

Discussion of facilities management as an academic discipline

To what extent are the general requirements met and what does it mean?

Abstract (250 words)

Purpose – The purpose of this paper is to explore what an academic discipline is and to apply and discuss this definition using facilities management as an example. The paper addresses an academic world that is facing the challenge of developing research and education in response to emerging disciplines and dealing with changes in the higher education system. Institutions are also confronted with the aim of the European Commission to “enhance the performance and international attractiveness of Europe's higher education” (European Commission, 2010).

Design/methodology/approach – A structured framework with six criteria outlining an academic discipline was applied to describe the state of the art of facilities management on the basis of systematical literature research. A survey was conducted with 215 contributions from the European Facility Management Network (EuroFM) and additionally 41 Master theses and 25 scientific papers were studied to gain up-to-date insights.

Findings – This paper provides a methodical approach on how to analyse and describe emerging disciplines. In addition, an overview of the state of the art in facilities management is shown.

Research limitations/implications – The methodological approach for the analysis of academic disciplines was tested using the example of FM. Before transferring the same methodology to other disciplines, researchers are advised to test and further develop the methodology for other disciplines.

Practical implications – This paper includes implications for the development and discussion of emerging disciplines in the academic world.

Originality/value – This paper contributes to a better understanding of academic disciplines and how they emerge.

Keywords: academic discipline, facilities management, research, higher education institutions, knowledge development

1 Introduction

The academic world is confronted with the aim of the European Commission to “*enhance the performance and international attractiveness of Europe's higher education*” (European Commission, 2010). The European Union’s 2020 vision towards achieving smart, sustainable and inclusive growth puts knowledge at the heart of the EU’s strategy for the future. For the academic world this means that higher education institutions like universities, universities of applied sciences, institutes of technology etc., are required to tailor education and research programmes accordingly to provide the graduates and researchers needed to develop emerging disciplines.

“Higher education and its links with research and innovation, plays a crucial role in individual and societal advancement, and in providing the highly skilled human capital and the articulate citizens that Europe needs to create jobs, economic growth and prosperity” (European Commission, 2011).

In response to this strategy the discussion of whether or not facilities management is an academic discipline gets a new meaning in comparison with earlier considerations like: *“Is FM just a profession or has it a theoretical basis? This question has to be answered to give FM a position in the academic world”* (Wagenberg, 1997). In the 1990s the main question was how far facilities management has found scientific recognition among the older or more established disciplines, like for example: Arts and humanities, economic sciences, information sciences and engineering, environment and geosciences, health and welfare, life sciences, mathematics, physics and social sciences (OECD, 2008; and Thomson Reuters, 2013).

It follows on from the European Commission’s vision that in future universities and industry must work together more closely to establish a foundation of knowledge for new academic disciplines. Regardless of the economic and political aims of the European Commission, the question remains whether they are working within a recognised academic discipline or not is of any importance for professors and other scientific key players in the institutions for higher education. Belonging to an academic discipline is relevant for the development of research careers as well as for the development of excellent institutions in a practical way. Research and education in the context of an older or more established discipline makes it easier to find the appropriate calls for papers, research programmes, study programmes, scientific panels, and scientific journals which support the development of scientific excellence. These activities fit also into the overall world university ranking methodology which is structured into the assessment categories: Teaching, Research, Citations, International outlook, and Industry income and innovation (Thomson Reuters, 2013).

The objective of this research paper is to discuss FM as an academic discipline with a scientific approach that can be applied to other disciplines as well. The paper aims to provide a framework about what an academic discipline is and apply and discuss facilities management as an example in detail. The main research questions are: (1) What is an academic discipline? (2) To what extent can FM be regarded as academic discipline? (3) What does it mean to be regarded as an academic discipline?

