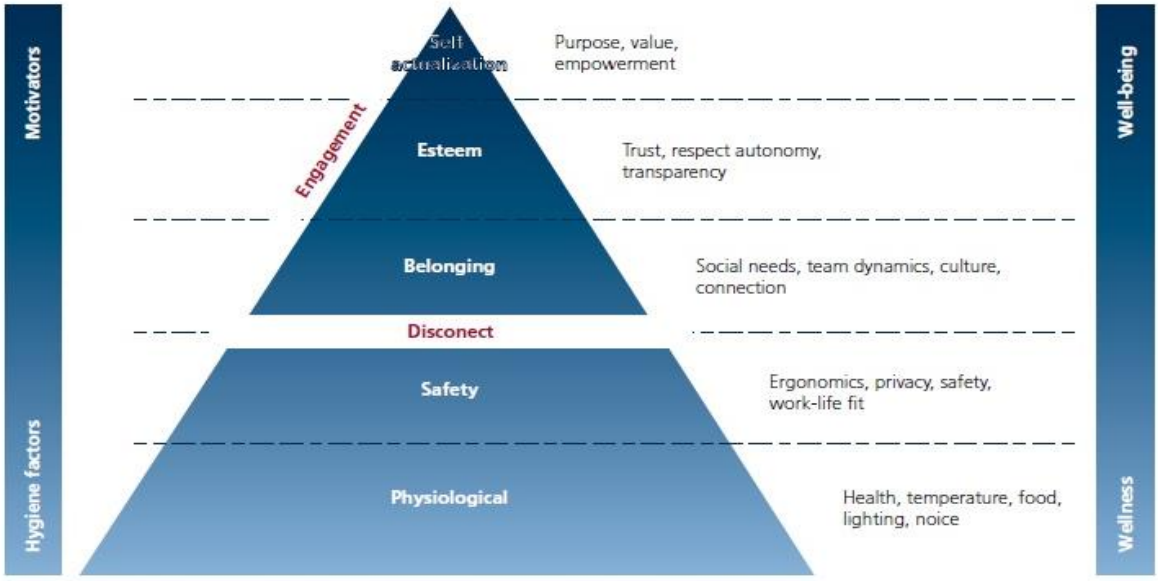

Fig. 3: Hygiene factors and motivators. Source: "Work on the move 2: Well-being in the workplace" (2016) and „ISS 2020 Vision - Future of Work, Workforce and Workplace - Capstone White Book" (2017)

2.2. Methodology of "Office Flexibility" research

The electronic questionnaire was applied to 94 persons from a relevant target group consisting of employees from multinationals companies that have or not implemented "new ways of working" [NWW] but also different kind of owners or employees of SME's or people that are using coworking spaces. The questioner had a few closed questions about the NWW experience but also opinions about the NWW personal suitability or organisational suitability and also an open question about personal NWW meaning. Four types of NWW where addresed in this research as following: partial home office [PHO], total home office [THO], flex office [FO] and coworking [CW]. PHO I define the jobs that are make a part of time from the employer's office space and a part of time from home. THO meaning to do almost all job from home. FO means in this research means nonpersonal or non-territorial work stations, or hot desks – shared desks concept combined with collaborative, informal office spaces or focus room areas. CW means working in a rented workplace as a freelancer or a small business and sharing more office facilities with the rest of people that have rented workplaces in the same conditions.

3. *RBAIC* case study

The final objectives established with the client for the RBAIC project was:

- Space transformations for RBAIC office community enhancement
- Improving the office facilities due to of creation of special spaces for collaborative tasks and focused tasks
- Improving the internal mobility and spontaneous communication trough introducing flexible / non-territorial work places
- A better life / work balance through "partial work from home" concept implementation
- To improve the space efficiency due to of space reduction with 1 level from total of 6 levels in the RBAIC head office

The case study has 3 major components: interviews, internal process overview and space planning recommendations.

3.1. Audit interviews

3.1.1. Workplace wellbeing perception

The introduction open question in the topic of interview was about the general perception of wellbeing at the office. I asked what is the first thought about workplace wellbeing trying to ignore the current project. I grouped the answers in 6 important items: flexible and home office;

quiet, focus and concentration; collaborative and psychosocial environment; space and ergonomics topics; tasks orientation issues; other organizational programs.

No.	Answer content	No. of answers
1	Work from home - partial	4
2	Work-life balance	3
3	Flexible work schedule and home office for a better focus	2
4	Difficult to implement home office for my own activity	2
5	Freedom of choice regarding of place for work	1
6	Reduction of traffic time	1
7	Wellbeing and space ok at RBAIC, open for new ways of work	1
Total no. of answers		**14**

Tab. 1: Flexible and home office answers associated with workplace wellbeing

From the beginning the RBAIC's people was very interested, open and in general very positive about flex & home office.

No.	Answer content	No. of answers
1	Focus and concentration environment without other perturbations	5
2	Quiet area	3
3	Missing of crowding	2
4	Missing of noise	2
Total no. of answers		**12**

Tab. 2: Quiet, focus and concentration answers associated with workplace wellbeing

In general the quiet, focus and concentration answers were connected with flex and partial home office. The partial home office was considered a solution for focus and concentration issues.

No.	Answer content	No. of answers
1	Positive work environment with accent on psychosocial factors	5
2	Team work	3
3	Collaborative and positive environment	3
4	Motivated team	1
Total no. of answers		**12**

Tab. 4: Space and ergonomics topics answers associated with workplace wellbeing

No.	Answer content	No. of answers
1	Comfort	2
2	Relaxing and gaming area	2
3	Green area	1
4	My private space, total against of flex and home work	1
Total no. of answers		**6**

Workplace ergonomics as chair and table was appreciate as suitable but it was revealed that more of 50% of the RBAIC's employees doesn't use the chairs facilities for dynamic seating.

Tab. 5: Tasks orientation issues answers associated with workplace wellbeing

No.	Answer content	No. of answers
1	Happiness of work in all tasks	1
2	Quality of services from internal and external suppliers, how quick and good they do the tasks	1
3	Reduction of routine	1
Total no. of answers		**3**

Tab. 6: Other organizational programs answers associated with workplace wellbeing

No.	Answer content	No. of answers
1	Healthy programs	1
2	Office massage	1
Total no. of answers		**2**

Tab. 7: Collaborative and psychosocial environment answers associated with workplace wellbeing

3.1.2. Workplace wellbeing of RBAIC's people evaluation

When I asked details about the particular wellbeing RBAIC's factors the highest numbers of complains was about work-life balance with accent on time for come and leave from work and lack of focus – a concentration condition that has consequence also in work-life balance. Many employees mentioned that they have to work from home in the private time in order to do tasks where they need concentration. Other important mentions was that there is not enough private space, food facilities, air conditioning, heating and cooling, poor intimacy, security tasks with inadequate open space workplace.

3.1.3. People learning and growth

Trainings for personal development plus sport and artistic programs cover the needs of those interviewed. Regarding of professional and specialized training people from few departments expressed that they need more specialized courses. The only one area where I discover that are problems of career planning and employee retention is Purchasing and Support Services, including the people from the reception.

3.1.4. Collaboration and level of self accomplishment

The most important complain regarding of collaboration provided by almost all interviewed people was the number and time consuming of formal meeting the current situation of space is not enough formal meetings rooms. It is a good level of cohesion and integration of the new people inside of teams / departments but there is poor relation with other people from organization. All interviewed people apparently are self-accomplished with there jobs. Nine of them affirm that certainly even if they will have all material need covered for live they would do the same job as volunteer for free.

3.1.5. Feedback for partial home office and flexible workplaces

The general feedback for partial home office and flexible workplaces was positive and actually there is a high expectation feedback sentences as “finally we have a discussion in RBAIC about this topic”. Many of the interviewed people worked in the past from home, or they have family members with home office or friends and they have a good opinion for partial home office but negative for total home office.

A large majority of the interviewed people, 24 people - 68%, considered as a positive factor for their jobs and teams to introduce work from home two days per week and 4 people – 11%, one day per week. In the same time they were open to the idea to have flexible, non-territorial workplaces.

Three interviewed people mentioned that they have to keep the closed office and not shared for security reasons, or they should to keep a departmental area even if it is open. Some fears available desks shortage, or be distracted home by their own children under the age of 5.

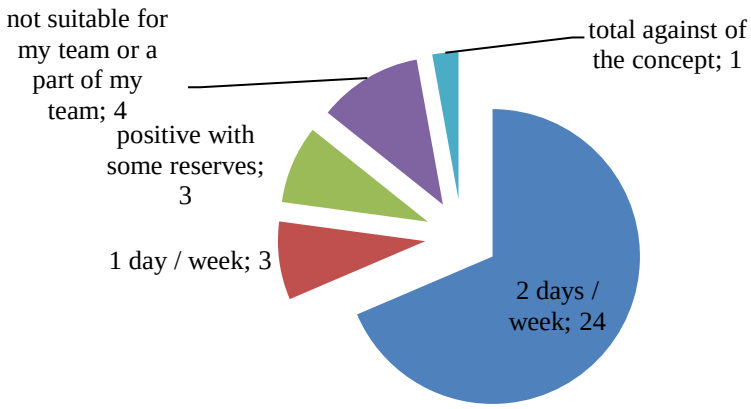

Fig. 4: Feedback for partial home office and flexible workplaces

The partial home office and flexible workplaces was considered not suitable by the interviewed people for 4 compartments that represent less of 20% from the total number of workplaces.

One single person from those interviewed people was total against of the home & flex office because for him, in particular, it is very important to have a private space with printed documents even if are not necessary to be print as working procedures. Also for him it is very important to have the possibility to communicate spontaneous with every one of his collaborators in any moment. He also mentioned that this is only the first step to cut finally RBAIC a half from the office space.

3.2. RBAIC's process overview

For the general analyze of RBAIC's process I applied Porter's Value Chain Model to the RBAIC organizational structure in order to build a general view and flow for RBAIC main process. The result was a custom RBAIC process map based in interviews where a large time was allocated to analyze the job descriptions and process managed by the interviewed people.

3.3. Space planning considerations

Main proposal is to create of a new type of space "office community plaza" at the grand floor. Here should be the most active space from the RBAIC organization with the following functions:

- to be the most important nodal point of direct communication from RBAIC, where the employees has opportunity to interact spontaneously between them and with RBAIC partners
- to be a type of space that accelerate the creativity, innovations and new ideas and in the same time has a RBAIC community enhancement
- to be a space that can accommodate the people that has days of home office but they prefer to be in the organization or they have tasks that require them physic presence at the RBAIC head office
- to be a space where more flexible and relaxed meetings can be done in order to reduce the frequency of the formal meetings from the present.

Fig. 5: GreenForest's proposal for RBAIC's office community area

In order to solve the concentration and focus complains I recommend creating a few areas with library rules. This means that in this closed spaces people don't talk between them or by phone.

In the space planning recommendations I used as main indicator "desk allocation rate" that is the ratio between the number of desks and the number of employees. In the regular open space I propose groups of 6 desks plus a supplementary one perpendicular on the traffic flow that has not an ergonomic position but can be used as reserve desk. For this reason I didn't calculate them as basic desks.

