Facility management in Dutch higher education

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Chapter 1

Introduction

1.1 Introduction

This book discusses whether, and if so, how facility management (FM) can contribute to educational achievements at Dutch higher education institutions. For some, especially those involved in the daily practise of education and educational administration, this may seem rather far-fetched. Obviously intelligent students achieve high grades. There is also increasing evidence that the quality of the lecturer is decisive for the performance and development of students (Marzano 2007; Mourshed, Chijioke and Barber 2010). In addition, educational leadership can shape the necessary boundary conditions for these primary actors to succeed. Yet, and of course the above is somewhat exaggerated, nowadays this must be considered as a too narrow conception of what good education is all about. But before we go into details and reveal the, sometimes, remarkable findings of a scientific quest for the possibilities of FM in the educational environment, we will first discuss the challenges that FM faces nowadays. What is this curiosity about the contribution of FM anyway, and how does that fit in an educational setting?

Facility management is the responsible function within organisations that takes care of the building and the people within it. For long, however, they have not been concerned with the discussion to enhance educational performance. Up to date, in literature however there appeared to be a lively debate about the effective use of facility design, as a mixture of designed features of physical facilities and services, and how to manage such, but few empirical results were shown. Literature does argue that FM is seen as a marginal activity whose costs should be reduced. There are also strong indications that the focus on cost reduction will be implemented regardless of the consequences for the performance. Empirical support for these particular conceptions is lacking. What is known is that customers perceive little risk for the primary process related to the use of facility services (Dean and Kiu 2002; Salonen 2004). In addition, it is widely accepted that managers generally regard facility management (FM) as a cost centre rather than as value adding for their primary processes (Alexander 1996; Price and Akhlagi 1999; Hinks 2004; Kaya et al. 2004; Davies 2008). In FM literature this has been related to the indemonstrable contribution of physical facilities and service processes (Williams 1996; Kaya et al. 2004) and/or the limited understanding of the relationship between this facility design and the objectives of the organisation that uses them (Loosemore and Hsin 2001; Then and Tan 2006). A number of FM related studies have been conducted focussing on different aspects of its added value for the primary processes (e.g. Williams 1996; Krumm, Dewulf, and De Jonge 1998; Amaratunga and Baldry 2000; Salonen 2004; Wauters 2005; Lindholm and Leväinen 2006; De Toni et al. 2007; Chotipanich and Nutt 2008; De Vries, De Jonge, and Van der Voordt 2008), especially quality (e.g. customer satisfaction), time (e.g. response time), risk (e.g. safety, reputation) and relationship quality (e.g. alignment). These studies pointed at the potential benefits of FM for the primary processes (Atkin and Brooks 2000; Hinks 2004; Salonen 2004). However, no integration of the different aspects of its added value were combined, also because of definitional and measurement problems.

So, although facility management, also by definition, is about providing internal services and managing/changing physical environments to support the effectiveness of primary processes of organisations (e.g. Atkin and Brooks 2000; Barrett and Baldry 2003; Comité Européen de Normalisation 2006), up to date very little is known about how best to establish and measure this in general, and in an educational setting in particular. In FM literature governance and performance in terms of added value is not approached as an integrated system. The theory focuses on separate components such as performance measurement, alignment (e.g. Green and Jack 2004) and the establishment of the service (e.g. Chotipanich and Nutt 2008). FM theory emphasizes that the objectification of the added value is difficult, and in order to make added value comprehensible, performance measurement should be based on shared measures between the use of facilities and the outcomes of primary processes. The monitoring and control of facilities nowadays seems largely based on financial benchmarks and employee satisfaction. Although these metrics signal some aspect of value, they are no clear-cut indicators for the effectiveness of facility design. Stronger, in an educational setting it goes without saying that this calls for evidence in terms of a demonstrable statistical relation between the use of different design features of physical facilities and services, and student outcomes.

Literature suggests that the key to effective FM is the alignment of the support environment to organisational needs, which consequently optimises the use of resources (e.g. labour, money) (Atkin and Brooks 2000; Green and Jack 2004; Then and Tan 2006). It allows facilities to be used situational in a way that their contribution to the activities of organisational units is maximised. Looking at the nature of demand and the organisational needs and preferences for facility services, alignment manifests differently on the three organisational levels (Comité Européen de Normalisation 2006). At the strategic, tactical and operational level alignment reflects respectively in an organisational-spatial environment that is consistent with the strategic direction and issues, that contributes to the outcome of primary processes, and that leads to the functional availability and suitability of physical facilities and services (Kok 2012). In other words, within the existing FM literature the importance of aligning with the primary processes has been recognized, however fails to assess how this alignment should manifest (Nutt 2004; Green and Jack 2004; Barrett 2000; McGregor 2000; Sarshar, Sertyesilisik, and Parry 2010). Also, previous studies are not clear about the organisational level of alignment between FM and the primary processes. So, although the responsible actors for facility design and management and their respective users are known, and in all situations where there is an established facility management, such an alignment occurs continuously, there is a lack of evidence for how facility design decisions come about and how they are evaluated.

Considering the entire above, there seems to be a scientific black box with respect to the relatively new scientific discipline of FM. Deeply rooted in practice, the abstractions that have existed until now have hardly led to a fundamental understanding of the contribution of the discipline in its social context in general, and specifically that of education. Therefore, the main objective of this book is as follows.

To analyse how higher education institutions can improve the added value of facility management for their primary processes.

1.2 Research context

Without doubt, FM is inherently a generic discipline that only acquires meaning in terms of effectiveness within a particular social-economic setting. The type of organisational primary process or human activity and the way facility resources are used for the benefit thereof, determine whether or not there is added value. Physical facilities and services, as the provisions of FM, are relatively meaningless. Once placed in a certain context, however, such as an organisation and users with use goals, and they will get a particular meaning. The extent to which physical facilities and services have significance will depend on the extent to which, whether or not the user and, consequently, the organisation is able to achieve their goals by their use (Woodruff 1997). We have seen many examples of the so-called human factor being negatively influenced by seemingly fringe events, but that suddenly appears to be precondition for education. Too warm, too cold, too crowded, too loud, too messy, and no idea why this device doesn't work are phrases that come to mind. Without going into detail and present a whole catalogue of factors, we now know that the built school environment and facility services that are offered are among the elements that can influence good education. The evidence comes from multiple disciplines, such as environmental-psychology (Hygge and Knez 2001; Durán-Narucki 2008), medicine (Hutchinson 2003), educational research (Schneider 2002; Oblinger 2006; Temple 2007; Blackmore et al. 2011), and real estate and facility management (Daisey, Angell and Apte 2003; Duyar 2010; Barrett et al. 2013).

The perspective that we embrace as a starting point for this book is facility management in a Dutch higher educational setting. Actually, we work with data collected from eighteen Dutch Universities of Applied Sciences (UoAS). Dutch UoAS provide higher vocational training. Students are educated for higher management positions in business and government. Unlike universities UoAS programs primarily focus, in addition to the transfer of academic knowledge, on the development of skills in close cooperation with professional practice. Dutch UoAS can be divided into different organisational units, often called faculties. Within a unit, students follow different courses. Most courses have a specialisation option as of the third year. Unlike universities, for Dutch UoAS students an internship is mandatory. In the fourth year, the student writes a thesis. UoAS programmes for bachelor's degrees usually last 4 years of each 60 ECTS. Of these, the preparatory phase includes one year and the main phase 3 years. There are variations that are shorter. After earning 240 credits students receive the diploma for the degree of Bachelor (B.)

Bitner (1992) suggests that organisations such as education institutions, but also hospitals and hotels, face the most complex "servicescape" decisions. These so called elaborate environments are complicated, with many elements and many forms. It is a comings and goings of students who can be considered as the customers of the organisation, and that are

onsite. Besides typical office work, there is also an interactive primary process of teaching and learning taking place, in which the teaching professional, in addition to the student, is central. That mix of both employees and customers in generally comprehensive physical environments makes it both dynamic and challenging to provide an effective support. In such an elaborate environment, the full range of marketing and organisational objectives theoretically can be approached through careful management of the servicescape (Bitner 1992). For example, a classroom can be designed to enhance student comfort and satisfaction while simultaneously facilitating teachers' productivity. Knowing this, the challenge is to ensure that these facilities are used effectively. In this context, the several studies shown in this book are prepared.

Facility management in an educational setting is by definition an interdisciplinary field of research. It touches for instance aspects of facility design that largely draws on theories from service management and operations management. Facility management, as a relatively new scientific field of research, builds upon theories in the area of environmental psychology, architecture, real estate, civil engineering, interior architecture and management studies. By conducting research in an educational setting, we touch educational studies. The difficulty, but also the challenge of this combination shows in this book where our position is at the crossroads of three overarching disciplines: facility management, service management and education management.

1.3 Research questions

1.3.1 A measurement model for the added value of facility management

In Chapter 2 we aim to conceptualise the added value of facility management in the educational environment into a measurable construct. In addition, and to be able to do this, we aim to define the added value of facility management in general and to develop a typology of facility design dimensions based on their added value in the educational environment. Therefore, the following research question was formulated.

Research Question 1 (RQ1): How can the use of different facility design dimensions and their effects on educational achievements be conceptualised into a measurement model of FM added value?

Discussing added value implies facility management has the potential to add value to the organisation and to the outcome of the primary processes. However, without a clear definition of what this added value is, and a tool to make this quantifiable, it is only rhetoric. Coenen, Alexander, and Kok (2012) argue that in FM, value is mostly based on economic rules of thumb such as value is created when financial value is added, i.e. lower costs and/or higher revenue for the client organisation. Based on the mostly cost-driven and technical approach of FM, the discipline appears to still be largely driven by a counting mind-set. A possible reason

for this practitioners' bias might be a lack of understanding of the added value of FM. Dodds (1999) suggested that when quality and customer service are difficult to discern, price information becomes stronger in determining value. Rather than measuring effects, financial indicators, which are relatively easy to measure, will then be used as a proxy for facility design effectiveness. Although both researchers and practitioners were very much aware of the limitations of such metrics, for long this has been common practise. Stronger, in FM practise in general, and in education in particular, benchmarks still are the preferred indicators for evaluation and decision-making purposes in the boardroom.