2 Methodology

2.1 Scope and focus of academic disciplines

In reference to the first question that asks what an academic discipline is, there are sets of characteristics of what constitutes an academic discipline, such as those by Clark (1980), Taylor (1976) and Dill (1992). Pierce (1991) claims that the boundaries of what is understood as an academic discipline typically follow the boundaries of academic departments. According to Terras (2006), disciplines are characterised by being formally accepted as a university subject, having a publication record but also by having heroes, symbols and myths that help to define the community that forms the discipline. Working within a discipline can give a scholar a sense of belonging, an identity. The term discipline is related to tools, methods, procedures, concepts, and theories which coherently account for the objects or subjects studied (Holland, 2008; and Krishnan, 2009). A similar approach is taken by Jensen (2008) when stating that *“A discipline arises when persons within a work field create a community to define the discipline and ensure its development through a kind of institutionalization of the discipline. Disciplines do not emerge from technological and structural changes in society”* (Jensen 2008).

The term “disciplina” relates to the field of learning and teaching. It originates from the Latin words “discipulus” (pupil) and “disciplina” (teaching). Over time, disciplines are shaped and reshaped by external contingencies and internal intellectual demands. In this manner, a discipline becomes a way to organise and concentrate experiences (Goodlad, 1979) into a particular world view (Miller, 1982). A new discipline can be founded by creating a professional chair devoted to it at an established university. Disciplines may have different degrees of formality and organisation. The term “academic discipline” incorporates several elements of the above-mentioned meanings. It’s exact definition varies depending on the context of discussion. The term has frequently been used in relation to the organisation of knowledge. Stanford (1998) describes women’s studies as an emergent discipline. She believes that the field of women’s studies is interdisciplinary, generating exciting transformations of knowledge across disciplinary boundaries. She also points out that for boundaries to be crossed, they must exist. Terras (2006) discusses to what extent humanities computing can be regarded as a discipline. She argues that it exists as an academic discipline without being a formal university subject, and that this gives the scholars a sense of freedom: they are free to develop their own research and career paths and develop their research agenda in whatever direction they choose. According to Kuchinke (2001), human resource development is not an academic discipline, however, he argues that it is important to clarify the root disciplines that human resource development is based on, in order to help human resource development to emerge from its amorphous form towards a better defined field of research and practice. The “Frascati manual” (2002) has another intention. It aims to provide a fruitful interrelation between research and practice by providing the following definition of research: *“Research and experimental development (R&D) comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications”* (OECD, 2002).

Ponzi and Koenig (2002) discuss the field of knowledge management as an emerging multidisciplinary field, but are also asking if knowledge management is just another fad. They argue, based on previous

studies of management (Wasson, 1978), that management movements generally reveal themselves as fads or fashions within about five years of gaining popularity. When applying this general rule of thumb to FM, it appears that FM has survived. Thus, FM does not appear to be a fad or fashion.

2.2 Six criteria describing characteristics of academic disciplines

A discipline is usually defined as the specialised exploration of particular objects and subjects by applying six particular characteristics: methods, concepts, tools, exempla, laws, and theories (Holland, 2008).

Krishnan's (2009) list of the characteristics of disciplines is somewhat similar:

1. **Object of research:** Disciplines have a particular object of research (e.g. law, society, politics), but the object of research may be shared with another discipline
2. **Body of knowledge:** Disciplines have a body of accumulated specialist knowledge referring to their object of research, which is specific to them and not generally shared with another discipline
3. **Theories and concepts:** Disciplines have theories and concepts that can organise the accumulated specialist knowledge effectively
4. **Technical language:** Disciplines use specific terminologies or a specific technical language adjusted to their research object
5. **Research methods:** Disciplines have developed specific research methods according to their specific research requirements
6. **Institutional manifestation:** Disciplines must have some institutional manifestation in the form of subjects taught at universities or colleges, respective academic departments and professional associations connected to it (Krishnan, 2009).

In the following section Krishnan's list will be used as a reference in the discussion on the extent to which FM meets such criteria of an academic discipline. Most lists of what constitutes an academic discipline include the last point on Krishnan's list, the institutional manifestation. This can be interpreted as if this is the most important characteristic. It may also be a consequence of other characteristics, and thus be some kind of "proof of the pudding", or key indicator.