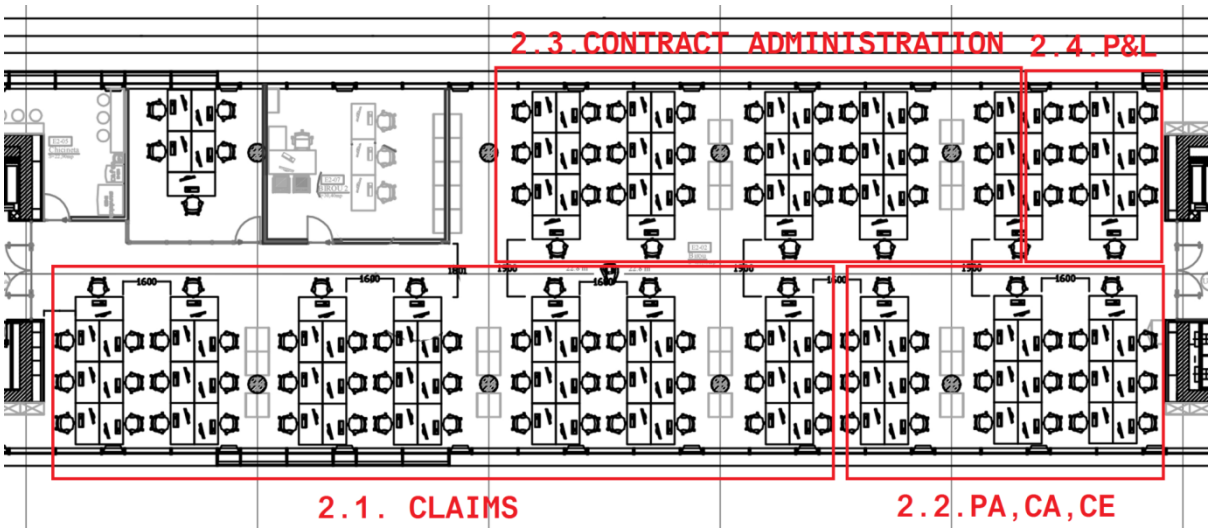

Fig. 6: RBAIC space planing proposal

3.4. Recommendations made for RBAIC

In the RBAIC Romania head office it is a high positive expectation regarding of partial home office & flex office implementations. In the same time it is a high potential of improvement for the collaborative facilities plus focus and concentration facilities with high impact on creativity, innovation, productivity and general people wellbeing.

The space efficiency objective is a sensitive and critical point for employees but in the same time if it is managed well can be transformed in a good organizational changing opportunity. This was the idea from the start and if it will be continued in the spirit of the project recommendations can have a high impact in order to improve the people global performance and their wellbeing.

The main recommendations are:

- To introduce partial home office 1 day / week in the majority of directions and departments from RBAIC with desk allocation rate by 80%. Even if the majority of department's managers consider that home office can be 2 days / week it is better to have a longer transition time with 1 day / week.
- To make sense in terms of space efficiency the partial home office should be combined with flex office, respectively non-territorial and non-personal workplaces. In general this is a critical point in terms of organizational changes but interviewed people were very open and they understood well the concept.

- To create “The Office Community Plaza” at ground floor as nodal point of direct communication from RBAIC, where the employees have opportunity to interact spontaneously between them and with RBAIC partners. Other functions are to accommodate people that have days of home office but they should to be in the organization and to be a space where can be done more flexible and relaxed meetings. Here it is an area that should to accelerate creativity, innovations and new ideas and in the same time to make a RBAIC community enhancement.
- To make a few areas with library rules in order to solve the concentration and focus complains. This means that in this space people don’t talk between them or by phone.

4. Office Flexibility research part

4.1. Profile of respondents

From the age point of view the higher number of respondents had the age between 25 and 35 years old (– 42%) follow by the age group between 35-50 years old (– 37%).

Regarding the structure of the respondents we consider 2 important jobs category, operative and executive. Executive are considered any persons that have the responsibility and authority to make decisions on how to achieve the organization's goals, not necessary correlate with team coordination. The number of respondents was quite well balanced, operative 46% respondents and executive 48%. From the team coordination activities point of view 30% of respondents coordinate teams with more than 3 people. From an entrepreneurial point of view 9% of respondents are owners of a business with more than 3 employees and 16% of respondents are self-employed or owner of a business with a maximum of 3 employees.

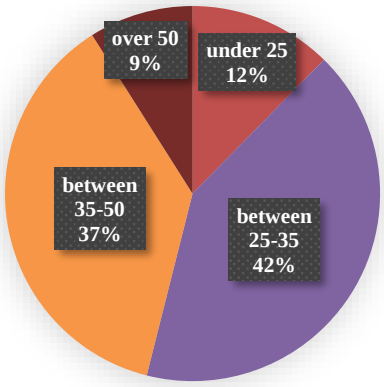

Fig. 7: Age structure of the Flexibility Research respondents

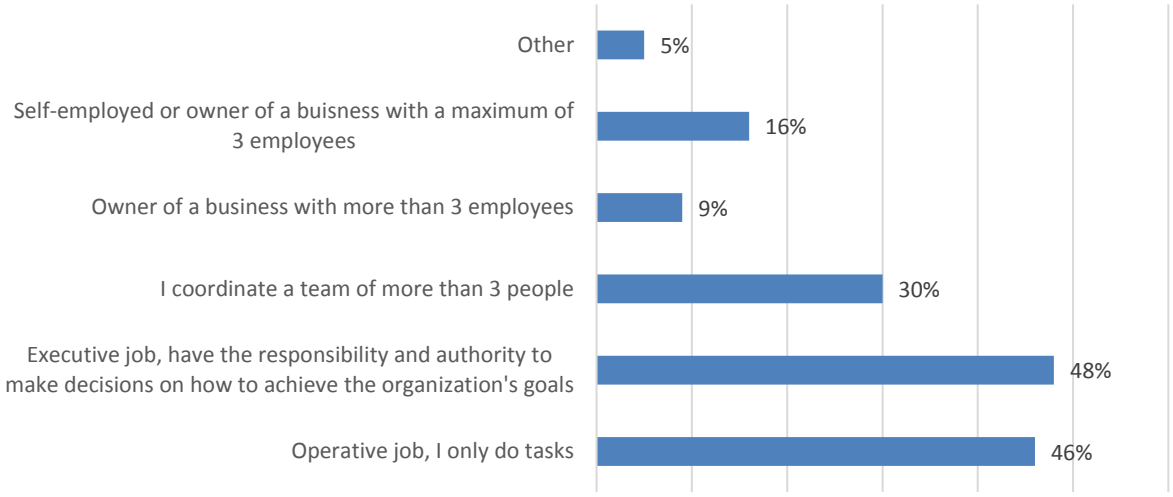

Fig. 8: Activities structure of the Office Flexibility Research respondents

4.2. NWW experiences

First topic of the research was about NWW experience. First observation it is that majority of the respondents know the concepts from this research. PHO and FO are frequently used by respondents or other family members, 41% from respondents work now with PHO, 23% with FO and 22% with CO. This means that those opinions are very relevant about the suitability of NWW.

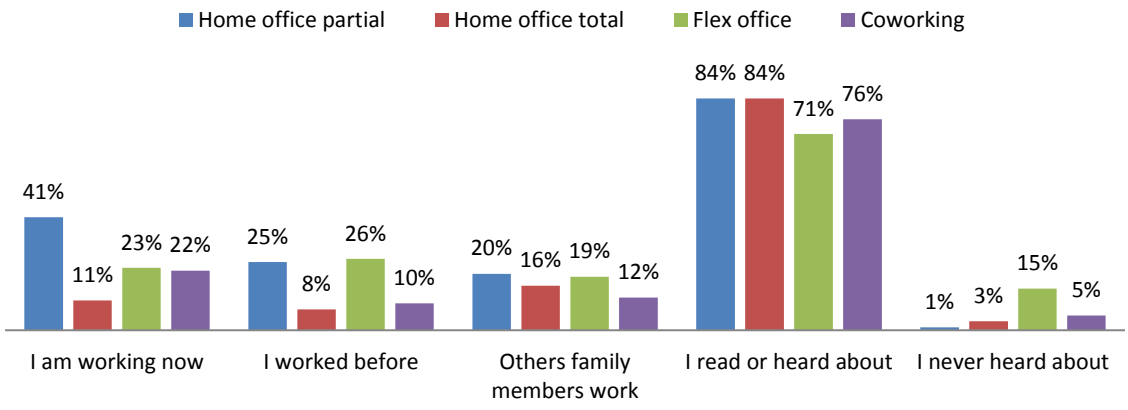

Fig. 9: NWW respondents experiences from the Office Flexibility Research

4.3. Suitability of NWW for respondents from the personal perspective

The level of acceptance for NWW it is very high at least in the respondents group. Only THO show a quite high percentage of answers that consider it as not suitable – 45%.

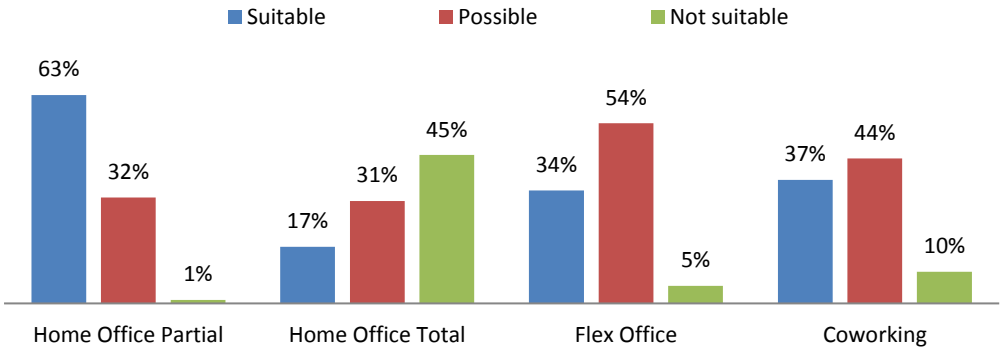

Fig.10: Suitability of NWW for Office Flexibility research respondents from the personal perspective

4.4. Suitability of NWW for the employer organization from the respondents perspective

The opinions about suitability from the employers' perspective are quite close, but a little bit lower as percentage, there may be some reservations about the suitability of NWW for all employees.

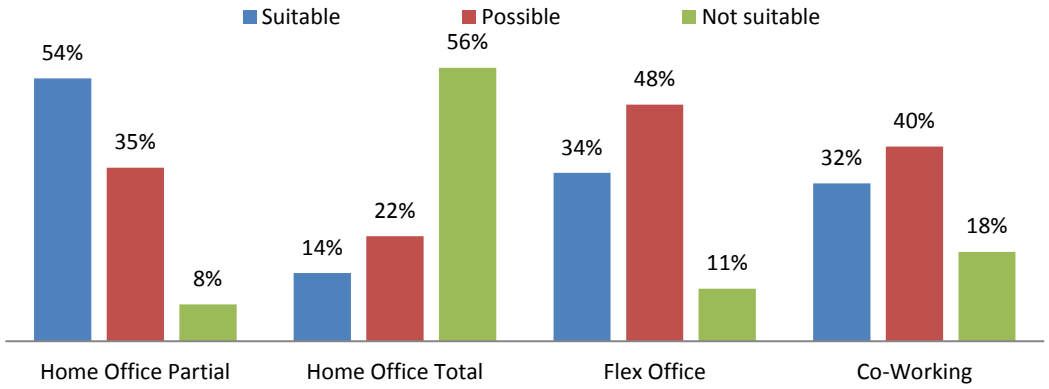

Fig.11: Suitability of NWW for the employer organization from the respondent's perspective

4.5. NWW personal meaning

In this topic the only open question was used. POH way of work has the most of the answers, 82 from 94. Most of them had a correct definition for the PHO, but in some answers there were also personal opinions about the advantages of this way of work, such as: flexibility to do task in the suitable personal time and flexibility to manage easier other personal activities; better focus and confidentiality; better efficiency following of the home comfort; time reduction with moving between home and firm office, cost reduction, benefits from home work and team work in the company; more family time and better work – life balance; an opportunity to take out

from the daily routine; possibility to manage better the personal trips and work tasks. An only one negative remark was that POH mean an opportunity to don't work nothing or almost nothing for the employer.