After decades of dominance of benchmarking and outsourcing in the literature, at the end of the first decade of 2000, a number of European researchers decided to collaborate closely to identify and study FM added value. Per Anker Jensen initiated the added value project as chairman of the EuroFM research network Group in 2007-2008. The EuroFM research group on added value of FM was founded in 2009 and started with a first workshop in Copenhagen in May 2009. All together eighteen international respected researchers, professors and experts in FM from six countries collected and compared theories and examples of research. They discussed results of joint research activities and included their main findings in a collective work, aimed to contribute to the change of FM from reducing costs towards increasing quality (Jensen, Van der Voordt, and Coenen 2012). The book is a remarkable documentation of how FM has been changing from a predominant focus on cost reductions within the last years. It is in this light that the second chapter was established, whereby our main attempt was to resolve the problems of definition and explain the concept of added value as a quantifiable concept. By doing so, we shape our theoretical expectations of the potential added value of facility management in an educational setting.

1.3.2 Alignment between decision makers and users

In Chapter 3 we aim to explore whether there is alignment between top managers' and facility managers' efforts regarding facility design at higher education institutions and related user experiences. To do so, we raised the following research question.

Research Question 2 (RQ2): To what extent are top managers' and facility managers' efforts to design their facilities consistent with user experiences?

Literature suggests that the key to effective FM is the alignment of the support environment to organisational needs, which consequently optimises the use of resources (e.g. labour, money) (Atkin and Brooks 2000; Green and Jack 2004; Then and Tan 2006). The idea behind this is that in the exchange of information between demand (i.e. users of facility design) and supply (i.e. facility management providers) an appropriate facility design will emerge. Central in this is the understanding of the needs and wants of users and consequently providing the matching physical facilities and services. This approach would reflect user centricity as opposed to a typical supply-driven approach. However, facility management decisions are made in a multistage process in which not only users and facility managers are involved, but also top

management has a say. To date little is known about the administrative considerations that play a role in decisions on facility design. Costs and risks are often mentioned, but whether these aspects are actually playing a central role in facility management decisions, or whether there are other considerations, are unknown. The degree to which decisions are made in mutual coherence and coordination, in terms of the nature of the cooperation between top managers, facility managers and end users, may then well explain differences in facility design, and that as such, may influence the effectiveness of the use of physical facilities and services.

To indicate this, Chapter 3 maps the facility design process (i.e. the different characteristics of facility management governance) in terms of coordination, monitoring and control action and assesses how students experience the outcome of this process. To gain an understanding of how the facility design is established, we here about examine the alignment and decision-making process on the basis of in-depth interviews with the responsible actors: top managers and facility manager. By this we aim to identify similarities and differences in facility management governance between the various institutions. To determine the degree to which users are emancipated in this process, we ask students whether and how they experience these different facility design steps and the outcome of this by means of group discussions. This obviously is a validation of the ruling of decision makers. Students for this are a good indicator because they, as customers (and thus relative outsiders) of the institution, are expected to be the most remote user in terms of their involvement in facility management. Therefore, as a non-informed crowd, they expectedly respond the least biased (unlike, for example lecturers who, as staff, often have much more information which may obstruct their objective view).

1.3.3 Different employees' quality perceptions

In Chapter 4 we aim to determine whether job position within higher education institutions has an effect on the perceived facility design. Therefore, the following research question was formulated.

Research Question 3 (RQ3): Are there differences in the perceived quality of facility design between the different employee categories (top manager, education manager, lecturer, facility manager) at higher education institutions, and, if so, what importance do they place on the different facility design dimensions?

With a multitude of users it is difficult to make everyone feel at home. In terms of employees, the primary process of education is represented by lecturers as providers and education managers as their supervisors. Looking at facility design, then it is the facility manager who has the primary responsibility for this. Top managers (i.e. Executive Board) have an overall responsibility, and therefore will have a (decisive) say in the ultimate physical surrounding of education, all be it due to their financial concern. When choosing a facility design it therefore just depends on who has the primacy, as all these different employee categories there may

have different wants and needs in regimes considering their different activities. Decision-making may also be subject to a certain bias of the decision maker, due to information asymmetry and managers allegedly generally regard FM as a cost centre, as mentioned earlier. Therefore, the third study explores the perceptions of facility design of four employee categories at higher education institutions, being top manager, facility manager, lecturer, and education manager. Also the importance these different employee categories attach to facility design in relation to educational achievement is quantified. The four categories are the primary actors with regard to decision-making and using facility design in the educational setting.

Determining the possible effect of job position on the opinion about facility design is of use in both the design process and managing the physical facilities and services. It may appear that in making (re)design decisions, the design features of the physical facilities and services (strongly) depend on the employee category whose input is used for this. If so, then insight in different employees' quality perceptions is a step forward towards a balanced facility design that caters to the needs of all employees.

1.3.4 Predictors of study success

In Chapter 5 we want to explore whether the built environment of educational institutions, as a mixture of designed features of physical facilities and services, affects learning outcomes. The study presented focuses on the following research question.

Research Question 4 (RQ4): Is, and if so, to what extent the perceived quality of facility design at higher education institutions positively related to the learning outcomes of the students?

In literature there is substantial evidence for the association between the use of physical facilities and services and the outcome of customer processes (e.g. Sundstrom and Sundstrom 1986; Bitner 1992; Rashid and Zimring 2008). The human response to the environment is either attract versus avoid (Mehrabian and Russel 1974; Bitner 1992). Specifically, in education the evidence found particularly focuses on the influence of spatial features as indoor climate, lighting, temperature, acoustics and configuration of the classroom on student performance (Fraser and Fisher 1982; Temple 2007; Uline and Tschannen-Moran 2008). Although, amongst others, Rapoport (1982) and Bitner (1992) argue that people respond to the built environment as a holistic concept, giving meaning to the whole instead of the different design elements, most empirical evidence for people's response to the built environment focuses on single or a few elements. For our purposes, exploring how higher education institutions can make effective use of facility design, these are encouraging but not sufficient results. To be able to make evidence-based decisions, on one hand, our curiosity is especially what the actual effect sizes are of the impact of the different physical facilities and services on students' educational achievements. On the other hand, since a holistic approach to facility design is needed, we must examine this relationship for the use of facility design

dimensions in their mutual coherence. Is the impact of different facility design dimensions, for example, all the same or not? Are there perhaps some facility design dimensions that are unfavourable with negative effects? This insight is interesting for decision makers since it enables them to allocate funds more effectively for educational support. It also allows decision makers to carry out interventions in the facility design to thereby improve organisational performance. Basically, we set out to demonstrate the contribution of facility design to educational achievement by quantifying the relationship between the use of physical facilities and services and educational achievement. By doing so, we inherently aim to quantify the possible added value of facility design and management in higher education. From a scientific perspective Chapter 5 builds on an empirical foundation next to the abundant conceptual contributions that already exist in FM literature.

At this stage we focus on lecturers as our informants for their opinion about the physical facilities services. There is a growing body of evidence that the school systems moving from good to great (e.g. Singapore, Hong Kong, South Korea, Saxony – Germany) are characterised by more highly skilled educators (Mourshed, Chijioke and Barber 2010). With this in mind it is also interesting to find out whether the facility design meets the needs of lecturers and whether there is a relationship between their opinion about facility design and study results. Hence, we may possibly find indications of the extent to which good facility design is a precondition for good education.

1.4 Research design and thesis setup

The remainder of this book is organised as follows. Chapters 2, 3, 4, and 5 present four separate studies, each addressing one of the research questions that are stated in this introduction chapter. To meet our main research objective and answer the research questions raised, we choose for a combination of methods. In Chapter 2 a literature study is presented to lead to firstly, a definition of FM added value and secondly, the conceptualisation of a model to measure this FM added value, answering RQ1. In Chapter 3 we continue with a qualitative study to gain an in-depth understanding of management considerations and efforts in the facility design process in the search of alignment between decision makers and users, answering RQ2. To do so, we describe the characteristics of the FM governance by means of a number of key elements. We do this through in-depth interviews with the top manager and the facility manager of seven higher education institutions. We then test this with students, in terms of how they experience the facility design and the different design steps that led to this. Therefore, in addition, data is gathered from students using group discussions at each of the seven participating institutions. For theory building purposes, and to create more robust and testable theory than single cases, Eisenhardt (1989, p. 545) suggests that “a number between 4 and 10 cases usually works well”. Of a total of 39 Dutch Universities of Applied Sciences we gathered, as mentioned, data from seven institutions. The sample represents the target population regarding scale (both larger and smaller institutions), and also reflects the different types of universities; general and specialised. So obviously, we validated the rulings of the

decision makers by asking students and therewith determine whether both actors are aligned. Students, as customers of the institution, are expected to be the most remote user in terms of their involvement in facility management, and therefore can be used as a good indicator of whether or not facility management results in an effective facility design in terms of fit with user needs and preferences. We also expect them to be less biased than lecturers, because they, as an external, are not part of the hierarchy of the organisation.

In Chapter 4 and 5 we present two quantitative follow up studies to identify possible perception gaps between different employee categories and to measure the effects of facility design on educational achievement, answering RQ3 and RQ4. In Chapter 4 we make use of an online survey questionnaire to measure the perceived quality of facility design of four different employee categories at eighteen institutions; top manager, education manager, lecturer and facility manager. To identify perception gaps, we compare measurements of these four employee categories. To determine possible effects of the quality perceptions of facility design, in Chapter 5 we regress the measurements of lecturers with study success at the institutional level, using the data collected from the same online survey questionnaire. At this stage, to obtain more generalisable results, we included nearly half of all the 39 higher education institutions. Hence we work with a highly realistic reflection of the target population. Also, at this stage we focus only on employees rather than also include students. Since a purposeful facility design is rooted in the needs of the employees and the goals of the organisation (Bitner 1992; Comité Européen de Normalisation 2006), it is clear that facility managers have to deal with a wide variety of employees, with different positions within the organisation like operational staff and (top) management. All these employees have different tasks and expectedly corresponding support needs, and, following Bitner (1992) and Fitzsimmons and Fitzsimmons (2011), different internal responses to facility design. To measure effect sizes, we use lecturers as the informants on the perceived quality of facility design. Early work of Cooper (1985) shows that lecturers, as a primary actor, are very informative when it comes to assessing the environmental conditions necessary for, and conducive to, the practice of education.