3 Describing the state of the art in FM referring to six criteria for academic disciplines

3.1 The object of research in FM

According to Krishnan (2009) disciplines have a particular object of research. However, the object of research may be shared with another discipline. Keith Alexander (1992) describes the object of FM research as a framework of interrelation between organisations' primary activities and supporting facilities and services. He identifies the processes, services, facilities, and objectives as important categories which support the organisations' primary activities: *"It is the emphasis on process and service and the relationship between facilities and the objectives of an organisation which characterise facilities management and distinguish it from the established professional disciplines of the industries which it calls construction, hospitality, support and other service industries"* (Alexander, 1992). Peter Barrett and

David Baldry (2003) defined the object of research in a similar way, referring to the first edition of their book *“Facilities Management towards best practice”* published in 1995: *“An integrated approach to maintaining, improving and adapting the buildings of an organisation in order to create an environment that strongly supports the primary objectives of that organisation”* (Barrett and Baldry, 2003). Tay and Ooi (2001) review a number of definitions of FM, in search of the essence of FM. They point to the workplace as the research object of FM, and define FM as *“The integrated management of the workplace to enhance the performance of the organisation”* (Tay and Ooi, 2001). Alberto F. De Toni and Fabio Nonino (2009) have defined FM as a practice for managing non-core business services. The authors base their theory around the FM discipline and describe a new model, named *“Open Facility Management”* which comprises the *“integrated and coordinated design, planning and management of non-core services”* (De Toni and Nonino, 2009).

3.2 Body of knowledge

Krishnan (2009) also states that disciplines have a body of accumulated specialist knowledge referring to their object of research. Furthermore, he claims that this specialist knowledge is specific to them and not generally shared with another discipline. Whereas in the 1990s a lack of knowledge was identified: *“As a profession it is, however, very much in its early stages. There are many examples of exemplary individual actions on specific issues, but there is not much in terms of a body of knowledge facilities manager can call their own.”* (Introduction to the first edition, published in 1995, by Barrett and Baldry, 2003). The FM knowledge can be found in textbooks for students and practitioners like for example the textbook by Per Anker Jensen (2008). The intention of this textbook is defined as follows: *“It defines the terminology in FM based on the new European standards, presents relevant theory, methods and tools, and covers all the main disciplines in FM like organisation, financial management, strategic planning, space management, property operation, services, ICT and sustainability with the main focus on strategic and tactical levels of management”* (Jensen, 2008).

3.3 Theories and concepts

A third issue listed by Krishnan (2009) is that disciplines have theories and concepts that can organise the accumulated specialist knowledge effectively. A number of publications have documented the development of FM. Brian Atkin and Adrian Brooks (2009) refer to the development of FM as follows: *“As recently as forty years ago there was only fleeting mention of facilities management. Buildings were maintained, serviced and cleaned: that was largely it”* (Atkin and Brooks, 2009). In their example FM is considered in the context of building maintenance. Other authors describe the development of FM in the context of service management or – like the following example – in comparison with related disciplines. Hans de Bruijn et al. (2001) compare FM with the field of hospitality management. They claim that hospitality management has experienced comparative debates about scope and meaning. An integrated approach of FM combining facilities (like buildings, workplaces etc.) and services to support primary activities of an organisation can be found in the theory by Keith Alexander (Alexander, 1992).

3.4 Technical language

Krishnan (2009) states that disciplines use specific terminologies or a specific technical language adjusted to their research object. There are a number of FM specific standards defining FM terminology, including the European standardisation EN 15221-1:2007 which defines FM as the *“integration of processes within an organisation to maintain and develop the agreed services which support and improve its primary activities”*. (EN 15221-1, 2007) FM has also been defined as an industry by the European Study on Industrial Policy and Services (2008): *“The FM industry can be defined as the group of companies delivering and providing a range of facility services to a client either directly or by sub-contracting, where the emphasis is primarily on the management aspect of these services. Three different types of FM companies can be distinguished: the managing agent, the managing contractor and the total facilities management company”* (ECORYS, 2008). However, FM is not yet documented in the overview of 23 European industry sectors which are documented in alphabetical order from A like aeronautic industries to W like wood, paper and printing industries (European Commission, 2013).