THO had 77 answers, most of them definitions for this concept, but also advantages, as mentioned at PHO, that were valid here, too. The difference was that here there were also many notices regarding the main well known weaknesses of this work way, such as: social isolation; captive in the house; team missing connection; poor connection with the culture and company values. Here were two mentions regarding of TOH as an opportunity to don't work nothing or almost nothing for the employer.

FO had 73 answers, again most of them were correct definitions, but also personal remarks of the advantages mentioned to the home office work, plus specific advantages, such as: better facilities for a specific task, different environments that encourage creativity and have a positive wellbeing contribution. There were mentioned also some specific FO weaknesses, such as: the risk of not finding a workplace when you need it and the lack of privacy and space personalization.

CW had 71 answers, most of them correct definitions, plus personal remarks about some strengths of this method, such as: share more knowledge and resources; better social and professional relations; an opportunity to meet new people; an opportunity to be part of a community; an opportunity to be connected in a social, professional and knowledge network; changing ideas with others; group energizing; a changing opportunity, but also some weaknesses, in general the same ideas as for FO, plus the renting cost issue.

5. Conclusion

In Romania there is a good level of knowledge and positive expectations regarding the "New ways of working". Even though the weaknesses of these new ways of working are well known by the people that are working this ways or only heard or read about them, they consider tham suitable solutions to improve the level of personal wellbeing and, at the same time, the level of organizational performance.

References

Alexander, K. (1996): *Facilities Management: Theory and Prcatice*, London, E & FN Spon

Bogathy, Z. (2002): *Introducere în Psihologia Muncii*, Timisoara, Universitatea de Vest

Capotescu, S. (2012): *Influenta facilitatilor asupra performantelor in spatiile destinate birourilor*, Timisoara, Editura Politehnica

Draghici, A. (2005): *Ergonomie*, Timisoara, Editura Politehnic

Dumitrescu, C., Pugna, A., Capotescu, S. (2008): *Ingineria si asigurarea calității*, Timisoara,

Editura Politehnica

Grifka, J., Peters, T. (2007): *Quality Criteria for Office Workplaces*, Berlin, Deutsches Buromobel Forum

Hanson, D., Fried, J. (2011): *ReWork*, București, Editura Publica

Kaplan, R., Norton, D. (1996): *The Balanced Scorecard*, Harvard, Harvard Business Review Press

Lister, K., Harnish, T. (2016) *Work on the move 2: Well-being in the workplace*, Houston, IFMA Foundation

Neufert, E., Neufert, P., (1999): *Arhitects' Data*, Oxford, Edited by Oxford Brookes University

Spath, D., Kern, P. (2003): *Office 21 – Push for the Future, Better performance in innovative working enviroments*, Stuttgart, Fraunhofer-Institut fur Arbeitswirtschaft und Organisation IAO

Facility Management Strategien in Spitälern - eine aktuelle Übersicht

Franziska C. Honegger, Nicol Kosik, Prof. Dr. Susanne Hofer

Zürcher Hochschule für Angewandte Wissenschaften, Institut für Facility Management, Wädenswil, Schweiz

Abstract

The meaning and benefit of a corporate strategy is undisputed. Literature offers a lot of material. In practice, varieties of strategy formulations are in place, in hospitals. There has been no earlier overview of FM strategies followed by Swiss hospitals. This paper is about the research being applied to describe the current use of FM-strategies in Swiss acute hospitals. Based on theory about corporate strategy, health care and facility management, a quantitative online survey addressed to FM leaders (C-level) was compiled. One third of the hospitals do not have a clearly defined FM-strategy. With regard to the total number of Swiss hospitals, it can be assumed that this number is much larger. Additionally, it was determined for which FM areas strategies were formulated and which contents they cover. The research led to an initial systematic overview of how Swiss hospitals use FM-strategies. This overview should encourage hospitals to develop their own FM strategies and refine them. Although this research relates to Switzerland, it can be assumed that numerous results also apply to other countries.

Keywords: Facility Management, Krankenhaus, Strategie, Health Care, Gesundheitswesen

1. Einleitung

Spitäler (Krankenhäuser) stehen heute vor grossen und vielfältigen Herausforderungen. Die Lebenserwartung der Bevölkerung steigt weiterhin an und die Anzahl der chronischen Krankheiten nimmt zu (Oggier, 2015). Diese Entwicklung stellt nicht nur für die Menschen, sondern auch für das Gesundheitswesen eine wachsende Belastung dar. Neben dem Hauptauftrag, die Gesundheit der Menschen zu erhalten, wiederherzustellen oder zu bessern, müssen die Spitäler diverse wirtschaftliche Ziele verfolgen und erreichen (Tecklenburg, 2013). Berger et al. (2015) erläutern, dass das Spitalwesen in der Zwischenzeit stark in Bewegung geraten ist. So werden mittlerweile immer mehr öffentliche Spitäler rechtlich selbständig. Aus diesem Grund steigt auch die Bedeutung der unternehmerischen Flexibilität im Hinblick auf die Wettbewerbsfähigkeit und die damit verbundene strategische Ausrichtung. Zum Thema Unternehmensstrategie gibt es viel wissenschaftliche und populärwissenschaftliche Literatur. In der Praxis trifft man verschiedenste Arten von Strategieformulierungen an, welche nur selten öffentlich publiziert sind.

Dieser Artikel basiert auf einer Bachelorarbeit. Vor dieser Arbeit existierte keine Übersicht über angewendete Strategien des Facility Managements (FM) in Schweizer Spitälern. Diese Lücke griff die Arbeit auf und mittels Beantwortung der gestellten Fragestellung wurde eine kommentierte Übersicht zum Thema FM-Strategien in Deutschschweizer Allgemeinspitälern erstellt.

Hauptfragestellung: Verfügen Spitäler über eine eindeutig definierte FM-Strategie?
Unterfragen zwecks Operationalisierung der Hauptfrage:
- Für welche FM-Bereiche werden Strategien formuliert?
- Welche Inhalte decken die FM-Strategien ab?
- Ist eine Kongruenz mit der übergreifenden Unternehmensstrategie erkennbar?

2. Hintergrund

Für diese Arbeit sind zwei Hintergrundthemen wichtig: Unternehmensstrategie und dessen Implikationen auf Facility Management Strategien, sowie Herausforderungen von Schweizer Spitäler als Teil des Gesundheitswesens. Nachfolgend sind die Kernelemente daraus erläutert.

2.1. Unternehmensstrategie - Allgemein

In der Managementliteratur gehört der Begriff *Strategie* zu den beliebtesten Wörtern (Tecklenburg, 2013). Lombriser & Abplanalp, 2010 bezeichnen ihn gar als *modisch*. Oft werden Dinge, die als wichtig oder langfristig erachtet werden, als strategisch bezeichnet

(Lombriser & Abplanalp, 2010). Dieselben Autoren halten auch fest, dass sich eine einheitliche Definition des Begriffes Strategie bis heute weder in der Theorie, noch in der Praxis durchsetzen konnte. So definiert Chandler, als ein Repräsentant von reichhaltiger Literatur zum Thema Unternehmensstrategie, (1962, S. 5) die Strategie als eine Festlegung von langfristigen Zielen einer Unternehmung. Für Rasche und Wolfrum (1994, S. 15) legt eine Strategie die Entwicklungsrichtung einer Unternehmung fest; sie trägt zur Integration von Geschäfts- und Funktionsbereichen bei und ordnet die Ressourcen zu. Diese beiden Aspekte gehören zum traditionellen Ansatz der Strategie, lassen sich auch in den meisten neuen Strategie-Definitionen finden (Lombriser & Abplanalp, 2010). Trotz dieser fehlenden Definition lässt sich mit dem traditionellen Ansatz der Theorie Arbeiten. Dieser besagt, dass die Strategie eine langfristige, bewusst geplante Entwicklung der Organisation ermöglicht (Probst & Wiedemann, 2013). Sie gibt eine allgemeine Stossrichtung an und setzt Leitplanken für den Handlungsspielraum (Lombriser & Abplanalp, 2010). Um die gesteckten Ziele des Unternehmens zu erreichen, wird die Strategie anhand von Aktivitäten konkretisiert (Probst & Wiedemann, 2013). Im Vordergrund des traditionellen Ansatzes steht nicht der Inhalt der Strategie, sondern die Frage, wie man zur Strategie kommt (Lombriser & Abplanalp, 2010). Der traditionelle Ansatz ist folglich mit der Definition im St. Galler Management-Modell vergleichbar.

Trotz der Breite des Strategiebegriffs lassen sich gemäss Corsten & Corsten (2012) in den unterschiedlichen Definitionen drei Gemeinsamkeiten in Bezug auf die Bedeutung der Strategie finden: „Relevanz (inhaltliche Betonung des Wichtigen)“ (S. 3); „Vereinfachung (methodische Beschränkung auf das Wesentliche)“ (S. 3); „Proaktivität (Streben nach Frühzeitigkeit in Plan und Aktion)“ (S. 3). Die verschiedenen Ansätze und Definitionen erscheinen in der Praxis meist nicht in Reinform, sondern ergänzen sich gegenseitig (Probst & Wiedemann, 2013). Zentral für das Strategieverständnis ist jedoch das Verhältnis zwischen dem Unternehmen und seiner Umwelt (Corsten & Corsten, 2012).

Damit ein Unternehmen langfristig ökonomisch lebensfähig ist und den Anspruchsgruppen effizient einen Nutzen erbringen kann, sind gemäss Rüegg-Stürm (2002) drei Leistungen des Unternehmens notwendig. Neben den Strukturen des Unternehmens, die sich mit dem WIE und dem „Dinge richtig tun“ (S. 37) beschäftigen und dem gemeinsamen Sinnhorizont und der Kultur, die sich mit dem WARUM und WOZU des Unternehmens beschäftigen, steht die Strategie. Das Unternehmen muss zunächst ein strategisches Orientierungswissen erarbeiten, damit es seine Aktivitäten auf die erfolgsentscheidenden Aspekte ausrichten kann. Einfach

gesagt geht es um das WAS und darum, „die richtigen Dinge zu tun“ (Rüegg-Stürm, 2002, S. 37). Die Strategie fungiert als Ausrichtungsfunktion und bildet die Grundlage des tragfähigen Orientierungswissen des Unternehmens (Rüegg-Stürm, 2002). Diese drei Leistungen eines Unternehmens werden im neuen St. Galler Management-Modell auch als die Ordnungsmomente eines Unternehmens zusammengefasst (Rüegg-Stürm, 2002).