Chapter 6 presents the overall discussion and conclusions of this book. First, we elaborate on main findings and conclusions per research question, and then we present the contributions to literature, followed by managerial implications, to end with limitations and suggestions for future research. Figure 1.1 summarises the outline of this book.

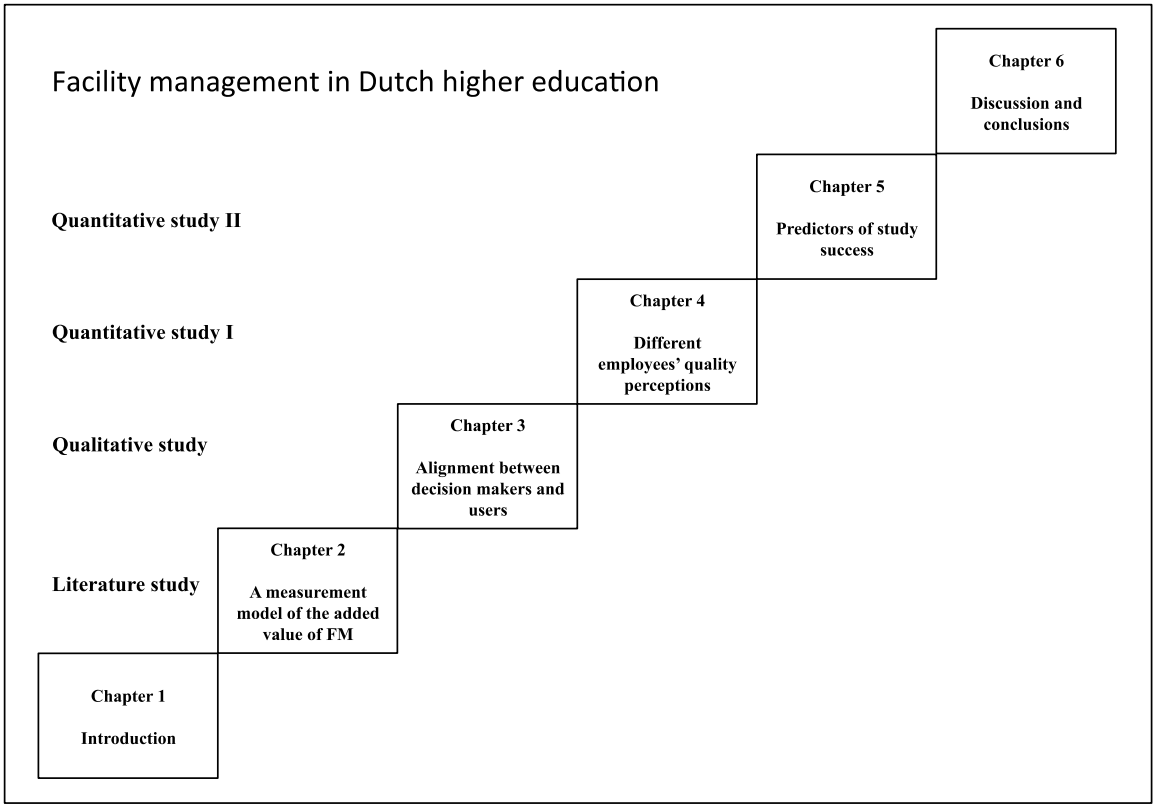

Figure 1.1 Thesis setup.

Chapter 2

A measurement model for the added value of facility management

This chapter is based upon:

Kok, Herman B., Mark P. Mobach, Onno S.W.F. Omta (2011), "The added value of Facility management in the educational environment," *Journal of Facilities Management*, 9 (4), 249-265.

2.1 Introduction

Learning can be affected by the environment in which the learning takes place (Hutchinson 2003). For this environment as a physical place, it seems that small factors rather than grand architectural statements may make an increased difference to learning (Temple 2008). There is a growing body of scientific evidence for the relationship between the quality of educational facilities and resultant educational achievement (Uline and Tschannen-Moran 2008; Tanner 2009; Duyar 2010; Fram 2010). Yet decisions about the educational built environment seem to be independent of teaching and learning needs and the impact of the educational built environment on the learning outcome (Temple 2008). This educational built environment includes important aspects of facility management, such as the accommodation and the fit out of classrooms. For the allocation of scarce resources to education and support, it is interesting to know which facility design dimensions contribute most towards educational achievement (Crampton 2009). A typology of facility design dimensions based on their added value would therefore help in making decisions about the use of such physical facilities and services. The importance of insight into the contribution of FM in general is also recognised in FM literature (Massheder and Finch 1998; Loosemore and Hsin 2001; Hinks 2004; Price 2004; Jensen et al. 2010).

In this chapter we aim to conceptualise the added value of facility management in the educational built environment into a measurable construct. To be able to do this, first we aim to define the added value of facility management in general and specifically the added value of facility management in the educational environment. Then a model is explored to make visible the use of facility design dimensions and their effects on educational achievement. The model also enables us to develop a typology of facility design dimensions based on their added value in the educational environment. Subsequently, the typology can be discussed based on the contribution of facility design dimensions to education as found in the literature. The final discussion focuses on the implications for a method with which the use of these facility design dimensions can best be organised in order to optimise their contribution to education. The following research question was formulated.

Research Question 1 (RQ1): How can the use of different facility design dimensions and their effects on educational achievements be conceptualised into a measurement model of FM added value?

2.2 Theoretical background

2.2.1 The meaning of facility management

It can be argued that facility support for organisations is based on a collection of more or less specialised technical and service-related tasks which are not part of the primary process, but which are essential for the functioning of this primary process. Traditional terms for this

collection of tasks are general services, internal services, household services and technical services. It is also often referred to as a distinction between so-called hard and soft services. In the late 1970s, the profession began to receive recognition and to define itself more formally within US and Canadian corporations, becoming known as FM (Rondeau, Brown, and Lapides 2006). Ever since, several definitions have been proposed, e.g. "Managing and coordinating interrelated 'people, process, and place' issues and functions within the corporation or organisation" (Facility Management Institute), or: [...] an integrated approach to operating, maintaining, improving and adapting the buildings and infrastructure of an organisation in order to create an environment that strongly supports the primary objectives of that organisation (Barrett and Baldry 2003). The International Facility Management Association currently defines FM as "a profession that encompasses multiple disciplines to ensure functionality of the built environment by integrating people, place, process and technology".

The definitions vary to some degree in their specificity of the different subjects of FM and the interpretation of FM as a profession or an activity. Whichever definition is adopted, it should stress the importance of an integrative, interdependent discipline which overall purpose is to support an organisation in the pursuit of its business and other objectives (Atkin and Brooks 2000). All of the definitions highlight to some degree at the distinction between demand and supply being the organisation as user of FM and the different services provided by FM. The past 20 years have seen a clear trend towards outsourcing the provision of facilities services to external suppliers (Duffy 2000; Roberts 2001; Bröchner, Adolfsson, and Johansson 2002; Salonen 2004). In cooperation with these parties, FM acts as a coordinating mechanism between demand and supply and aims to align support activities to primary objectives. For this study the definition of FM to be used is therefore:

Facility management is the coordination between demand and supply of facility design dimensions that, by doing so, seeks to support the effectiveness of an organisation.

The function of FM covers a wide range of processes, services, activities and facilities (Comité Européan de Normalisation 2006). Where FM refers to the managerial aspect, their deliveries are often called physical facilities and services (i.e. facility design dimensions). The breadth and scope of FM are not constrained by the physical characteristics of buildings (Barrett and Baldry 2003). The services vary from providing and managing the accommodation to ensuring that employees and guests feel welcome, cared for and safe. The scope of FM varies in the literature, but there is indeed a broad consensus about the products and services for which FM is responsible. According to Friday and Cotts (1995), Booty (2006) and Rondeau, Brown, and Lapides (2006) these are accommodation (e.g. design and construction), maintenance (e.g. services, building, grounds, furniture and equipment), alterations (e.g. churn and refurbishment) and fitting out (e.g. with furniture and equipment), cleaning, security and reception, utilities, internal decoration, signage, archiving, reprographics (copy centre), stationery, telecommunications (e.g. switchboard), distribution (mail, post room and courier), transport/fleet management, catering (food and beverages), audio-visual equipment, conference room scheduling, travel. Chauffeur services (Friday and

Cotts 1995), IT equipment, fitness centre, helpdesk, laundry and nursery/crèche (Booty 2006) are also mentioned. Kennedy (1996) highlights that there are likely to be other functions depending on the evolution of individual organisations as FM depends on multiple disciplines performing concentrated activities in order to deliver integrated solutions to the organisation. Thus, is can be argued that FM serves as a "container" for a range of activities which creates the complex issue of coordination and also makes is it difficult to identify the contribution of FM to organisational change and improvement. As a result it is also difficult to determine the exact added value of FM.