3.5 Research methods

To continue the review of Krishnan’s list (2009), he claims that disciplines have developed specific research methods according to their specific research requirements. Only a few studies point to purely FM unique research methods. There are a number of studies that document how research methods can be customised to include FM research, including Klungseth (2012) and Hansen et al. (2011). However, these approaches are arguably applications of established research methods in a FM context. Klungseth (2012) investigates how shadowing can be beneficial to FM, acknowledging that it has been proven as a useful research method in other management disciplines. Another research method that has relevance to FM is Post Occupancy Evaluation (POE). POE was introduced before FM, but is closely related to FM, as pointed out by Blakstad et al. (2010). According to Preiser et al. (1988) POE is: *“the process of evaluating buildings in a systematic and rigorous manner after they have been built and occupied for some time”*. Methods within the field of POE focus on the users and their needs, and ideally include both physical, technical and psychosocial aspects and evaluations (Leaman and Bordass, 2001). Chan, Beckman and Lawrence (2007) argue that despite a long tradition of studies on organisations, there has been relatively little systematic work linking the built environment with organisational theory or vice versa. This indicates a potential for FM to fulfil.

A wide array of research disciplines have touched upon FM, and this has created a need for not only mapping research but also for categorising the research. There is a general need to develop theoretical frameworks and categorise existing knowledge in FM. There is also a requirement to gain more insight into the different services that are managed, as this would help practitioners and researchers when searching for information and could also stimulate more research. This is not new thinking. Authors such as Tay and Ooi (2001) have started such work. Schalcher (2007) recognised similarities in the research practice between FM and cybernetics. The present practice-driven approach to FM can be compared to the use of knowledge from cybernetics before the scientific bases of cybernetics were completed. He called it a *“necessary and unavoidable learning process”* and a methodological approach of *“trial and*

error” indicating a need for FM to move forward. Schalcher described the unique combination of different disciplines as a real challenge for research in FM (Schalcher, 2007).

3.6 Institutional manifestation

The criterion that Krishnan (2009) highlights as potentially the most crucial on the list is that disciplines must have some institutional manifestation. Such manifestation can be in the form of subjects taught at universities or colleges and to have academic departments and professional associations. This appears to be a criterion where FM has a lot to show. In the United States, the first educational programme in FM was established in the 1980s. Professor Bill Sims established the Bachelor- and Master- degree programmes in FM at Cornell University. By the end of the 1990s’ approximately fifty programmes in FM had been established at American Universities (Cotts, 1999). The institutional manifestation of FM in Europe started with the establishment of research centers at universities (Jensen 2008). The first university related research centers were established in 1990 at the University of Salford in UK, in 2001 at the Delft University of Technology in the Netherlands, in 2002 at the Norwegian University of Science and Technology in Trondheim, and in 2008 at the Technical University of Denmark in Copenhagen (Junghans and Olsson, 2012). Researchers from all over Europe participated in the research group of the European Facility Management Network (EuroFM) which was constituted in 1993. The European FM education guide provides an overview of FM study programmes at institutes of higher education across Europe (EuroFM, 2009). The vision of EuroFM is: “Advancement of knowledge in facility management in Europe and its application in practice, education and research, in order to communicate best practice throughout Europe” (EuroFM webpage). EuroFM holds an annual research symposium and business symposium at the European FM conferences. These take place at different locations in Europe (Junghans, 2011).