Es geht bei der Erarbeitung der Strategie um den langfristigen Erfolg eines Unternehmens (Rüegg-Stürm, 2002). Dabei steht der Erfolg in drei, fünf oder zehn Jahren im Fokus (Rüegg-Stürm, 2002). Unter Berücksichtigung sämtlicher Bedürfnisse und Interessen der betroffenen und beteiligten Anspruchsgruppen wird die Strategie in einem komplexen Aushandlungs- und Entscheidungsprozess erarbeitet (Rüegg-Stürm, 2002). Dabei sollte die Strategie mindestens zu den fünf Themenfeldern Auskunft geben, die in der nachfolgenden Abbildung 1 ersichtlich sind (Rüegg-Stürm, 2002).

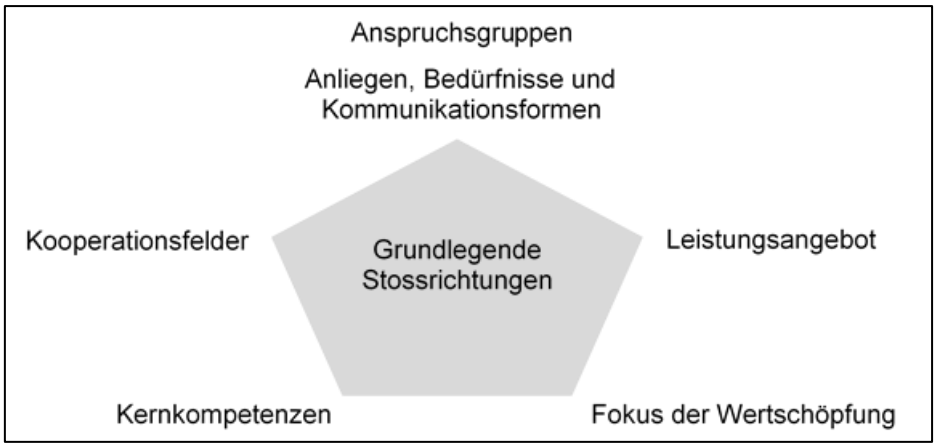

Abbildung 1: Inhaltliche Fragestellungen einer Strategie (in Anlehnung an Rüegg-Stürm, 2002)

Aus der Bearbeitung dieser fünf Themenfelder und der daraus abgeleiteten Festlegung von Zielen ergibt sich die angestrebte strategische Erfolgsposition, die es dem Unternehmen ermöglicht, langfristige Wettbewerbsvorteile im Vergleich zu den anderen Wettbewerbern zu erzielen (Rüegg-Stürm, 2002).

2.2. Strategien im Facility Management

Gemäss der ISO Norm 41011:2018 für Facility Management (ISO, 2018) erreicht ein Unternehmen seine strategischen Ziele durch seine Hauptaktivitäten, welche durch verschiedene äussere Einflüsse beeinflusst werden. Die Unterstützungsprozesse haben dabei direkten Einfluss auf die Hauptaktivitäten des Unternehmens und dessen Effizienz und Effektivität (ISO, 2018). Damit das Facility Management die vereinbarten Unterstützungsleistungen koordinieren kann, ist ein ganzheitliches Management mit einer

strategischen, taktischen und operativen Ebene notwendig. Dabei dient die strategische Ebene zur langfristigen Erreichung der Unternehmensziele, die taktische Ebene zur mittelfristigen Umsetzung der strategischen Ziele und die operative Ebene zur Schaffung des erforderlichen Umfelds für die Nutzer. Das Facility Management führt auf zwei Ebenen (IFMA Schweiz, ohne Datum): Einerseits sind es die Mitarbeitenden und die Dienstleister, anderseits beeinflussen Facility Manager die Entscheidungen und Haltungen der Anspruchsgruppen des Kerngeschäfts. Um die Führung auf beiden Ebenen erfolgreich zu meistern, ist die Entwicklung und Umsetzung von Strategien notwendig (IFMA Schweiz, ohne Datum). Braun (2013) erläutert, dass die meisten Unternehmen die strategische Ausrichtung des Facility Managements vernachlässigen, obwohl diese eine wesentliche Rolle spielt. Denn das Facility Management formuliert Strategien und Massnahmen, die in erster Linie zur Unternehmenssteuerung und Kostensenkung führen. Aufgrund der Dynamik und der Vielseitigkeit im Facility Management sei es gemäss Braun (2013) jedoch schwierig, Strategien zu formulieren. Entscheidend für die Strategieformulierung sieht Braun (2013) das Kerngeschäft und die Ermittlung der für das Kerngeschäft relevanten FM-Leistungen. Solche Leistungen können beispielsweise die Reinigung oder der Unterhalt der technischen Anlagen sein. Für diese Leistungen wird anschliessend entschieden, ob sie intern oder extern erbracht werden und eine entsprechende Strategie formuliert.

Als Grundlage der FM-Strategien beschreibt Hellerforth (2006) die Immobilienstrategie, die jeweils im Kontext zur Unternehmensstrategie formuliert werden sollte. Denn ein auf das Unternehmen abgestimmtes Immobilienmanagement erkennt die Unterstützungsfunktion und beeinflusst die Umsetzung der Unternehmens- und Geschäftsfeldstrategien positiv. Zuerst muss aber die Frage beantwortet werden, für welche Gebäude und welche FM-Leistungen sich das Facility Management anbietet (Hellerforth, 2006). Denn unabhängig vom Zweck und Eigentümer der Immobilie, haben alle Immobilien gemeinsam, dass sie ein breites Spektrum von Leistungen in und um die Immobilie sowie für ihre Nutzer anbieten (Hellerforth, 2006). Hellerforth (2006) führt weiter aus, dass die Unternehmen sich zum Ziel setzen sollten, das Leistungsspektrum in Bezug auf den Lebenszyklus der Immobilie auszurichten und intelligente Lösungen für die FM-Leistungen zu entwickeln. Dabei muss das Unternehmen bei jeder Strategieplanung die bisherigen Leistungen analysieren. Zusätzlich muss der aktuelle Stand betrachtet und die zukünftigen Schritte geplant werden. Anschliessend gilt es zu definieren, welche Leistungen intern erbracht und welche Leistungen outgesourct werden. Diese Entscheidungen sind jeweils von diversen Faktoren wie beispielsweise dem unternehmensinternen Know-how oder den verfügbaren Ressourcen abhängig. Neben der

Immobilien- und In- / Outsourcing-Strategie, kann sich das Facility Management auch mit Instandhaltungsstrategien beschäftigen, diese sind vor allem im Lebenszyklus der Immobilie entscheidend (Hellerforth, 2006). Zusammenfassend lässt sich sagen, dass die Unternehmens- und Immobilienstrategie als Grundlage für die FM-Strategien dienen. Die FM-Strategien sollen sich sowohl am Kerngeschäft als auch am Lebenszyklus der Immobilie orientieren und einen entsprechenden Nutzen in Bezug auf die Unternehmenssteuerung und die Kosten liefern.

2.3. Herausforderungen des Schweizer Spitäler

Spitäler spielen in der Schweiz als Teil des Gesundheitswesens volkswirtschaftlich eine wesentliche Rolle (Berger et al., 2015). Nicht nur, dass die Spitäler rund 4 % der Erwerbstätigen in der Schweiz beschäftigen, sie generieren auch eine Wertschöpfung von 14.9 Mrd. Franken (Berger et al., 2015, S. 393). Dank dem benötigten Bedarf an Waren und Dienstleistungen werden durch die Spitäler weitere etwa 43‘000 Arbeitsplätze sichergestellt (Berger et al., 2015, S. 393). Das Gesundheitswesen ist einem stetigen Wandel ausgesetzt (Berger et al., 2015). Während sich die Anzahl der Spitäler zwischen 1970 und 1982 auf eine Zahl von 460 Spitäler fast verdoppelte, nahm die Anzahl seit 1982 wieder ab und liegt heute bei ca. 288 (Berger et al., 2015, S. 393). Eine Ursache dafür liegt im medizinisch-technischen Fortschritt (H+, 2012). Dieser führt zum einen zu kürzeren Spitalaufenthalten und damit zu überflüssigen Kapazitäten und zum anderen zu höheren Investitionskosten für die Anschaffung der entsprechenden Technik. Folglich haben sich in den letzten Jahren Spitäler zusammengeschlossen, wurden zu Langzeitpflegeinstitutionen umfunktioniert oder gar ganz geschlossen (Berger, et al., 2015). Die öffentlichen Spitäler sind von diesen andauernden Veränderungen stärker betroffen als die Privaten Institutionen (Berger et al., 2015).

3. Methodik

Die Fragestellung wurde mittels quantitativem Erhebungsdesign beantwortet, mit der Methode einer onlinebasierten Umfrage. Die Entwicklung des Erhebungsinstruments (Items des Fragebogens), basiert auf dem theoretischen Hintergrund. Die Stichprobenziehung erfolgte mit Hilfe der Kennzahlenliste der Schweizer Spitäler vom Bundesamt für Gesundheit (BAG, 2017). Es wurden alle Deutschschweizer Allgemeinspitäler ausgewählt. Es handelte sich somit um eine bewusste Stichprobenziehung. Innerhalb dieses Segments wurde eine Vollerhebung gemacht, indem personalisierte Emails zur Umfrageteilnahme an FM Verantwortliche von 73 Spitälern (C-Level) gesendet wurden. Mit 35 Antworten betrug die Rücklaufquote zufriedenstellende 48%. Die Datenauswertung erfolgte deskriptivstatistisch. Freitextantworten wurden thematisch codiert.

4. Resultate & Diskussion

Nachfolgend werden die Kernresultate dieser Arbeit dargestellt und zugleich diskutiert. Dies immer bezogen auf die Rücklaufquote der Umfrage. Abbildung 2 zeigt, dass zwei Drittel der Spitäler über eine schriftliche festgehaltene FM-Strategie verfügen und lediglich ein Drittel keine FM-Strategie formuliert hat.

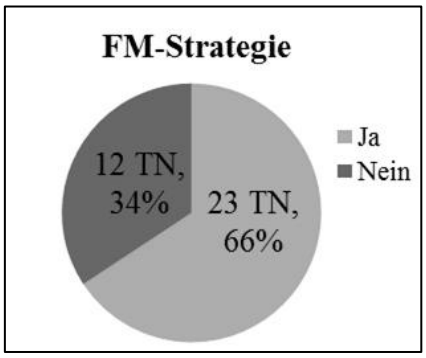

Abbildung 2: Antwort auf die Frage «Verfügen Sie über eine schriftlich definierte FM –Strategie?»

Die angegebenen Gründe, weshalb keine FM-Strategie formuliert ist beinhalten: Wird den Bedürfnissen entsprechend geplant (1x), andere Themen hatten bisher Vorrang (1x), es besteht eine Strategie, die das FM einschliesst (1x), Teilstrategien werden aus der Unternehmensvision und -strategie abgeleitet (1x). Ob das Vorhandensein einer FM-Strategie mit der Spitalgrösse zusammenhängt, lässt sich aus den Resultaten der Abbildung 3 nicht abschliessend beurteilen. So sind die Resultate bei Spitälern mit weniger als 250 Betten verfügen nicht ausschlagend.