2.2.2 Added value

In the past, added value was particularly seen as a combination of price and quality (Treacy and Wiersema 1995). Nowadays added value is considered as a complex concept that can be studied from different perspectives. Despite the differences in definition and scope of analysis, there appears to be broad consensus about added value being the ratio between benefits and sacrifices for the customer (Porter 1985; Monroe 1991; Woodruff 1997). Risk is also mentioned in literature as a separate aspect of added value (Kemperman and van Engelen 1999). The assessment of and decision about added value involves a trade-off and a choice between different criteria – benefits, costs and risks – which in themselves are difficult to compare. The assessment concerns the functional or emotional advantages offered by a product or service in relation to the financial costs and efforts as well as the risks involved in using (or not using) the service. For example, neglecting maintenance initially saves scarce resources however shortens the technical lifespan of the equipment concerned. Postponing real estate maintenance to improve financial performance may even result in reduced staff motivation, student satisfaction and attraction of students, resulting in a negative financial performance (De Vries, De Jonge, and Van der Voordt 2008). Cutting back on cleaning may lead to heightened health risks due to fungi and bacteria. Their possible negative effects in the long-term (e.g. absenteeism, reduced productivity) reduce the advantages of short-term profit. This trade-off between benefits, costs and risks is also known as optimising the various values. Value can be created by and for individuals, organisations and society (Lepak, Smith, and Taylor 2007).

It is possible to distinguish two forms of value creation: "use value" and "exchange value" (Bowman and Ambrosini 2000). Use value refers to the specific quality of a product, service or task which the user experiences in relation to needs. The exchange value is the financial translation of this value and the monetary amount or price the user is willing to exchange and the risk that the user is willing to take (Lepak, Smith, and Taylor 2007). This will vary depending on the situation. The actual assessment of added value is context dependant, determined by customer perception and is dynamic and relational. The role of perceptions in assessing added value and its dependencies on the use situation, the use purpose (i.e. what a customer is trying to do with the offering at a particular time and place) and the alternatives offered by competition is common in literature (Christopher, Payne, and Ballantyne 1991; Woodruff 1997; Lindgreen and Wynstra 2005). The judgement of added value is subjective

(Zeithaml 1988) and a result of the expectations and the evaluations of the experiences of the product attributes, use consequences and use purpose (Zeithaml, Berry, and Parasuraman 1993; Friday and Cotts 1995; Woodruff 1997). Friday and Cotts (1995) highlight that benefits, costs and risks are criteria of customer expectations. Various authors add the element of perception to the context of added value (Monroe 1991; Zeithaml 1988; Zeithaml, Berry, and Parasuraman 1993; Woodruff 1997) finding that it is a personal pre-use and post-use interpretation of a product or a service. Christopher, Payne, and Ballantyne (1991) find that the aim of establishing what value is to the customer must be to identify what a customer is trying to do with the offering at a particular time and place. The variables involved in the customer's valuation as well as the assessments evolve over time (Kemperman and van Engelen 1999). From a customer's perspective, added value is often judged in terms of additional advantages expected or experienced by the customer compared to competitive offerings in case of substitutability (Woodruff 1997; Dodds 1999). Availability and competition, as factors of the laws of economics, influence the acceptance of price and thus the value perceived by customers (Meijer 2006).

In recent management literature, the conceptualisation of value has developed into two streams. One studies the value of goods and services itself while the other focuses on the value of the buyer-seller relationship (Lindgreen and Wynstra 2005). The importance and significance of maintaining a customer relationship for providing added value is widely acknowledged in the literature (Ravald and Grönroos 1996; Lindgreen and Wynstra 2005). Ravald and Grönroos (1996) argue that the customer relationship itself might have a major effect on the total value perceived by the customer. They propose that a good relationship between customer and supplier increases the trust for the supplier, making the customer more tolerant towards occasional inferior performance. Barrett (2000) points to the importance of building strong relationships in terms of information linkages with the core business to create value. Meaning that the alignment of the core business and FM is also a key element to the achievement of added value and that, besides the service specifications in terms of quality and performance required, the relationship between FM and the customer must also be considered. A customer-supplier relationship can therefore be viewed as the parties attempting to formulate an agreement under which the objectives of both parties can be met (Ravald and Grönroos 1996). Meijer (2006) finds competitive advantage to be due to unique and detailed knowledge of customers. After identifying and assessing the various aspects of added value, the question must then be asked as to whether physical facilities and services contribute to the primary process and, if so, how they contribute.

2.2.3 What is the added value of facility design?

In the literature, it is assumed that the application of FM is focused on supporting primary processes and contributing to achieving organisational goals (Atkin and Brooks 2000; Barrett and Baldry 2003). The physical setting can aid or hinder the accomplishment of both internal organisational and marketing goals (Bitner 1992). A lively discussion is taking place about the added value of FM as a function within organisations and the services they provide. A

clear expression of this is the large number of FM-related studies that have been conducted focussing on different aspects of its added value for primary processes (Williams 1996; Krumm, Dewulf, and De Jonge 1998; Amaratunga and Baldry 2000; Salonen 2004; Wauters 2005; Lindholm and Leväinen 2006; De Toni et al. 2007; Chotipanich and Nutt 2008; De Vries, De Jonge, and Van der Voordt 2008), especially quality (e.g. customer satisfaction), time (e.g. response time), risk (e.g. safety, reputation) and relationship quality (e.g. alignment). However, none of the studies provides a clear definition of what is meant by this added value. It has already been established that added value concerns a trade-off by the customer between benefits, costs and risks. In this study, the scope of FM focuses on the contribution to the educational achievement. For this study FM added value can be defined as the following:

FM added value is the customer perceived contribution of the different facility design dimensions to the organisation in terms of benefits in comparison to costs and risks.

In order to establish the contribution of FM, we use the work of Mobach (2009). Mobach (2009) distinguishes various business administration (financing, power, strategy, structure, culture and marketing), architectural (location, materials, colours and building types), technological (light, climate, sound and ICT) and natural (natural elements like daylight, air, water, plants and needs and behaviour like rest, space, relaxation and variety) contingencies which determine performance in terms of people's health, mood and behaviour in and around organisations via intermediaries (sensory observation, cognition, contact and functionality). These contingencies can be seen as basic ingredients for the spatial environment of which the physical facilities and services form part. The contribution of FM can thus be established by obtaining information about the relationship between the physical facilities and services and the customer's work processes. The contribution of FM can be found in the effects that the use (or non-use) of physical facilities and services have on the outcome of these processes. Facility design dimensions have differing effects on people's performance in and around office organisations. Often this relates to spatial characteristics, which is a limitation within the scope of the facility design. Effects of spatial characteristics can be considered to be; crowdedness, lack of privacy and noise in relation to stress (Gaillard 1996; Moline 2001) and perceived workload (Blomkvist et al. 2005; Evans and McCoy 1998), colour (Jacobs and Blandino 1992), lighting (Bronzwaer 2008) and temperature (Griffit 1970) in relation to vitality, air quality in relation to sick building syndrome (Wilson 1987; Kreiss 1990), too little exercise at the workplace and unhealthy diet in relation to health (Engbers et al. 2005). With regard to mood, these are effects of privacy in relation to employee satisfaction (Canter 1968; Oldham and Brass 1979; Sundstrom, Burt, and Kamp 1980; Ferguson and Weisman 1986) and temperature and lighting in relation to comfort (Nemcsics 1993). With regard to behaviour, these are effects of physical distance in relation to interpersonal communication and knowledge exchange (Peters and Waterman 1982; Allen 1967), physical layout and fitting out in relation to social interaction (Mehrabian and Diamond 1971; Tibúrcio and Finch 2005), productivity (Ilozor, Love, and Treloar 2002; van der Voordt 2004) and effectiveness and efficiency of meetings, use of colour (Kreiss 1990) and plants (Bakker and van der

Voordt 2010) in relation to productivity and the use of plants in relation to creativity (Klein Hesselink et al. 2007; Mehta and Zu 2009).

The use of physical facilities and services can be seen to influence the financial position of the organisation in a number of ways. Facility costs, after staff remuneration, account for organisations' second largest expenditure (Booty 2006). Choices regarding the building, construction materials and the technical facilities influence the operational costs and the related investments can tie up capital in the longer term. The value of real estate and facilities relate to the efficient use of financial resources in itself and in relation to what the building and these facilities generate in terms of returns, support of the primary process and achievement of organisational goals. The physical environment can be found to act as a differentiator, positioning the organisation and conveying distinctiveness from competitors (Bitner 1992; De Vries, De Jonge, and Van der Voordt 2008), contributing to the presentation of an institutional brand and building design and materials in relation to environmental issues (Treloar et al. 2001; Hodges 2005).

The influence of FM (in this case facility design dimensions) on the function of people within organisations can be argued sufficiently. The ability of the physical environment to influence behaviour and to create an image is particularly apparent for service organisations, for the place where the service is produced may have a strong impact on customers' perceptions of the service experience (Bitner 1992). In order to fully establish the added value of FM, according to the definition chosen, information is also required about the costs of physical facilities and services and the risks associated with utilising them. Costs are an aspect of added value, whether the customer actually bears the costs of the physical facilities and services is likely to effects the assessment of the added value. Facility services are unlikely to provide an equally important contribution to the organisation in every situation. Some physical facilities and services are more important to customers than others (Friday and Cotts 1995). The different perspectives to classify products and services might explain this. In relation to motivation at work, Herzberg, Mausner, and Snyderman (1959) suggest that motivation factors can contribute to satisfaction and that people cannot be made satisfied by hygiene factors, but that the lack thereof causes dissatisfaction. Studying consumer complaints and compliments in the restaurant and hotel industry Cadotte and Turgeon (1988) found different drivers for customer satisfaction:

- *Dissatisfiers* attributes that the customer naturally expects in a product or service but whose absence causes dissatisfaction.
- *Satisfiers* that can cause high satisfaction.
- *Criticals* that can cause both satisfaction and dissatisfaction.
- *Neutrals* that seem to have little effect on satisfaction or dissatisfaction.