4 Analysing FM relevant topics and the institutional background of FM research

4.1 From the institutional background towards the object of research

To provide a more detailed and up-to-date insight into the state of the art in FM the most relevant FM topics for students at an institution for higher education were studied. The Norwegian University of Science and Technology (NTNU) has been providing master study programmes in facilities management since 2005. Topics and methods chosen by students were the basis for the following analysis. The material consisted of 41 master theses in FM, delivered between 2008 and 2012. The theses were delivered at the Faculty of Civil Engineering or the Faculty of Architecture and Fine Art. The master theses were reviewed and the topics addressed were summarised into five main categories referring to the students’ prioritisation: (1) “Property value” was addressed in six of the theses; (2) “Usability” was the main topic of five theses; (3) “Maintenance” was the main topic of four theses; (4) “Service level agreements”, “Decision analyses”, “Benchmarking”, and “Property management” were studied by three

students each; (5) "Building information models", "FM IT-tools", "Contracts", "Internal rent", "Organisation", "Building", and "Life cycle calculations" were chosen by two students each.

4.2 From the object of FM research towards the institutional background

The research group of the European Facility Management Network (EuroFM) identified the ten most relevant FM research fields by conducting a survey among 22 member universities and universities of applied sciences from 10 countries. The scope of the survey was to get an overview of the future research objectives, existing research capacities, planned projects and concrete proposals. A structured questionnaire was sent to the research group members. The reply rate was very high. In total researchers from 9 countries sent 17 questionnaires back and made 215 individual contributions to the FM research agenda. These results were used to prioritise the ten most relevant FM research fields as follows: (1) "Sustainability", (2) "Knowledge", (3) "Added value", (4) "Workplace", (5) "Demand and supply", (6) "Built environment", (7) "Usability", (8) "Future", (9) "Health care", and (10) "Work organisation" (Junghans 2011).

The next step was to prove the relevance of the 10 research fields outside the EuroFM research group. Therefore a keyword research was conducted in the scientific journals '*Facilities*' and '*Journal of Facilities Management*' which are well known by FM researchers in Europe and at an international level. The keyword research was conducted online by using Google scholar (<http://scholar.google.no>). The research focused on scientific papers published between 2000 and 2012 either in '*Facilities*' or in the '*Journal of Facilities Management*'. The highest amount of scientific papers showed up by using the keywords: (1) "Workplace", (2) "Knowledge", (3) "Health care", (4) "Built environment", and (5) "Sustainability". A deeper insight into these results was gained by examining the institutional background of the authors from the most cited 25 scientific papers. This means the top five cited scientific publications referring to each of the five keywords were considered. For example the keyword "Workplace" revealed the following results:

The "Workplace" has been studied by researchers from different universities, mainly from the UK, Korea, and Hong Kong. The institutional backgrounds of the authors are: (1) The Built Environment Division Research Group at Sheffield Hallam University (Haynes and Price, 2004), (2) The Graduate School of Human Environmental Sciences at Yonsei University (Lee, 2006), (3) The Strathclyde Business School at the University of Strathclyde (Cairns, 2003), (4) The Faculty of Construction and Land Use at Hong Kong Polytechnic University (Gilleard and Tarcisius, 2003), and (5) The School of the Built Environment at Liverpool John Moores University (Tucker and Smith, 2008).

The results regarding the four other keywords "Future", "Health care", "Sustainability" and "Knowledge" revealed a similar mixture of faculties, academic departments and research centres referring to other disciplines, for example: Management, geography, planning and architecture, civil and environmental engineering, property valuation and management, built and human environment. And finally 5 institutions identified from the 25 examined papers are directly related to FM and Real Estate Management:

- The Facilities Management Graduate Centre at Sheffield Hallam University (Price, 2002, and Pudy et al., 2001)
- The Institute of Facility Management at the University of Karlsruhe (Lennerts et al., 2003)
- The Department of Real Estate and Construction at Oxford Brookes University (Wood, 2006)
- The Department of Building and Real Estate at Hong Kong Polytechnic University (Lee and Chan, 2008)
- Real Estate Management at Eindhoven University of Technology (Appel-Meulenbroek, 2010).