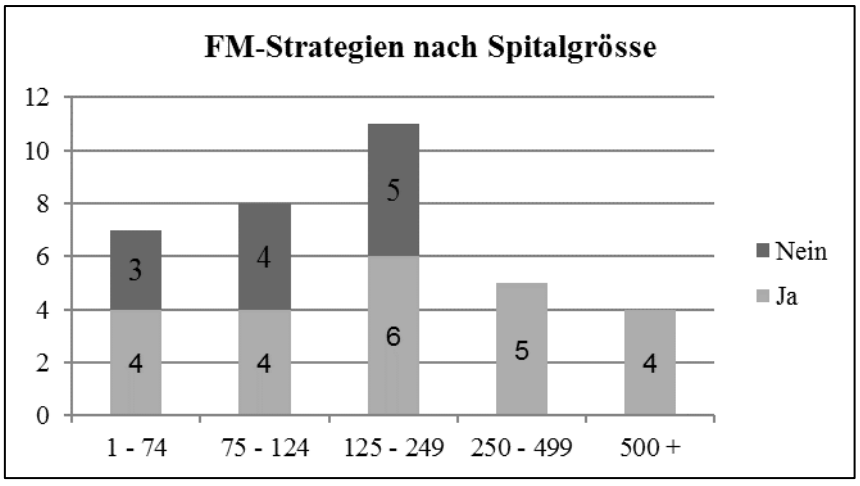

Abbildung 3: FM-Strategien nach Spitalgrösse

Die Spitäler, die angegeben haben, dass sie keine FM-Strategie haben, wurden gefragt, ob sie in der übergreifenden Unternehmensstrategie etwas zum Thema Facility Management festgehalten haben. Das Ergebnis zeigt Abbildung 4. Daraus lässt sich ableiten, dass sich lediglich drei weitere Spitäler mit dem Facility Management auf strategischer Ebene befassen.

Daraus folgt, dass neun Spitäler keine FM-Strategie und auch keine strategischen Leitsätze in der Unternehmensstrategie formuliert haben. Dies entspricht fast 26% aller teilnehmenden Spitäler.

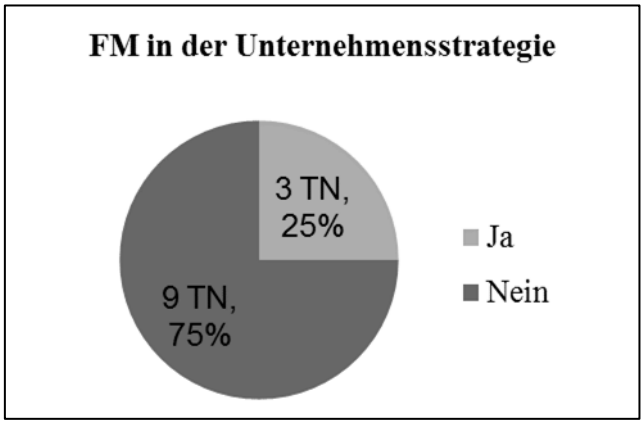

Abbildung 4: FM in der Unternehmensstrategie

Die folgenden Resultate beziehen sich nur noch auf 23 Spitäler, die angegeben haben, eine FM-Strategie zu besitzen. Aus der Abbildung 5 geht hervor, dass die meisten Spitäler einzelne Strategien für die FM-Teilbereiche formuliert. Bei näherer Betrachtung der Ergebnisse fällt auf, dass drei der sechs Spitäler, die angegeben haben, eine übergreifende Strategie zu haben, aus der grössten Spitalklasse mit 500 und mehr Betten stammen. Zwei Spitäler mit einer übergreifenden Strategie finden sich in der Kategorie mit 125 – 249 Betten und das letzte Spital in der Kategorie mit 75 – 124 Betten.

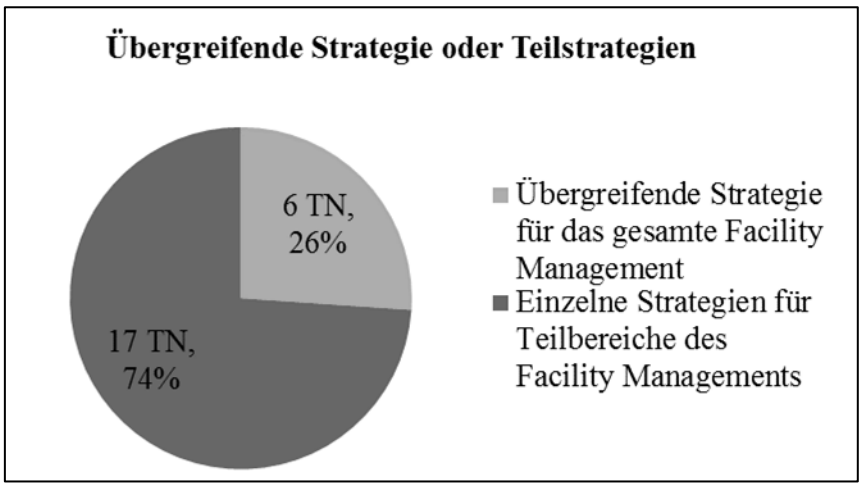

Abbildung 5: Übergreifende Strategie oder Teilstrategie

Für welche Teilbereiche des Facility Managements die Strategien formuliert werden, ist aus der Abbildung 6 ersichtlich.

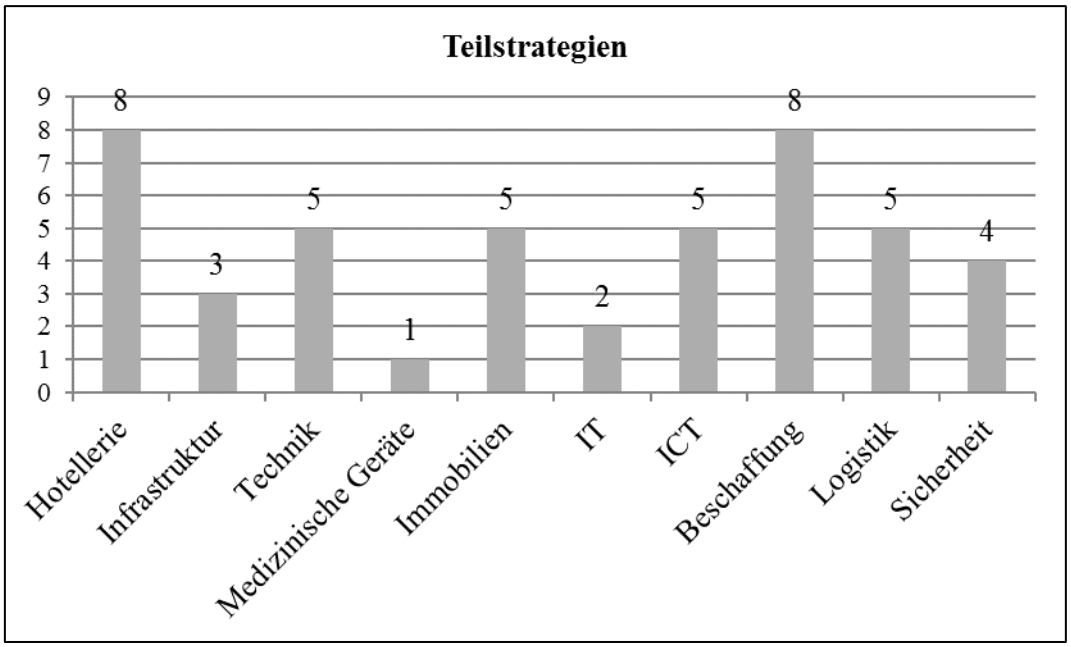

Abbildung 6: Überblick Teilstrategien

Am häufigsten formuliert werden Teilstrategien für die Hotellerie und die Beschaffung, gefolgt von Teilstrategien für die Technik, die Immobilien, die ICT und die Logistik. Dazu muss erwähnt werden, dass viele eine gemeinsame Teilstrategie für die Infrastruktur und Technik oder die Beschaffung und Logistik haben. Zu berücksichtigen ist, dass die FM Aufbauorganisation in jedem Spital anders ist. Deshalb ist nicht zwingend gegeben, dass unter diesen Begrifflichkeiten auch alle Spitäler das Gleiche verstehen oder in jedem Spital die gleichen Leistungen durch diese Bereiche erbracht werden. Mit welchen Themen sich FM Strategien befassen zeigt Abbildung 7. Wie aus dieser hervorgeht, stehen bei 19 von 23 Spitälern die Ausrichtung auf die Kundenbedürfnisse, die Unterstützung des Kerngeschäftes und Prozessoptimierungen in den FM-Strategien. Die Kosten sind bei 18 Spitälern ein Bestandteil der Strategie. Ebenfalls haben über die Hälfte der Spitäler angegeben, dass sie sich mit der Steigerung der Effizienz und mit der Standardisierung beschäftigen. Dieses Resultat widerspiegelt die aktuellen Trends im Gesundheitswesen. Gemäss Sommer et al. (2017) stehen Effizienzgewinne, Einsparungen und Optimierungen von Betriebsabläufen zurzeit im Vordergrund der Spitäler. Ebenfalls möchten sich die Spitäler gemäss denselben Autoren noch stärker auf die Kundenbedürfnisse ausrichten und überlegen sich, wie sie das mit Hilfe der Unterstützungsprozesse erreichen können.

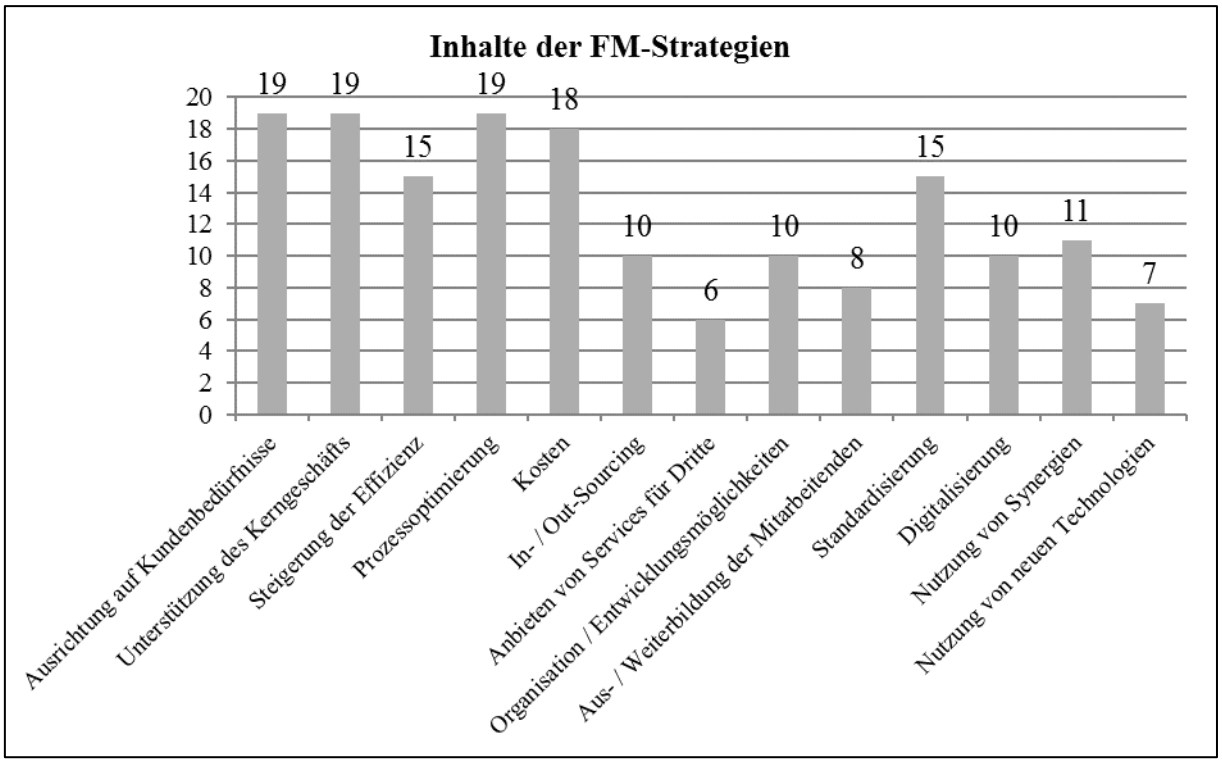

Abbildung 7: Inhalte / Themen der FM-Strategien

Es fällt auf, dass Sourcing Themen (In- und Outsourcing) zumindest bei dieser Umfrage keine sehr hohe Priorität aufweisen. Und entgegen den derzeitigen Trends beschäftigen sich nur wenige Spitäler auf strategischer FM Ebene mit neuen Technologien oder Digitalisierung.