Physical facilities and services can be categorised accordingly. It is then expected that the degree in which facility design dimensions are important to customers and (can) cause satisfaction determines the assessment of their added value. According to Arnold (2000), the effect of support services depends on the degree to which they are necessarily connected with

the organisation's existence. With declining influence and importance he identifies core-close, core-distinct and core-disposable activities. Atkin and Brooks (2000) and Tucker and Pitt (2009) prioritise facility services according to their degree of risk of failure and the consequence thereof for the primary process (e.g. in terms of continuity). Services become more critical as the risk of failure increases and the consequences for the primary activities become more serious. It is expected that the assessment of these consequences affects the decision of whether or not to use physical facilities and services. In the assessment of the added value of facility design dimensions, it is expected that their perceived contribution to preventing serious or less serious failure of the primary process is important. It can be seen that FM has a significant latent ability to affect people's performance in and around organisations. As in educational organisations, the support of information exchange is central, such as for "new ways of working", smarter working and the Dutch "Het Nieuwe Werken" which currently receives great attention among Dutch corporations. The question is then how this potential ability of FM to contribute to the performance of the primary process can manifest itself in other organisations, such as education where knowledge transfer is central. Studies in university research centres (Toker and Gray 2008) and R&D laboratories of pharmaceutical companies (Omta and Van Engelen 1998) found that workspace features affect the information exchange and create inspiring work environments resulting in improved innovation.

2.3 Results

2.3.1 Facility design and educational environment

The educational built environment can be described as the learning space in which conditions are created which makes teaching and learning possible (Temple 2007). The primary goal of an educational built environment is offering space for knowledge transfer. Classrooms as physical spaces designed to support face-to-face teaching and learning, with tables and chairs and a means of displaying information for all to see, can still be regarded as the core learning space (Brown and Lippincott 2003; Temple 2008). The physical form of the university supports community formation similar to original layouts of human settlements that can be interpreted as attempts to manage encounters between locals and strangers safely and efficiently (Temple 2007). Thus, design features are used to bring people together in settings where mutually beneficial interactions may occur among teachers and students (Temple 2007). Universities establish and nurture learning communities (Bennett 2007). Designing a university poses some questions: how to manage interactions between the "resident" staff members and "visiting" students effectively and safely; how to maximise the possibility of beneficial encounters; how to locate facilities to make them easily accessible; and how to use design to contribute to the brand (Dovey 2008). The abovementioned questions provide guidance for the use of physical facilities and services in the educational built environment.

For the conceptualisation of the added value of FM in the educational built environment, we make use of the study by Donabedian (1988), used at the time to assess the quality of health care. This conceptualisation focuses on the structure in which care occurs and the processes of care which affect the outcomes of care (Donabedian 1988). Structure denotes the attributes of the settings and includes material resources (such as facilities and money), human resources and organisational structure. Process denotes what is actually done in giving and receiving care. Outcomes denote the effects of care on the health of patients and populations. The analogy with education consists in the fact that educational achievement is partly the result of the organisational-spatial attributes of the setting in which the education takes place (Figure 2.1). Mobach (2009) finds the organisational-spatial attributes to be partly determined by the physical facilities and services and the coordination of FM for creating added value for education. The process relates to the education itself that consists of knowledge transfer, for example in the form of lectures and seminars (Vernooij 2001). The outcome of this process is the educational achievement, such as success rate and educational evaluations. Educational achievement can be measured in various ways. In studies focusing on primary education, end-of-school results measured by performance in standardised reading, writing, and mathematics tests are common (Collins, McLeod, and Kenway 2000; Meier and O'Toole 2003; Driessen 2007), and in some cases the advice for secondary school and the educational position achieved in secondary education (Driessen 2007). Other important and post-school outcomes are further education, labour market participation, as well as out-of-the-labour market activities (Collins, McLeod, and Kenway 2000). In higher education, academic achievement, also termed learning outcomes, can be measured at individual level, or student and group level (Jansen 1996). At student level, a student's learning outcome can be examined by the grade point average, the total number of credits obtained after a certain period, and the study pace, i.e. the time a student needs to obtain a degree (Jansen 1996; Need and De Jong 2001). Beside these outcomes at individual level, domain-specific outcomes at group level are distinguished, i.e. the so-called "numerical returns" (Jansen 1996). The numerical return concerns the percentage of students who pass an exam, e.g. a propaedeutic (foundation year) or final master's degree exam, within one or four years, respectively. Besides, the numerical returns, a more commonly used outcome measure is the dropout rate (Bruinsma 2003).

Learning, and therefore the results measured through the above methods, can be affected by the environment in which the learning takes place (Hutchinson 2003). Historically ideas and decisions about campus design and university buildings in terms of learning space are independent of teaching and learning needs or the possible effect of the learning space on the educational achievement (Temple 2008). More recently, the importance of creating human-scale learning environments features in the literature suggesting how campus and building design can be used to facilitate learning (Temple 2008). Some writers note that teaching and learning should drive design, rather than vice versa, in response to changed approaches to teaching and learning (Jamieson et al. 2000; Jamieson 2003). However, rather little is said about the precise nature of the new spaces (Temple, 2008). There is some limited evidence on the role of both campus and individual building design in supporting learning (Temple 2008). What is not clear in the available studies is whether new buildings account for the difference or whether it was the resulting cleaner, brighter environment, or neither (Temple 2008).

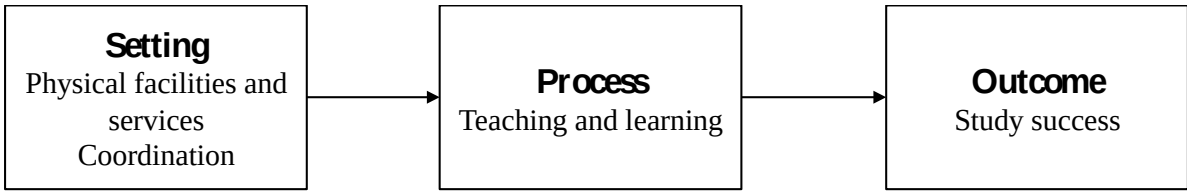

Figure 2.1. Conceptualisation of added value of FM in the educational environment.

There are indications that certain aspects of the so-called micro-design such as seating arrangements (Strange and Banning 2001; Hutchinson 2003), scheduled and day-to-day maintenance and cleaning (Temple 2008) and wireless/wired information technology (Tibúrcio and Finch 2005) affect the teaching and learning processes. There is a growing body of research that connects the design and physical school environment to academic achievement (Uline and Tschannen-Moran 2008; Tanner 2009; Duyar 2010; Fram 2010) and the impact facilities have on a student's choice of university (Price 2004; De Vries, De Jonge, and Van der Voordt 2008). Duyar (2010) found that the conditions of natural lighting, air conditioning, indoor air quality, acoustics or noise control, physical condition of ceilings, floors, walls, windows and doors and the size or configuration of classrooms significantly contributed to predicting the delivery of instruction in schools. This study also supports the literature on the comparative importance of cosmetic facility conditions over structural facility conditions. Hutchinson (2003) found room temperature, seating comfort, background noise and visual distractions are all factors of the environment that can influence learning because they affect concentration and motivation.

Good environmental conditions like temperature, humidity, noise control and lighting are also prerequisites for learning, whereas buildings design and internal layouts that suit their users work patterns produce better outcomes for both learning and staff and student satisfaction (Temple 2007). Effective instruction can be argued to be hindered by the deficient or inadequate condition of buildings, heating and/or cooling systems, lighting systems, acoustic systems, indoor air quality and instructional space (Roberts 2009). Hodgson found that the quality of verbal communication can be improved by proper design of classrooms and the use of acoustic material on walls and ceilings. Findings of research by Versteeg (2007) commissioned by the Dutch ministries of Housing, Spatial Planning and the Environment (VROM), Education, Culture and Science (OCW), Social Affairs and Employment (SZW) and Health, Welfare and Sport (VWS) show that the quality of the indoor environment in primary schools is often substandard. Problems are found with the air quality in classrooms, disturbance from outside noise and noise associated with the ventilation system and temperature control. There are indications that poor indoor air quality in schools can result in rising health problems, however this is still not proven entirely (Meijer, Hasselaar, and Snepvangers 2007). There are also indications that high CO2 concentrations in classrooms can cause a decline in children's learning achievements (de Gids et al. 2007).

2.3.2 Typology

The literature provides sufficient proof for the link between the quality and performance of physical facilities and services on the outcome of the education, teaching and learning process. The elements included in the facilities design dimensions in this case are mainly natural lighting and lighting systems, heating, ventilating and air conditioning (HVAC) systems, acoustic systems, the design and configuration of classrooms, audio-visual/IT equipment, cleaning and maintenance (Strange and Banning 2001; Temple 2007; Roberts 2009; Duyar 2010). Others argue that facility conditions affect concentration and motivation (Hutchinson, 2003) and the health (de Gids et al. 2007) of students and teachers, impacting on academic achievement. From a FM perspective, the physical facilities and services have a major and direct effect on academic achievement. Other facility design dimensions such as building design, physical layout and fitting out of buildings, internal decorations, plants and catering have a more indirect influence on the educational process but do affect staff and student satisfaction and the organisations image. Their effect on academic achievement is thus limited. The more physical facilities and services directly affect the educational process, the higher we expect their potential contribution to the educational achievement will be.

In addition to a functional relationship between the built environment and work processes, Rapoport (1982) argued that the built environment also influences behaviour through the messages it sends. Its fixed-feature elements such as the physical structure and layout of the building and semi fixed-feature elements such as type and arrangement of furniture, plants, signage and decoration communicate meaning. Where fixed-feature elements rarely and slowly change, semi fixed-feature elements can, and do, change fairly, quickly and easily. The latter become particularly important for personalisation of the environment. Baldry (1999) adds the ambient environment in terms of temperature, air quality and lighting conditions as a third variable. All of these elements represent sets of social choices, encapsulate social priorities and constrain social action (Baldry 1999).

Table 2.1. Typology of facility design dimensions based on their added value in the educational environment.