5 Conclusion

FM has a particular object of research, which is characterised by its belonging to non-core business services, focusing on workplaces and their management. Indications of this were also found through literature research. The conclusion that FM research focuses on non-core business services has also been upheld by the following authors: Alexander, (1992), Cotts (1999), De Toni and Nonino (2009) and Schalcher (2007). In addition FM can be seen in close relation to the design and management of workplaces (Alexander 1992, Cotts 1999, IFMA 1998, Wagenberg 1997).

FM has a large and growing institutional manifestation. The starting point was the development of FM programmes in the US at the beginning of the 1980s (Cotts 1999). Today, many universities in different countries offer FM courses, for example the Master study programme at the Norwegian University of Science and Technology (NTNU) in Trondheim has been established since 2005. The research group of the European Facility Management Network (EuroFM) currently has twenty-two universities and universities of applied sciences as members from ten countries (Junghans 2011). However, the analysis of 25 scientific papers published between 2000 and 2012 documented that the majority of research papers have authors with a background in other disciplines. Only 5 of the authors had a background where FM and Real Estate Management was immediately obviously from the title of the institutions.

Based on recent developments in the field, FM meets several of the criteria that qualify a subject as an academic discipline. An important question is to what extent FM knowledge is unique to the FM field, to what extent there is a unique FM research methodology, and whether there is a need for such a methodology. FM appears to be on the way to becoming established as an academic discipline, even though it also has clear multidisciplinary characteristics. Depending on what criteria are applied, it may already be established. Based on the descriptions of multidisciplinary and interdisciplinarity, FM appears to be multidisciplinary, as it is associated with more than one established academic discipline.

A related question is to what extent FM has emerged as an interdisciplinary field, where researchers from different disciplines develop new knowledge that lies between the existing disciplines, thus representing FM unique knowledge. It should also be examined as to what extent it is important for FM to meet all the defined criteria. It seems as important to keep on working as a multidisciplinary, and possible interdisciplinary but definitively practitioner-focused “discipline,” to meet all the defined criteria. But institutions of higher education and their researchers and students may also benefit from

recognition of belonging to an established discipline. This would lead to a wider potential for participation in research programmes, better quality of scientific publications and would attract new students, researchers and partners from industry.

References

Alexander, K. (1992), "An agenda for facilities management research", *Facilities*, Vol. 10, No. 7, pp. 6–12.

Appel-Meulenbroek, R. (2010), "Knowledge sharing through co-presence: added value of facilities", *Facilities*, Vol. 28, No. 3/4, pp. 189–205.

Atkin, B., Brooks, A. (2009), *Total Facilities Management*, Wiley-Blackwell, Oxford.

Barrett, P., Baldry, D. (2003), *Facilities Management – Towards Best Practice*, Blackwell Publishing, Oxford.

Blakstad, S. H., Olsson, N., Hansen, G. K., Knudsen, W. (2010), "Usability mapping tool", Alexander, K. (Ed.) *Usability of Learning Environments - CIB W111: Usability of Workplaces – Phase 3. CIB Publication 330. International Council for Research and Innovation in Building and Construction*, Rotterdam, pp. 17–29.

Cairns, G (2003) Seeking a facilities management philosophy for the changing workplace, "Facilities", 21(5/6), pp. 95–105.

Chan, J.K., Beckman, S.L., and Lawrence, P.G. (2007), "Workplace design: A new managerial imperative", *California Management Review*, Vol. 49, No. 2, pp. 6–22.

Clark, B. (1980), "Academic culture", Working Paper, [number 42], New Haven, CN. Yale University Higher Education Research Group.

Cotts, D.G. (1999), *The facility management handbook*, American Management Association, New York.

De Bruijn, H., Van Wezel, R., Wood, R.C. (2001) "Lessons and issues for defining 'facilities management' from hospitality management", *Facilities*, Vol. 19, No. 13/14, pp. 476–483.

De Toni, A.F. and Nonino, F. (2009), *The facility management: non-core services and taxonomy: open facility management, a successful implementation in a public administration*, IFMA, Milan.