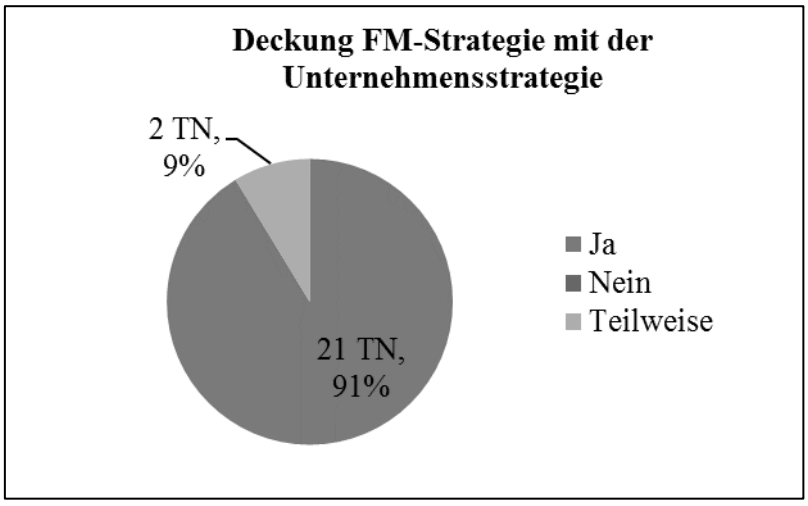

Abbildung 8: Deckung FM-Strategie mit der Unternehmensstrategie

Abbildung 8 zeigt die Antwort auf die Frage, ob die FM-Strategie jeweils aus der Unternehmensstrategie abgeleitet ist und beide Strategien in die gleiche Richtung weisen, so wie es auch die Theorie vorsieht. Dies bestätigen 21 Spitälern. Lediglich zwei Spitäler gaben an, dass sich die FM-Strategie nur teilweise mit der Unternehmensstrategie deckt. Beispiele,

bei denen die FM-Strategie aus der Unternehmensstrategie abgeleitet wurde, lauten: Investitionsplanung Immobilien (1x), Flexible Nutzung der Immobilien (1x), Nutzenbeitrag der Informatik zum „Produkt“ muss auf das Leistungsversprechen gegenüber den Patienten ausgerichtet sein. (1x) Aus den beiden ersten Beispielen der Spitäler zeigt sich, dass die Leitsätze für die Immobilien offensichtlich aus der Unternehmensstrategie abgeleitet werden, so wie Hellerforth (2006) empfiehlt. Aus dem dritten Beispiel geht hervor, dass sich das Spital Gedanken darübergemacht hat, wie es mit dem Facility Management das Kerngeschäft unterstützen kann. Auch dieses Vorgehen ist sehr erfreulich, denn gemäss Braun (2013) sollten sich die Unternehmen bei der Strategieformulierung genau damit beschäftigen.

5. Schlussfolgerungen

Hier werden die Fragestellungen der Arbeit nochmals aufgenommen und summarisch beantwortet.

Verfügen Spitäler über eine eindeutig definierte FM-Strategie? Ja, zwei Drittel der Spitäler verfügen über eine eindeutig definierte FM-Strategie. Zudem ist aus der Umfrage hervorgegangen, dass drei Spitäler, die keine eindeutige FM-Strategie haben, das Facility Management in der Unternehmensstrategie untergebracht haben. Dies bedeutet jedoch, dass sich insgesamt neun aller an der Umfrage teilgenommenen Spitäler nicht mit FM-Strategien beschäftigen, was einem Viertel entspricht und doch eine relativ grosse Zahl ist.

Für welche FM-Bereiche werden Strategien formuliert? Am häufigsten werden Strategien für die Bereiche Hotellerie und Beschaffung formuliert. Weitere Bereiche, die ebenfalls mehrfach genannt wurden, sind Technik, Immobilien, ICT und Logistik. Für die Sicherheit, die Infrastruktur und die IT werden von wenigen Spitälern ebenfalls Strategien formuliert.

Welche Inhalte decken die FM-Strategien ab? Die FM-Strategien beschäftigen sich im Wesentlichen mit der Ausrichtung auf die Kundenbedürfnisse, der Unterstützung des Kerngeschäftes, Prozessoptimierungen sowie den Kosten. Weitere, häufig genannte Inhalte sind die Steigerung der Effizienz, die Standardisierung sowie die Nutzung von Synergien. Die Analyse der Homepages und Aussagen in den Visionen und Leitbildern bestätigen, dass Effizienz und Wirtschaftlichkeit sowie die Ausrichtung auf die Kundenbedürfnisse wichtige Bestandteile im Spitalbetrieb sind. Diese Inhalte widerspiegeln die meisten der aktuellen Trends im Gesundheitswesen und zeigen, dass sich die Spitäler mit ihrer Umwelt auseinandersetzen.

Ist eine Kongruenz mit der übergreifenden Unternehmensstrategie erkennbar?

Diese Frage lässt sich nicht abschliessend beantworten, da keine Strategiedokumente zur Verfügung stehen. Die Antworten der Umfrage deuten auf eine positive Kongruenz hin.

6. Fazit & Ausblick

Die Bearbeitung der diesem Artikel zugrundeliegenden Bachelorarbeit hatte zum Ziel einen ersten Überblick über die angewandten FM-Strategien in Schweizer Spitälern zu geben. Die Ergebnisse liefern erste Einblicke, sind jedoch begrenzt, da sie sich nur auf der Oberfläche dieses wichtigen Themas bewegen. Weiterführende Forschung hat zum Ziel, die Inhalte von FM-Strategien detaillierter zu untersuchen. Motivation dafür ist, dass mittels angewandter Forschung und Entwicklung evidenzbasierte und anwendbare Werkzeuge für FM-Führungskräfte entstehen, die sie bei ihren anspruchsvollen Arbeitsaufgaben unterstützen. Bezogen auf das Thema FM Strategien in Spitälern, soll eine Art Rahmenwerk entstehen, das Führungskräfte bei der Formulierung guter FM-Strategien unterstützt.

References

BAG. (2017). Kennzahlen der Schweizer Spitäler 2015. Bern: Bundesamt für Gesundheit.

Berger, S., Bienlein, M., Schürch, D., & Wegmüller, D. (2015). Spitäler (S. 393-411). In W. Oggier (Hrsg.), Gesundheitswesen Schweiz 2015 - 2017. Bern: Hogrefe Verlag

Braun, H.-P. (2013). Facility Management - Erfolg in der Immobilienwirtschaft. Berlin, Heidelberg: Springer-Verlag.

Chandler, A.D. (1962) Strategy and Structure: Chapters in the History of American Enterprise. MIT Press, Boston.

Corsten, H., & Corsten, M. (2012). Einführung in das Strategische Management. Konstanz und München: UVK Verlagsgesellschaft mbH.

Hellerforth, M. (2006). Handbuch Facility Management für Immobilienunternehmen. Berlin, Heidelberg: Springer-Verlag.

H+ Die Spitäler der Schweiz. (2012). Abgerufen am 21. September 2017 von http://www.hplus.ch/de/zahlen_fakten/h_spital_und_klinik_monitor

IFMA Schweiz. (ohne Datum). FM-Kompetenzanalyse. Abgerufen am 4. Dezember 2017 von http://www.ifma.ch/de/karriere-und-bildung/fm-kompetenzanalyse

International Organization for Standardization. (2018). Facility management -- Management systems -- Requirements with guidance for use (ISO Standard No. 41001:2018).

Lombriser, R., & Abplanalp, P. (2010). Strategisches Management. Zürich: Versus Verlag AG.

Oggier, Willy. (2015). Gesundheitswesen Schweiz 2015-2017: Eine aktuelle Übersicht. Bern: Hogrefe Verlag.

Probst, G., & Wiedemann, C. (2013). Strategie-Leitfaden für die Praxis. Wiesbaden: Springer Gabler Fachmedien.

Rasche, C., B. Wolfrum, Ressourcenorientierte Unternehmensführung, in: Die Betriebswirtschaft, 54. Jg. (1994), S. 501-517.

Rüegg-Stürm, J. (2002). Das neue St. Galler Management-Modell. Bern: Verlag Paul Haupt.

Sommer, P., Bieri, B., Schulthess, M., & Schwendener, P. (2017). CEO Survey Spitalmarkt Schweiz 2017. PricewaterhouseCoopers AG.

Tecklenburg, A. (2013). Strategische Ausrichtung im Krankenhaus (S. 97-104). In J.F. Debatin, A. Ekkernkamp, B. Schulte, A. Tecklenburg (Hrsg.), Krankenhausmanagement - Strategien, Konzepte, Methoden. Berlin: MWV Medizinisch Wissenschaftliche Verlagsgesellschaft mbH & Co. KG.

Science meets Practice II:

Operative Facility Management

Energy Efficiency Improvement of Buildings by Using Linear Programming

B. Ecer, Ankara Yildirim Beyazit University, Turkey
M. Dağdeviren, M. Kabak, Gazi University, Turkey

Abstract

Energy efficiency is an important issue. Innovative technologies are developed in order to make buildings better at energy efficiency. Energy efficiency labels are used around the world to show how much energy efficient a building is. This labelling process is an assignment of buildings into predefined classes. If we consider the assignment problem has multiple criteria to consider and the classes are ordered, this problem can be handled by using multiple criteria sorting techniques. Furthermore, Inverse Multiple Criteria Sorting Problem (IMSCP) is concerned with the selection among the possible actions, which can change objects state in terms of criteria to obtain a better sorting of objects. In this study, a linear programming model of IMSCP is proposed to construct an energy efficiency improvement plan for buildings. The main aim is to choose the actions, which give us the desired labels at minimum cost. An illustrative example is presented to demonstrate the applicability of the proposed model. Solution results prove that this model is appropriate for energy efficiency improvement of buildings.