Facility design dimension	Direct effect	Indirect effect
Ambient / low cost	Cleaning	Security, reception, distribution
Semi-fixed	Maintenance, acoustic systems, configuration of classrooms, audio-visual/IT equipment	Fitting out, internal decorations, signage, plants, archiving, physical security, reprographics, catering
Fixed / high cost	Lighting systems, HVAC systems (heating, ventilating and air conditioning), design of classrooms	Buildings design, physical layout

The typology (see Table 2.1) is constructed around two dimensions based on the questions "what effect do facility design dimensions have on the educational outcome?" and "what level of fixity and costs do the facility design dimensions have within the environmental dimension?" Three types of facility design dimensions and two types of effect have been

identified. Combined in a matrix, they make six possible categories of facility design dimensions, each illustrated with examples. For a number of physical facilities and services in the matrix, such as security, reception, distribution, signage, archiving, reprographics and catering, there are no relevant studies currently available regarding their effect on the educational outcome. It can be assumed that their effect is indirect because of the low impact these services have on the educational process as such. Facility design dimensions that share a cell within the matrix have common implications for FM and the customer when making decisions about their use in terms of adjustability and costs. Based on the matrix, modifications of the educational built environment could be prioritised to positively influence the educational outcome. The level of fixity of the environmental dimensions also sets the timeline for decision making. For educational managers, the matrix indicates which topics to align with FM during the different phases of decision making on the educational built environment, being designing, building and operating, and to allocate resources accordingly to create FM added value. The more fixed the features of the physical facilities and services are, the more strategic the decision on their use to affect educational outcome.

2.4 Discussion and conclusions

Despite the fact that much is known about the influence physical facilities and services executes on academic achievement, the literature provides little insight into how best to organise the use of such physical facilities and services to maximise their contribution. What aspects of the coordination of FM provide the increased added value? What will the educational built environment look like in a situation where the potential contribution of FM to academic achievement is optimally harnessed? What is then the role of the facility manager? According to Bitner (1992), the first step in the purposeful design of an educational built environment is to identify desirable customer and/or employee behaviours and the strategic goals that the organisation hopes to advance through its physical facility. This requires alignment between FM and the demand side in order to offer physical facilities and services which are relevant and usable in view of the desired behaviours of their users and the strategic goals of the organisation. Physical facilities and services can then offer solutions for issues such as knowledge transfer, encountering, productivity, mobility, hospitality, accessibility, safety, representation, distinction and sustainability. The demand for facility design dimensions occurs at various organisational levels – strategic, tactical and operational – and is wide ranging (Sarshar and Pitt 2009). The strategic level is represented by the Executive Board, the tactical level by the academy principals[1] and directors of support units (e.g. HRM, ICT and Finance) and the operational level by the teaching and non-teaching personnel, students and visitors. FM as to take these different stakeholders into account when supporting the educational built environment. By aligning with the different levels, the facility manager can compile a holistic set of requirements, wishes and desired effects of facility design. This alignment optimises the use of scarce resources and is the key to effective

[1] An academy refers to a cluster in which – usually – different bachelor's and master's degrees, research activities and custom work are combined. In practice, these are also called institute, school or faculty.

FM (Atkin and Brooks 2000; Green and Jack 2004; Kaya et al. 2004; Then and Tan 2006). However, because the facility manager is faced with different organisational levels in the process, also differences in perception may arise with regard to the added value of FM. The next question is then how best to organise the alignment between FM and demand in order to optimise the contribution of FM to the organisation. The typology of facility design dimensions shows that the contribution to academic achievement is varied. That may mean that, in order to maximise this contribution, the alignment of education and FM as part of the complex coordination issue of FM primarily can be limited to the facility design dimensions, which directly affect the education process. The typology can help the facility manager and the education management to determine in which phase of the decision making about the educational built environment the sharing of FM knowledge is crucial. The more fixed the environmental dimensions are, the earlier the facility manager should engage in decision making regarding the educational built environment. Depending on the goals and the situation, other facility design dimensions can successively be subject to alignment for additional added value. In order to improve added value, it can be argued that it is the responsibility of the facility manager to then deliver the physical facilities and services at the lowest possible costs and with minimum risks, whether in-house service provision or through partial or total outsourcing. It would be interesting to know which situation, i.e. in-house or outsourced, results in an increased level of added value of FM.

Chapter 3

Alignment between decision makers and users of facility design

This chapter is based upon:

Kok, Herman B., Mark P. Mobach, and Onno S.W.F. Omta, "Alignment between decision makers and users of facility design in Dutch higher education," Submitted to *Journal of Service Research*.

3.1 Introduction

In organisations many of the supporting activities focus on the physical facilities and user-related service processes. Physical facilities concern ambient conditions (e.g. temperature, air quality, cleanliness), spatial layout and functionality (e.g. layout, equipment, furnishings), and signs, symbols, and artifacts (e.g. signage, interior decoration) (Bitner 1992). In contrast, service processes focusing on human interaction are (a series of) activities of more or less intangible nature that, to some extent, take place in interactions between provider (i.e. frontline employee) and employee (as an internal customer) and/or goods/systems (e.g. catering, print) (Grönroos 1990). From an organisational perspective, designed features of the physical facilities and service processes are mixed together and interact with each other into a complex whole supporting the organisation, which we term facility design.

However, many senior managers consider facilities a necessary evil: you appreciate them but would rather spend money and energy on something else (Becker 1990; Kampschroer and Heerwagen 2005). Contemporary organisations 'push' the facility design towards cost reduction. Therefore facility design generally emphasizes minimal cost rather than optimum value (Price and Akhlaghi 1999). However, social and organisational trends, for instance, information technology, competition, high cost of space, and employee expectations, have placed enormous new demands on organisations' physical facilities, pushing the awareness of the (potential) added value of facilities into management consciousness (Becker 1990; Ware and Carder 2014). This notion is strengthened by the argument that the spaces which organisations occupy are an integral part of how organisations function (Price 2004; Dale and Burrell 2008). Moreover, building-related services (e.g. maintenance, landscaping) and user-related services (e.g. reception desk, catering, and print) support work processes of organisations (Friday and Cotts 1995; Atkin and Brooks 2000; Barrett and Baldry 2003). Man-environment studies have learned that the facility design can influence people's behaviour in several ways as a cognitive, emotional, and physiological response to the perceived environment (Rapoport 1982; Russel and Ward 1982; Bitner 1992). So, for this matter organisations would be better off if the physical facilities and service processes were designed in alignment and managed to fit user needs and consequently enhance user experiences.

Evidently most employees work in environments designed by somebody else (Dickson 1975), and are commonly excluded from decisions about their work environment because of professionalization (Becker 1981). The facility management department typically makes these decisions on facility design (Barrett and Baldry 2003; Zeithaml, Bitner, and Gremler 2009). Employees use the facility design supportive to their activities on a day-to-day basis, yet have little or no choice in what facilities are provided to them. Moreover, for interpersonal service organisations (e.g. schools, hotels, hospitals), where the service encounter requires a close interaction between frontline employee and customer (Bitner 1992), the added value of facility design may even become more eminent. Because the service is produced and consumed simultaneously within the physical facility, the facility will have a strong impact on

customers' service experience. As physical evidence for service firms (Booms and Bitner 1981), facilities are considered to be an integral part of the service delivery system to customers, that also encompass roles of service employees and the specific service processes (Heskett 1987; Chase and Bowen 1991; Bitner 1992; Goldstein et al. 2002; Fitzsimmons and Fitzsimmons 2011). Hence, spaces and services and inextricably interwoven (Kok, Mobach, and Omta 2015). If decision makers are aware of this, one would expect them to design their facilities to support the activities of both customer and employee, conducive to the interaction between and among the two. But do they? With studies focusing on either the needs of customers (e.g. Griffin and Hauser 1993; Verma, Thompson, and Louviere 1999) or employees (e.g. Parish, Berry, and Lam 2008; Jaakkola and Alexander 2014), there seems limited empirical evidence on how decision makers design these facilities as well as how they organise the alignment with users, for instance, in terms of coordination, monitoring, and control action in relation to user experiences. Therefore, the focus in current research is on the alignment between decision makers and users, the latter expected to be the ones not involved in the facility design process, but only affected by its outcome (Ulrich 1983).

In this specific context, it may be hard to assess the functioning of facility design. According to Parasuraman, Zeithaml, and Berry (1985), design can fail to meet user requirements or service delivery does not meet the quality of specifications or standards. Moreover, facility design can also prove insufficient due to changing needs and changing circumstances. These insufficiencies may have implications for user outcomes (e.g. Bitner 1992; Gremler, Bitner, and Evans 1994; Lings and Greenley 2005; Parish, Berry, and Lam 2008) and ultimately for an organisation's financial performance (Heskett 1987; Heskett, Sasser, and Schlesinger 2003). In addition, organisations must have monitoring, control, and interventions systems in place to ensure that the facility design and standards actually keep matching the specified interpersonal service delivery (Zeithaml, Bitner, and Gremler 2009) and bridge the possible perception gaps between decision makers and users. Literature provides various service-specific approaches to such systems, which can be grouped in either improving design quality (e.g. blueprinting, failsafing), or improving conformance quality (e.g. guaranteeing, mystery shopping, recovering, customer involvement) (Harvey 1998). The managerial challenge with these systems is choosing the right metrics that are critical to success, and whereby evaluations of the facility design are sufficiently informative to carry out effective adjustments. In short, there should be monitoring and adequate control actions in place (Checkland and Scholes 1990), which are essential for organisational learning (Senge 1990). There is however a lack of empirical evidence of how this is done in practice and what standards, according to whom are guiding the quality of facility design at interpersonal service organisations. This raises the following research question:

RQ2 *To what extent are top managers' and facility managers' efforts to design their facilities consistent with user experiences?*

The purpose of this article is to explore whether there is alignment between decision makers' efforts regarding facility design and related user experiences. We aim to deepen and expand knowledge of service design methods within a specific discipline, as suggested by Ostrom et

al. (2010). The theoretical contribution to the service literature is to help ensure that service facilities are designed to effectively serve the people who use them. As suggested by Parish, Berry, and Lam (2008) this can be done by exploring the alignment between decision makers and users of facility design. Present study is exploratory in nature, by qualitatively identifying the facility management governance at interpersonal services organisations aiming to gather an in-depth understanding of management considerations and actions in the facility design process. The article is organised as follows. First, the literature on different aspects of the facility design process is briefly discussed. The article continues by outlining the methodological approach, the case study setting for the research and data collection. The subsequent sections report the study findings, followed by conclusions, discussion, and implications for research and practice.