Dill, D.D. (1992), "Academic Administration", Clark, B.R. and Neave, G. (Ed.), *The Encyclopedia of Higher education*, Vol. II, Pergamon Press, Oxford, pp. 1318–29.

ECORYS (2008), "Study on Industrial Policy and Services - Within the Framework Contract of Sectoral Competitiveness Studies – ENTR/06/054", Rotterdam, available at: http://ec.europa.eu/enterprise/newsroom/cf/_getdocument.cfm?doc_id=5416 (accessed 20 February 2013).

EN 15221-1: 2007, Facility Management Part 1: Terms and definitions.

European Commission (2010), "Europe 2020, a strategy for smart, sustainable and inclusive growth", available at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:2020:FIN:EN:PDF> (accessed 23 February 2013)

European Commission (2013), "Industry sectors overview", available at: http://ec.europa.eu/enterprise/sectors/index_en.htm (accessed 20 February 2013).

European Commission (2011), "Supporting growth and jobs – an agenda for the modernisation of Europe's higher education systems", available at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0567:FIN:EN:PDF> (accessed 20 February 2013)

EuroFM (2009), *European Facility Management Education Guide – A resource for the FM industry, students and FM educators across Europe 2009*, EuroFM publication, Naarden.

Gilleard, J D, Tarcisius L C (2003), "Improving the delivery of patient services: alternative workplace strategies in action", *Facilities*, Vol. 21, No.1/2, pp. 20–27.

Goodlad, S (1979) What is an academic discipline? In: R Cox (ed.) "Cooperation and choice in higher education". London: University of London Teaching Methods Unit.

Hansen, G.K., Blackstad, S.H., Knudsen, W. (2011), "USEtool - Evaluating Usability - Methods Handbook", available at: http://www.metamorfose.ntnu.no/Dokumenter/USEtool_handbok-small.pdf (accessed 20 February 2013).

Haynes, B. and Price, I. (2004), "Quantifying the complex adaptive workplace", *Facilities*, Vol. 22, No. 1/2, pp. 8–18.

Holland, G.A. (2008), "Information science: an interdisciplinary effort?", *Journal of Documentation*, Vol. 64, No. 1, pp. 7–23.

IFMA (1998) "International Facility Management Association: about facility management". Houston, Texas, available at: <http://www.ifma.org/about/what-is-facility-management> (accessed 23 February 2013).

Jensen, P.A. (2008), *Facilities management for students and practitioners*, Centre for Facilities Management – Realdania Research, DTU Management Engineering, Technical University of Denmark, Copenhagen.

Junghans, A., Olsson, N. (2012) "Does Facilities Management meet the requirements of an academic discipline?", in Mitchell, K.; Bowen, P.; Catell, K. (eds.) *Proceedings of the Joint CIB W70, W92 & TG72 International Conference on Facilities Management, Procurement Systems and Public Private Partnership Delivering Value to the Community, 23–25 January 2012, Cape Town, South Africa*, pp. 115–121. ISBN 978-0-620-50759-2

Junghans, A. (2011), "European FM research agenda", Jensen, P.A., Balslev Nielsen, S. (Ed.), *Facilities Management Research in the Nordic Countries – Past, Present and Future*, Polyteknisk Forlag, Copenhagen, pp. 325–339.

Klungseth, N.J., Blakstad, S.H.(2012), "The silent army – A story from practice", in Michell, K.; Bowen, P.; Catell, K. (eds.) *Proceedings of the Joint CIB W70, W92 & TG72 International Conference on Facilities Management, Procurement Systems and Public Private Partnership Delivering Value to the Community, 23–25 January 2012, Cape Town (South Africa) Department of Construction Economics and Management, University of Cape Town 2012*, pp. 711–720.

Krishnan, A. (2009), "What are academic disciplines? Some observations on the disciplinarity vs. interdisciplinarity debate", NCRM Working Paper Series 03/09, University of Southampton: National Centre for Research Methods.