Keywords: Building energy efficiency, Inverse multiple criteria sorting problem, Linear programming.

1. Introduction

Buildings are primary users of energy and energy efficiency of buildings is important in many countries. It is important to use energy efficiently, because of the limited global energy resources and the harmful effects of fossil fuels (coal, oil, etc.) on energy generation to the environment. There is a great potential to save energy in the building sector.

The heating, ventilation and air conditioning (HVAC) systems in the buildings provide the comfort, health and safety of the residents. Generally, these systems are the most important energy consumers. Their design is shaped by the architectural characteristics of the building and the needs of living. While HVAC systems provide and maintain energy efficiency, they must be designed to be modified for future needs.

Today, building energy design often needs analytical power to study complex design scenarios. Computer based building energy simulations provide this power and allow for great flexibility in the design process. The simulation method is based on load and energy calculations in HVAC designs. The aim is to identify and study the energy characteristics of buildings and systems.

Design alternatives are need to be in harmony in terms of initial investment, maintenance and energy costs. Fortunately, simulation techniques provide tools to create different design options based on energy performance and lifetime costs.

When there is a consideration about energy performance which is related to the evaluation of the building performance, it is necessary to define the energy efficiency based on the criteria on which the building is to be defined, standards definition, regulations and guidelines. Within the framework of the energy efficient building concept, each country has its own standards, regulations and directives which is developed within its own local conditions.

Building energy regulations and standards will help to recognize the energy conservation potential in buildings and increase the demand for energy efficient design in buildings. This will also provide a basis for the development of energy efficient policies.

Building energy regulations and standards are being used and developed in many countries to ensure a certain level of control over building design and the development and renewal of energy-conscious design in buildings.

In the last decade, Turkish Government are developing similar regulations with European Union (EU) and new standards and regulations for energy saving and renewable energy sources usage are being published.

The most important of these legal regulations is the "Energy Performance in Buildings (BEP) Regulation" which abrogates the "Regulation on Thermal Insulation in Buildings" from the implementation date. In accordance with the framework directive 2002/91 / EC of the European Union, the Regulation on Energy Performance in Buildings was published in the Official Gazette on 05 December 2008 and entered into force on 05 December 2009.

One requirement of this regulation is to prepare an "Energy Identity Certificate" for each building. The Building Energy Performance Calculation Method to be used in the preparation of the Energy Identity Certificate is a method of calculating the energy efficiency of buildings by evaluating all the parameters affecting the energy consumption of the building in accordance with the regulations such as houses, offices, education buildings, health buildings, was designed to assess energy performance for all existing and new building types.

According to the energy performance in the Energy Identity Certificate, buildings are assigned to energy classes from A to G. A is the highest, G is the lowest energy-efficient building. According to the relevant legislation, the energy identity certificate class of the new buildings must be designed and built to be at least C class. Buildings that are lower than class C will not receive a residential usage licence. In addition, energy pricing and taxation will be done according to the determined energy class. In other words, high energy class buildings will buy energy at a lower price. For this reason, energy performance will be the reason for preference in purchasing, selling and renting. The value of buildings with high energy class will increase.

In this study, the problem of determining the actions that can be taken to improve the energy classes of buildings identified in the Energy Identity Certificate is modelled as the Inverse Multi-Criteria Sorting Problem, which is proposed by Mousseau et. al (2017). The choice of improvement options for energy efficiency is done by the proposed linear programming model.

This paper goes on as follows. A summary of recent literature on energy efficiency improvement studies is presented in the second part. In the third part, the proposed linear

programming model to improve energy efficiency is defined by giving parameters and mathematical formulation. In the fourth part, the applicability of the proposed model is tested on an example of energy efficiency improvement. The study is concluded in the fifth part by giving the results and the research directions for further studies.

2. Literature Review

The use of multi-criteria decision-making approaches in measuring and improving building energy efficiency is one of the popular topics discussed by researchers in recent years. Some of the following are summarized below:

Diakaki et al. (2010) aimed to improve the energy efficiency of buildings in the design phase with a multi-objective optimization model that includes the structure of the building and the decision variables that express the energy system used. In the proposed model, it is aimed to find the building design parameters that minimize the maximum proportional deviation from the building energy consumption, CO_2 gas release and initial investment cost.

Wang et al. (2012) examined quantitative energy performance assessment methods for existing buildings. It is stated that energy performance evaluation methods in the study can be examined in three topics as calculation-based, measurement-based and hybrid methods.

Kabak et al. (2014) determined energy classes of three buildings by using building energy performance measuring system in Turkey based on 7 criteria which can be expressed with linguistic variables and interacting with each other. Fuzzy Analytic Network Process method is used for evaluation of buildings and the obtained results are compared with Analytic Hierarchy Process and TOPSIS methods.

Hu et al. (2015) evaluated energy performance based on 6 criteria for three parts of a building on the Wuhan University campus. The result obtained by Fuzzy Analytical Network Process in this study are being used for interpretations in terms of future improvements of campus buildings.

Xu et al. (2015) used the Fuzzy Analytical Network Process method to determine the importance of effective criteria for sustainable improvement of the energy performance of hotel

buildings in China. The results of the decision model in which inter-criteria interactions are taken into account show which factors are more effective in improving performance.

Delgarm et al. (2016) proposed a three-objective optimization model that optimize building energy performance for four different climatic regions in Iran in terms of cooling, heating and energy consumed in lighting. To obtain quick and good solutions for the proposed model, a Multi-Objective Particle Swarm Optimization based solution approach is developed.

Ignatius et al. (2016) stated that sustainability is one of the most important concerns in construction projects, and they have implemented green building evaluation in Malaysia with a Quality Function Deployment and Fuzzy Analytical Network Process-based approach. In a sensitivity analysis that observes the effect of changing the weight value is used to defuzzification of the fuzzy results, the changes of different decision makers are examined.

Migilinskas et al. (2016) developed an ARAS-based assessment approach from multi-criteria decision-making approaches to assess building energy performance. The study, which considers the economic, technical and environmental criteria, show that the energy performance of the building is not directly proportional to the investment amount, so the additional expenditure has no effect on the building energy performance.

Jeong et al. (2017) proposed a modified system of the BECC system used to assess the energy performance of existing buildings in South Korea against possible problems with respect to criteria and evaluation criteria. By using the recommended system and the K-means clustering method, they obtained improvements in classifying the energy performance of 504 buildings.

According to the literature, it seems that optimization studies have not been used to improve the energy performance of existing buildings. It has been observed that energy performance improvement efforts are mostly directed towards the optimization of building design parameters in the design phase buildings.

3. Proposed Model

Inverse multiple criteria sorting problem is introduced into the literature by Mousseau et al. (2017). According to the proposed optimization models in that study, the aim of the problem is

to determine the best actions for improving classes of predefined objects to desired classes or to obtain an improved classification for all of the objects subject to budget limitation.

Second model of Mousseau et al. (2017) is considered in this study. The proposed inverse multiple criteria sorting problem model with budget limitation aims to obtain the best sorting of objects subject to budget limitation. Decision variables are selection of possible actions and type of the variables are binary. Model parameters, decision variables and mathematical formulation of the model presented in this part as follows:

Parameters

q^{t-h} : coefficient for objects in class h

δ_{ijk} : effect of action k on object i in views of criteria j

O_{ij} : present condition of object i in views of criteria j

c_k : cost of action k

b_h : upper bound of weighted score for assigning an object to class h

B : budget limit

w_j : weight of criteria j

Decision variables

O'_{ij} : new condition of object i in views of criteria j

Y_{hi} : binary variable showing assignment status of object i to class h

X_k : binary variable showing selection of action k

Mathematical formulation:

$$\min \sum_{h=1}^{t} q^{t-h} \sum_{i=1}^{q} y_{hi} \quad (1)$$

s.t.

$$o_{ij}^{'} = o_{ij} + \sum_{k=1}^{m} \delta_{ijk} x_k \quad , \forall i, j \quad (2)$$

$$\sum_{k=1}^{m} c_k x_k \leq B \quad (3)$$

$$\sum_{h=1}^{t} y_{hi} = 1 \quad , \forall i \quad (4)$$

$$\sum_{j=1}^{n} o_{ij}^{'} w_j \leq b^{h+1} + M(1 - y_{hi}) \quad , \forall i, \ \forall h = 2, ..., t \quad (5)$$

$$\sum_{j=1}^{n} o_{ij}^{'} w_j \leq b^{h} + M(1 - y_{hi}) \quad , \forall i, \ \forall h = 1, ..., t-1 \quad (6)$$

$$x_k \in \{0,1\} \quad , \forall k \quad (7)$$

$$y_{hi} \in \{0,1\} \quad , \forall h, i \quad (8)$$

Objective function of the model is expressed in Equation (1). This equation ensures that the number of objects in undesired classes should be minimized. q^{t-h} values are determined smaller for the desired classes and greater for undesired classes. By this way, the number of objects in undesired classes are minimized.

Change of objects' scores in views of criteria are expressed via the first constraint of the model. This constraint is given in Equation (2) and states that the change occurs only if the selected action causes a change for the object. Budget limitation is given with Equation (3) and total cost of selected action should not exceed the limit. Each object should be assigned to only one class. This restriction is expressed with Equation (4). The relationship between classes and weighted sum of object scores are expressed with Equation (5 – 6), where M is a great number. Sign restrictions of decision variables are given via Equation (7 – 8).

The given model is used in this study to improve energy efficiency of a site consisting 10 buildings by considering 7 sorting criteria. Data for the buildings, classification measures and alternative actions are explained in the fourth part.

4. An Example of Energy Efficiency Improvement

Applicability of the model is tested on an energy efficiency improvement in a building site example. This site is assumed to have 10 buildings and 7 criteria are considered to be effecting the energy efficiency in buildings. The sorting criteria are proposed by Kabak et al. (2014) and listed as follows:

- Location and climate data (C1)
- Geometrical shape (C2)
- Building envelope (C3)
- Mechanical Systems (C4)
- Lighting system (C5)
- Hot water system (C6)
- Renewable energy and Cogeneration (C7)

Let's assume that the buildings are assigned into 7 classes. Buildings are classified by comparing the weighted sum of scores on each criteria for each building with lower bound of efficiency classes. Kabak et al. (2014) calculate criteria weights via Analytic Network Process method. These weights are given in Table 1 as follows:

Criteria	C1	C2	C3	C4	C5	C6	C7
Weights	0.27	0.07	0.10	0.16	0.12	0.08	0.20

Tab. 1: Criteria weights

Upper bounds for classes for comparison with weighted sum of scores are presented in Table 2 as follows:

Class	A	B	C	D	E	F	G
Lower Bound	5	10	14	18	22	26	30

Tab. 2: Upper bounds of classes

Action	A1	A2	A3	A4	A5
B1	-8 for C2, -10 for C3	-9 for C4, -14 for C6	-5 for C5	-10 for C6	-8 for C7
B2	-7 for C2, -16 for C3	-15 for C4, -13 for C6	-16 for C5	-7 for C6	-9 for C7
B3	-15 for C2, -18 for C3	-18 for C4, -16 for C6	-10 for C5	-18 for C6	-22 for C7
B4	-11 for C2, -12 for C3	-7 for C4, -15 for C6	-7 for C5	-12 for C6	-10 for C7
B5	-18 for C2, -16 for C3	-19 for C4, -17 for C6	-16 for C5	-15 for C6	-25 for C7
B6	-19 for C2, -14 for C3	-6 for C4, -9 for C6	-4 for C5	-9 for C6	-7 for C7
B7	0 for C2, -2 for C3	0 for C4, 0 for C6	-1 for C5	0 for C6	-1 for C7
B8	-9 for C2, -17 for C3	-7 for C4, -12 for C6	-8 for C5	-9 for C6	-13 for C7
B9	-12 for C2, -6 for C3	-12 for C4, -15 for C6	-2 for C5	-14 for C6	-13 for C7
B10	-9 for C2, -9 for C3	-10 for C4, -8 for C6	-7 for C5	-8 for C6	-1 for C7

Tab. 3: Possible changes of building scores

The most desired class is A and G is the most undesired class. As it seen from Table 2, the aim of energy efficiency improvement problem is to minimize the value of weighted sum. Hence, the possible changes in building scores after energy efficiency improvement actions will be in negative numbers. There are five possible actions and these actions are determined as changing the roofs with most energy efficient roof type (A1), changing the HVAC system of buildings with the newest one (A2), changing the lighting systems with the most efficient one (A3), building a central hot water system (A4) and installing solar panels on roofs to support energy demand (A5). Possible changes in building scores (δ_{ijk}) are given in Table 3.