3.2 Theoretical background

3.2.1 Facility design perspective

Facility design can originate from different perspectives and principles. They guide the design process in terms of goals on which to base design decisions and to assess the ultimate facility design as outcome of the design process. The physical facilities and service processes can be designed to effectively serve the people who use them and support organisational effectiveness. To this respect, Jensen (2011) emphasizes the importance to distinguish between customer and business orientations. In other words, facility design can be based on user needs by looking through the "lens of the customer" and the ambition of business strategy by looking through the "lens of the organisation". In the former context, the facility design has been associated with positive/negative perceptions about how well the facility design, amongst others, affects how people feel (Rashid and Zimring 2008), their work performance (Sundstrom and Sundstrom 1986; Vischer 2008), user interactions (Peponis et al. 2007), job satisfaction, employee motivation and commitment (Parish, Berry, and Lam 2008), customer experience (Lovelock and Wirtz 2007), and work-life balance (Hill, Ferris, and Märtinson 2003; Blok et al. 2010). In the latter context the facility design has been associated with organisational outcomes like employee attraction and retention (Baldry 1999), corporate identity and branding (Westcott Allessandri 2001), differentiation from competitors (Kotler 1973), operational efficiency (Fitzsimmons and Fitzsimmons 2011), adaptation to organisational change (Kampschroer and Heerwagen 2005), and sustainability (Hodges 2005).

We expect customer and organisational perspectives will lead to a different coordination between decision makers and users regarding the facility design. Looking through the customer lens is expected to emphasize on coordination with (large groups of) users in various ways to identify their wants and needs. End-users and designers can become co-designers of the facility (Seim and Broberg 2010), which challenges the traditional, distinct roles of both the firm (i.e. decision makers) and the customer (i.e. internal and external)

(Prahalad and Ramaswamy 2004). Co-design aims to improve the position of the less powerful in the decision-making process, especially focusing on the ones not involved but affected (Ulrich 1983). Looking through the organisational lens is expected to be dominated by managerial and architectural perspectives, emphasizing mutual coordination between decision makers and architects. Following Prahalad and Ramaswamy (2004), this traditional conception of value creation emphasizes the distinct roles of production and consumption. Besides decision makers and architects, there is little involvement of others in the design process.

So, in this study indicative for a user-centric view expected attempts are to actively involve employees and customers in the design process in order to help ensure the facility design meets their needs and is usable. Consequently, the variety of users will probably lead to ambiguity in wants and needs, and a differentiated offering of physical facilities and services to optimise fit with user circumstances. In contrast, the organisation-centric view is expected to reveal a top-down approach to accomplish external marketing goals such as attracting and maintaining customers and/or internal organisational goals such as emphasising cost minimisation and efficient operations. This will probably result in a high degree of standardisation of facility design to, with Treacy and Wiersema (1995), reduce flexibility and individual choice, with economies of scale as a result.

3.2.2 Coordination

In order to optimise the contribution of facility design to the organisation, integrating together different organisational parts is required to accomplish a collective set of tasks. By definition, with Hage, Aiken and Marret (1971), the question would then be how best to organise the coordination between decision makers and users? In this respect, Barrett (2000) points to the importance of building strong relationships in terms of communications linkages between decision makers and users, while failing this leads to a gap between actual use and design intentions (Zhang and Barrett 2010). The nature of the collaboration between decision makers and users, in terms of feedback as the degree to which there are adequate linkages among organisational parts (Hage, Aiken, and Marrett 1971), will therefore possibly influence the effectiveness of the facility design. Feedback can be established by interpersonal communication (dialogue) and group communication involving more than two people having scheduled and unscheduled meetings (Thompson 1967; Van de Ven, Delbecq, and Koenig 1976). Because organisations are dynamic constellations and user wants and needs change over time, also the effectiveness of the facility design may fluctuate. It can be expected that different conditions at different stages in the organisation's life-cycle require a different facility design (Chotipanich 2004). Therefore coordination should not be a one-off activity, but should have a structural character of repetitive dialogues and group discussions. Depending on their size, organisations may also face different challenges with regard to building intra-organisational relationships (Hall, Johnson, and Haas 1967). Where large organisations often need to rely on formal structures, at relatively small organisations this coordination is much more based on informal structures and direct feedback (Davis 1984).

Basically, maintaining relationships with the users ultimately serves as input for the facility design requirements, which are consequently discussed in the relationship between facility managers (as a generic label for the senior executive who leads the facilities function within the organisation) and top management (i.e. CEO and/or COO) as decision makers. Decision makers are concerned with aligning facility design with the corporate strategy (Ware and Carder 2012). However, establishing such a strategic coalition requires that facility managers are capable of talking the language of top management and to make them interested and aware of the importance of facility design for the core business (Jensen 2011). It is then up to the decision makers to balance facility design to the core business through a linkage with key business issues such as customer satisfaction, business continuity, operating efficiency, and the organisation's key objectives such as income maximisation, minimising risks and costs (Lee 2002; Kok, Mobach, and Omta 2011). Therefore, in this study we explore the patterns that emerge in the coordination between decision makers and users, as well as confronting decision makers' efforts regarding facility design with user experiences.

3.2.3 Monitoring and control action

Once the physical facilities and service processes have been designed, the job is only half done (Harvey 1998). Initial facility design can prove insufficient due to changing needs and changing circumstances. Also, design quality may fail to meet user requirements, or service delivery not conforms the quality of specifications or standards (Parasuraman, Zeithaml, and Berry 1985). Either way, the service performance may fall below a customer's expectation in such a way that it leads to customer dissatisfaction (Zeithaml, Bitner, and Gremler 2009). Given the importance and pervasiveness of facility design and the important benefits to be realised from getting it right, interpersonal services organisations should be keen to learn from defects to bring about improvements. This refers to efforts to raise standards and improve service performance, listening to customer's preferences, and ensuring that customer's requirements are met. Therefore, customer preferences and experiences must be translated and fed back into design and day-to-day management of service processes (Varma, Thompson, and Louviere 1999). Limited quality improvement, to this respect, has been linked to inappropriate culture (e.g. blame culture, not a learning culture, arrogance), lack of customer focus, lack of resources (e.g. staff, money or time), management issues (e.g. poor planning, decision making, lack of internal coordination and communication), people issues (e.g. resistance, limited empowerment), and poor processes (e.g. poorly designed, lack of standard procedures) (Johnston 2008).

Literature suggests several ways to quality control. A customer approach would rely on customer's feedback. Feedback can take many forms, e.g. by systematically exploring customer needs and perceptions through i.e. market research, satisfaction surveys, customer observations, as well as walk-through audits as the evaluation of a customer's view of the service provided (Fitzsimmons and Fitzsimmons 2011). By continually listening to customers, firms can discover what is valued in their products and services and what could be added to them to improve perceived use value (Bowman 1998). As a means to listen to

customers Zeithaml, Bitner, and Gremler (2009) propose also complaint solicitation, customer panels and customer relationship management. The organisational approach typically favours service benchmarks, (statistical) process control, and on-going quality-improvement programs (e.g. employee training, Six Sigma, Lean Service) (Fitzsimmons and Fitzsimmons 2011). Sundstrom and Sundstrom (1986) suggest a holistic perspective, with facility design and interpersonal services actors as interdependent elements of an intertwined system, whereby the facility design influences the nature and quality of customer and employee interactions and their outcomes. Monitoring should then be performed on whether or not facility design is congruent with the desired behaviour of the users (i.e. customer and employee) as their internal response to the perceived environment. Following Senge et al. (1994), control action can be taken to create a unity of purpose in the accomplishment of the systems' goals, functions, or desired outputs.

The question then is whether decision makers engage in improving the quality of facility design as isolated physical facilities and service processes, or as an interconnected system with interpersonal service delivery, with the perspective of organisational learning (Senge 1990) and hence improving organisational performance? In any case, every metric used will affect actions and decisions, even if the measure does not lead to improved performance (Hauser and Katz 1998). In this study we will identify the monitoring and control methods in place as reported by decision makers, in order to subsequently determine its effect based on user experiences.

3.3 Methodology

3.3.1 Research approach and sampling

Our study focuses on theory building with respect to the decision-making on the facility design in an interpersonal service setting. Therefore, we engaged in qualitative case study research. As theorised by Barratt, Choi, and Li (2011), we used contextually rich data from bounded real-world settings to investigate a focused phenomenon. The rationale behind this approach is that the research is explanatory and the context and experiences of actors are critical (Benbasat, Goldstein, and Mead 1987). Case studies remain one of the best ways to make sure that researchers are making valid observations and contributions to the body of knowledge (Stuart et al. 2002).

The research setting was an exploration of the specific service setting within Dutch higher education institutions for empirical reasons. Facility design for an educational setting is both challenging and very complicated. For their elaborate physical complexity, with many elements and many forms, and both customers (i.e. students) and employees (i.e. lecturers) performing actions within the facility, education institutions face the most complex facility design decisions (Bitner 1992). The data upon which this study is based were gathered in seven Dutch Universities of Applied Sciences. For theory building purposes, and to create

more robust and testable theory than single cases, Eisenhardt (1989, p. 545) suggests that "a number between 4 and 10 cases usually works well". Of a total of 39 Dutch Universities of Applied Sciences, four participating institutions were among the largest, ranging from 20,000 to 40,000 enrolled students, and the other three were typically relatively small institutions offering specialised education (e.g. hospitality, food and agri-business) to 2,000 to 10,000 students. The sample represents the target population regarding scale, and also reflects the different types of universities, being general and specialised. Another argument for using these polar extreme-types of institutions was to possibly identify contrasting characteristics (Miles and Huberman 1984), which may explain potential differences in the alignment between decision makers and users of facility design. A short profile of the seven institutions can be found in Table 3.1.

Table 3.1. Short profile of participating Dutch higher education institutions.