Kuchinke, K. P. (2001), "Why HRD is not an academic discipline", *Human Resource Development International*, Vol. 4, No. 3, pp. 291–294.

Leaman, A. and Bordass, B. (2001), "Assessing building performance in use: the Probe occupant surveys and their implications", *Building Research & Information*, Vol. 29, No. 2, pp. 129–14.

Lee, G. K., Chan, E.H. (2008), "A sustainability evaluation of government-led urban renewal projects", *Facilities*, Vol. 26, No. 13/14, pp. 526–541.

Lee, S.Y. (2006), "Expectations of employees toward the workplace and environmental satisfaction", *Facilities*, Vol. 24, No. 9/10, pp. 343–353.

Lennerts, K., Abel, J., Pfründer, U., and Sharma, V. (2003), "Reducing health care costs through optimised facility management-related processes", *Journal of Facilities Management*, Vol. 2, No. 2, pp. 192–206.

Miller, R. (1982), "Varieties of interdisciplinary approaches in the social sciences", *Issues in Integrative Studies*, Vol. 1, pp. 1–37.

OECD (2002), "Frascati manual 2002: Proposed Standard Practice for Surveys on Research and Experimental Development", Paris: Organisation for Economic Co-operation and Development, available at: <http://www.oecdbookshop.org/oecd/display.asp?K=5LMQCR2K61JJ&DS=Frascati-Manual-2002> (accessed 20 February 2013).

OECD (2008), "Education at a Glance 2008", available at: <http://www.oecd.org/education/skills-beyond-school/41284038.pdf> (accessed 20 February 2013).

Pierce, S. J. (1991), "Subject areas, disciplines and the concept of authority", *LISR [Library and Information Science Research]*, Vol. 13, pp. 21–35.

Puddy, J R, Price, I, Smith, L (2001) FM policies and standards as a knowledge management system. "Facilities", Vol. 19 No. 13/14, pp. 504–515.

- Preiser, W., Rabinowitz, H. and White, E. (1988), *Post-Occupancy Evaluation*, Van Nostrand Reinhold.
- Price, I. (2002), "Can FM evolve? If not, what future?", *Journal of Facilities Management*, Vol. 1, No. 1, pp. 56–69.
- Ponzi, L.J., Koenig, M. (2002), "Knowledge management: another management fad?", *Information Research*, Vol. 8, No. 1.
- Schalcher, H.R. (2007), "Facility management - a scientific discipline?", Schalcher, H.R. (Ed.) *6th EuroFM Research Symposium, 26-27 June 2007, Zurich*.
- Stanford, S. (1998), "(Inter)disciplinarity and the question of the women's studies Ph.D.", *Feminist Studies*, Vol. 24, No. 2, pp. 301–25.
- Tai, L., Ooi, J.T.T. (2001) "Facilities management: a 'Jack of all trades'?", *Facilities*, Vol. 10, No. 10, pp 357–362
- Taylor, P. J. (1976), "An interpretation of the quantification debate", *British Geography. Transactions of the Institute of British Geographers N.S.*, Vol. 1, pp. 129–42.
- Terras, M. (2006), "Disciplined: using educational studies to analyse 'humanities computing', *Literary and Linguistic Computing*, Vol. 21, No. 2, 29–246.
- Thomson Reuters (2013), "The World University Rankings", available at: <http://www.timeshighereducation.co.uk/world-university-rankings/> (accessed 20 February 2013).
- Tucker, M. and Smith, A. (2008), "User perceptions in workplace productivity and strategic FM delivery", *Facilities*, Vol. 26, No. 5/6, pp. 196–212.
- Wagenberg, A F (1997), "Facility management as a profession and academic field", *International Journal of Facilities Management*, Vol. 1, pp. 3-10.
- Wasson, C. (1978), *Dynamic competitive strategy & product life cycles*, Austin Press, Austin, TX.
- Wood, B. (2006), "The role of existing buildings in the sustainability agenda", *Facilities*, Vol. 24, No. 1/2, pp. 61 – 67.