Cost of each action is determined as 300 Monetary Units (MU) for A1, 700 MU for A2, 100 MU for A3, 200 MU for A4 and 250 MU for A5, respectively. Building site management have allocated a budget of 750 MU for energy efficiency improvement actions and they are willing to determine the best improvement policy for overall energy efficiency. Scores are buildings are given in the scale of 0 – 30 for each criteria. Present scores of each building in views of each criteria are presented in Table 4:

Building	C1	C2	C3	C4	C5	C6	C7
B1	19	12	14	11	9	16	13
B2	23	15	23	20	19	15	18
B3	21	20	23	23	16	24	26
B4	14	19	16	9	8	18	15
B5	28	25	21	23	24	22	27
B6	22	26	28	8	7	13	12
B7	13	1	3	1	2	2	2
B8	20	13	22	10	10	15	15
B9	12	19	11	16	5	20	17
B10	12	16	15	11	7	9	3

Tab. 4: Present scores of buildings in views of each criteria

Initially these 10 buildings are assigned to classes D, E, F, C, F, D, A, D, C and B, respectively. Inverse multiple criteria sorting problem model is coded with GAMS optimization software to solve this energy efficiency improvement application on a personal computer with Intel Core i7 2.40 GHz processor and 8 GB RAM. Objective coefficient for classes are determined as 0, 10, 20, 30, 40, 50 and 60, from Class A to Class G respectively. Obtained results indicate that the objective function value is 160. The classes of buildings will be C, D, C, B, D, C, A, B, B and B, respectively after the suggested changes.

These results show that the best sort of buildings subject to a budget limit of 750 MU. Only classes of two buildings remains as the same of initial classes. The other buildings classes are improved. Furthermore, the classes of the emphasized buildings are A and B. They are already two of the most energy efficient buildings among the ten buildings. After the suggested changes, final scores of buildings are given in Table 5, as follows:

Building	C1	C2	C3	C4	C5	C6	C7
B1	19	4	4	11	4	16	5
B2	23	8	7	20	3	15	9
B3	21	5	5	23	6	24	4
B4	14	8	4	9	1	18	5
B5	28	7	5	23	8	22	2
B6	22	7	14	8	3	13	5
B7	13	1	1	1	1	2	1
B8	20	4	5	10	2	15	2
B9	12	7	5	16	3	20	4
B10	12	7	6	11	0	9	2

Tab. 5: Final scores of buildings

5. Conclusion

Due to the increasing attention on environmentally friendly approaches, energy efficiency becomes an important issue for building designers, construction companies and customers. Energy efficient buildings are taking attention of potential customers even more, because of the taxing, energy pricing and energy saving aspects of these properties.

Energy efficient buildings are also an interesting subject for researchers. In the last decade's literature there are different studies of this field. However, researchers generally focused on energy efficient design of new buildings. In this study, energy efficiency improvement of existing buildings problem is considered.

Inverse multiple criteria sorting problem is used to model the emphasized problem and an example of energy efficiency improvement is solved to demonstrate applicability of the model on this problem.

GAMS optimization software is used to solve the application of energy efficiency improvement of 10 existing buildings based on 7 criteria. Obtained results show that this model is a suitable solution method for energy efficiency improvement policy determination.

This study can be extended by considering different evaluation criteria for energy efficient buildings. Researchers may consider solving the problem by taking different constraints or objective functions into consideration. Another extension of the problem may be testing the solution capacity of integer programming solvers by solving examples of greater dimensions.

References

Delgarm, N., Sajadi, B., Kowsary, F. & Delgarm, S. (2016): Multi-objective optimization of the building energy performance: A simulation-based approach by means of particle swarm optimization (PSO). In: *Applied Energy* 170, 293–303.

Diakaki, C., Grigoroudis, E., Kabelis, N., Kolokotsa, D., Kalaitzakis, K. & Stavrakakis, G. (2010): A multi-objective decision model for the improvement of energy efficiency in buildings. In: *Energy* 35, 5483 – 5496.

Hu, S., Liu, F., Tang, C., Wang, X. & Zhou, H. (2015): Assessing Chinese campus building energy performance using fuzzy analytic network approach. In: *Journal of Intelligent & Fuzzy Systems* 29, 2629–2638.

Ignatius, J., Rahman, A., Yazdani, M., Šaparauskas, J. & Haron, S. H. (2016): An integrated fuzzy ANP–QFD approach for green building assessment. In: *Journal of Civil Engineering and Management* 22, 551-563.

Jeong, J., Hong, T., Ji, C., Kim J., Lee, M., Jeong, K. & Koo, C. (2017): Improvements of the operational rating system for existing residential buildings. In: *Applied Energy* 193, 112–124.

Kabak, M., Köse, E., Kırılmaz, O. & Burmaoğlu, S. (2014): A fuzzy multi-criteria decision making approach to assess buildingenergy performance. In: *Energy and Buildings* 72, 382–389.

Migilinskas, D., Balionis, E., Dziugaite-Tumeniene, R. & Siupsinskas, G. (2016): An advanced multi-criteria evaluation model of the rational building energy performance. In: *Journal of Civil Engineering and Management* 22, 844-851.

Mousseau, V., Ozpeynirci, O. & Ozpeynirci, S. (2017): Inverse multiple criteria sorting problem. In: *Annals of Operations Research* in press, https://doi.org/10.1007/s10479-017-2420-8.

Xu, P., Chan, E.H.W., Visscher H.J., Zhang X. & Wu, Z. (2015): Sustainable building energy efficiency retrofit for hotel buildings using EPC mechanism in China: analytic Network Process (ANP) approach", In: *Journal of Cleaner Production* 107, 378 – 388.

Wang, S., Yan, C. & Xiao, F. (2012): Quantitative energy performance assessment methods for existing buildings, In: *Energy and Buildings* 55, 873–888.

Wir danken unseren Partnern des 11. IFM-Kongresses 2018:

ÜBER SODEXO

Von Pierre Bellon 1966 gegründet, ist Sodexo weltweit führend bei Services für mehr Lebensqualität, die eine wichtige Rolle für den Erfolg des Einzelnen und von Organisationen spielt. Dank einer einzigartigen Kombination aus On-site Services, Benefits & Rewards Services und Personal & Home Services stellt Sodexo täglich für 75 Mio. Menschen in 80 Ländern seine Dienste bereit. Der Erfolg und die Leistungsfähigkeit von Sodexo beruhen auf der Unabhängigkeit, dem nachhaltigen Geschäftsmodell und der Fähigkeit des Unternehmens, seine weltweit 428.000 Mitarbeiter an sich zu binden und kontinuierlich weiterzuentwickeln.

Sodexo verfügt über langjährige Erfahrung im Bereich integrierte Servicelösungen - vom technischen Gebäude- und Energiemanagement über Catering, Reinigungs-, Empfangs- und Sicherheitsdienste bis hin zu Concierge-Services, mit denen Sodexo auch die individuellsten Wünsche eines jeden Kunden erfüllt. Als weltweit tätiges Unternehmen verfügt Sodexo über namhafte Referenzen in der Betreuung nationaler und internationaler Facility-Management-Projekte. In enger Abstimmung mit dem Kunden erarbeiten die Experten von Sodexo Optimierungspotentiale und erstellen maßgeschneiderte und nachhaltige Facility-Management-Konzepte.

On-site Services in Österreich

Sodexo Service Solutions Austria ist seit mehr als 20 Jahren in Österreich vertreten und beschäftigt heute bundesweit rund 4.000 Mitarbeiter. Diese begeistern mit ihrer Servicementalität täglich 70.000 Endkunden in 1.125 Betrieben, darunter Wirtschaftsunternehmen, Behörden, Schulen, Kindergärten, Kliniken und Senioren-einrichtungen.

Benefits & Rewards Services in Österreich

ist mit über 20 Jahren Erfahrung Marktführer in der Abwicklung von Sozialleistungen und Incentives für Mitarbeiter mittels Gutschein- und Chipkartenlösungen und bietet vielfältige Möglichkeiten, um zusätzliche Leistungsanreize zu setzen und Wachstum zu steigern.

www.sodexo.at

Schneider Electric mit Niederlassungen in über 100 Ländern ist führend in der digitalen Transformation von Energiemanagement und Automation. Die Firma bietet integrierte Effizienzlösungen, die Energie, Automation und Software nahtlos miteinander verbinden. Ihre offene Systemarchitektur EcoStruxure gewährleistet Kontrolle in Echtzeit und maximale Betriebseffizienz.

Die Stärke von Schneider Electric für Ihr Gebäudemanagement

Schneider Electric bietet Gebäudeeigentümern, Gebäudetechnikern und Facilitymanagern umfassende Gebäudemanagementlösungen. Ziel ist es, den Energieverbrauch zu optimieren, eine gesunde und produktive Umgebung zu schaffen, alternde Anlagen zu erneuern und jederzeit Zugang zu Informationen zu erhalten. Dabei unterstützen Sie die zuverlässigen Lösungen von Schneider Electric:

EcoStruxure™ Facility Advisor hilft die Leistung von kleinen bis mittelgroßen Gebäuden zu verbessern, die Geschäftskontinuität zu gewährleisten und die Betriebs- und Wartungskosten zu optimieren.

EcoStruxure™ Power Monitoring Expert maximiert die Systemzuverlässigkeit und hilft bei der Optimierung der Betriebseffizienz zur Steigerung Ihrer Rentabilität.

EcoStruxure™ Building Operation bietet integrierte Überwachung, Steuerung und Management von Energie, Beleuchtung, Brandschutz und HLK.

Der neue **Masterpact MTZ** ist ein wichtiger Bestandteil der EcoStruxure Systemarchitektur. Als netzwerk- und internetfähiger Leistungsschalter ist er Schutz- und Messgerät (der Genauigkeitsklasse 1) in einem. Sein Herzstück ist das Steuer- und Auslösegerät
Micrologic X.

schneider-electric.at