Case	Size (students)	Locations	Programmes	NSE[2]
1	36,500	2	Educational programmes include almost all professional sectors	3.5
2	29,000	3	Environmental science, industrial engineering, international business	3.4
3	24,000	4	Educational programmes in technology, economy and health & wellbeing	3.5
4	20,500	2	Study programmes in fifty disciplines	3.4
5	7,500	4	Tourism & leisure, hotel, games & media, logistics, built environment	3.4
6	2,500	2	Food, agriculture and horticulture, nature and the environment, agribusiness	3.4
7	1,800	2	Food, agriculture, horticulture, agribusiness and animal science	3.5

3.3.2 Data collection and analysis

To identify the different aspects of facility management governance, we conducted interviews with a member of the Board of Directors (top management) and the facility manager of all seven education institutions, as responsible actors involved in facility design decisions. Respondents within each organisation were selected by the following criteria: a) Members within the board to whom the portfolio facility management is allocated, b) Facility managers with an overall responsibility for facility support activities. The interviews were held using a topic list with semi-structured questions related to the earlier addressed aspects of the facility

[2] The National Students Survey (NSE) is a large-scale national survey in which annually almost all students in higher education are invited to give their opinion about their education. Students are asked to complete the questionnaire and to provide their judgment about various aspects, amongst others study facilities. The NSE is the responsibility of the Foundation Studiekeuze123. Studiekeuze123 is an initiative of the Association of Colleges, NRTO, VSNU and student organizations LSVb and ISO, and thus represents the entire higher education. The study facilities that are assessed in the NSE are: the accessibility of the institution, the availability of workplaces, the library/media center, the digital learning environment, the appropriateness of the teaching rooms, the suitability of workplaces, the ICT facilities, and the restaurant facilities. Survey scores are measured using a 5-point scale.

design process. In total fourteen interviews, all conducted in the respondents' offices and about 60 minutes in length, were recorded and transcribed.

In order to produce a contextually detailed account of the case study, the collected data were carefully analysed in a multi-stage process. The first stage in this process was a within-case analysis by open, intuitive and selective coding the data, initially based on the topic list with the lens on the category labels facility design perspective, coordination, monitoring and control action. We got to work with a 'start list' of descriptive codes, as suggested by Miles and Huberman (1994) that come from the research question and theoretical concepts discussed earlier. Hence, we focused on the facility design perspective (customer vs. organisation orientation), the nature of coordination activities (e.g. frequency, actors involved, formal vs. informal), the nature of monitoring activities (e.g. satisfaction surveys, customer panels, observation), and control activities (e.g. quality improvement, feedback response). The researcher then summarised the comments into a set of words and phrases and identified key themes composing the codes into a governance structure. Then cross-case analyses were conducted, comparing and contrasting the patterns and configurations emerging from the within-case write-ups. Our aim was to see outcomes across the cases, to deepen understanding and explanation to strengthen theory through examination of similarities and differences across cases (Miles and Huberman 1994).

After the initial analysis of the data, additional data were gathered from students at the seven institutions using group discussions in order to get a feel for how the studied governance develops in practice. Students, as customers of the institution, are expected to be the most remote user in terms of their involvement in facility management. Therefore, as a non-informed crowd, their user experiences may be very informative in this respect. We visited spontaneous and unannounced a single location of all seven higher education institutions[3]. Random groups of students standing or sitting together were approached, asking whether they wanted to participate in a brief group discussion about their opinion about the facility design. After approval, starting the group discussion we indicated that we were interested to find out whether they feel that on the one hand physical facilities and services were designed with students in mind fitting their needs, or on the other, that in particular organisation considerations played a central role, such as appearance, low cost, and a standard range of services. In the discussion that followed, we prompted whether they were possibly involved in assembling physical facilities and services, regularly asked for feedback on the extent to which the facility design fits their wants and needs, and whether they had the impression that the facility design was actually adjusted in response to their feedback. After discussing, students, individually, had to reflect their opinion about two statements on a five point scale ranging from 1) strongly disagree, to 5) strongly agree. The two statements were: 1) Student's interest is clearly paramount in offering physical facilities and services at our higher education institution, and 2) The organisation's interest is clearly paramount in offering

[3] All of the studied higher education institutions had different (2 to 6) locations where education is provided. Also at large locations students do not always experience all parts of the building, possibly leading to a limited view of the facility design. This does not necessarily have to influence their experience with facility management governance, since this concerns basically all building users, regardless of location.

physical facilities and services at our higher education institution. All group discussions were recorded. First we calculated the average scores per statement per higher education institution. Then we analysed the discussions for their content. Since the participants would discuss a predefined theme (i.e. user-centric versus organisation-centric design) not necessarily in an orderly manner, we basically set out to find illustrative quotations for their opinions. To do so we repeatedly listened to the recordings and wrote down these commentaries.

3.4 Results

3.4.1 Facility design perspective

Table 3.2 shows the observed top managers' (TM will be used to abbreviate top manager) and facility managers' (FM will be used to abbreviate facility manager) commentary on facility design perspective key words.

Apart from existing buildings as part of legacy, new facilities at all institutions were discussed as somehow having been designed purposefully, with design principles based on user needs and the ambition of organisation strategy. With regard to customer orientation, respondents reported attempts to pursue customer satisfaction and user interaction. With regard to organisation orientation, respondents reported operational efficiency, a functional design in terms of (basic) usability, sustainability, and organisational culture to be the facility design driving forces. Top management exhibited a particular emphasis on marketing goals such as brand reputation and attracting students. Besides that, they considered facility design a hygiene factor, and, when proper functioning, causing no dissatisfaction. Top managers were also rather wordy with respect to what could be accomplished with facility design (e.g. forming communities, enhancing hospitality, feeling proud, making a statement and being a role model).

Facility managers reported an operational focus on the efficient structuring of facility processes. Facility managers seemed very hands-on, focusing on functionality (e.g. safety, tidiness, a good first impression), and emphasized facility design as a precondition to the functioning of the institution. Regarding the contribution of facility design to educational performance respondents were much less pronounced and opinions were also to some extent divided. None of the respondents pointed to a direct contribution of facility design to educational achievement. Some indicated a possible and/or small indirect contribution; some said they simply didn't know. So, although one would expect a facility design from a user perspective to benefit interpersonal service delivery, and consequently organisational performances, the results show a different picture. Facility design is foremost considered a hygiene factor, in particular with an operational contribution to the primary process and to some extent with an aesthetic appeal.

Table 3.2. Nature of reported facility design perspective.

Design perspective	Observed key words	Top manager's and facility manager's commentary
- Customer orientation	- Customer satisfaction	- Customer intimacy, for example, the design of workstations (FM2) - Facility design is extremely important, because it touches so many aspects that in education jargon are indicated with 'small quality'. If it goes well, you'll hear no one and if it does not go well, it appears to be an enormous dissatisfier. Therefore, I can hardly imagine that the education is summit and that the rest of the facilities surrounding it would be worthless. If there is a positive flow, then that's in all areas (TM2)
	- User interaction	- An attractive and pleasant environment that would shape communities, and making users wanting to stay (TM1)
- Organisation orientation	- Operational efficiency	- Efficiency for what you have to organise very tight and routinely, where individual choice is no option (FM2)
	- Functional	- Without well-functioning facility services, very little happens in an educational institution (FM3) - As long as we do not get fuss about it, I think it's all right. It does not need to be luxurious (TM4) - Hygiene factor, contribution to providing a basic quality for users' comfort and well being, and, when proper functioning, causing no dissatisfaction (TM5)
	- Sustainability	- We are an Agricultural University, the green sector, so that also means that you have to have sustainability as paramount importance. We have really chosen for that, which shows in many things (FM 7)
	- Organisational culture	- Facilities contribute indirectly to study success, and also to the culture of the organisation. It does something to people (TM6)

3.4.2 Coordination

Table 3.3 shows the observed top managers' and facility managers' commentary on coordination key words.

The analysis showed that at all institutions coordination takes place between top manager and facility manager according to a predetermined schedule with varying frequencies: weekly, bi-weekly, three-weekly, four-weekly, and quarterly. In some cases tight linkages were found between top managers and facility managers. Top managers indicated to only be involved in decision-making when a certain threshold would be exceeded, being financial and/or

organisational impact (e.g. new construction, relocation), to where the facility managers would be autonomous in their actions. At the smaller institutions both actors much more came to a decision in dialogue, either formal or informal.

Additionally facility managers maintained a relationship with education (whether or not together with the top manager), with varying intensities. Looking at the position of end users herein, structural contact with end users to obtain input for facility design was the exception rather than the rule. It appeared that the coordination related to facility design is a mutual affair between top managers and facility managers. In contrast with what was expected, students as primary actors were relatively little involved, which then was even limited to committees or panels with a small delegation of users. Looking at informal consultations, at the larger institutions they were primarily used in the context of internal politics (e.g. preparing decisions, gauging moods, search of support base), whereas at the smaller institutions these informal contacts were seized to collect spontaneous feedback from end users.

Table 3.3. Nature of reported coordination between decision maker and user.

Observed key words	Top manager's and facility manager's commentary
- Scheduled dialogues	- My contact with the director of operations is weekly and at item level that can sometimes be daily (TM1)
	- In the new building it is mainly the architect in dialogue with decision makers, who want to see their vision realised in the building (TM6)
- Scheduled group meetings	- We have a large degree of consultation: four times a year management reporting, twice a year an interview as part of a business plan, we have a director consultation, twice a year a two-day management conference, service units have a network consultation. That's quite frequently! (TM2)
- Users' council	- When interventions are on the roll, we always take much time to identify the wishes of the users. Herein the Representative Advisory Council plays no role. The group, who it concerns, is approached. That can sometimes be only directors or certain academies, but also user groups from academies. (TM2)
	- There is a continuous cooperation between schools and facility support, whereby on subjects from the long-term policy focus groups provide input from their department, and which is presented to the board. (FM2)
- Consumer panel	- Recently, there is also a student panel and that provides a lot of information. They meet once in every two months (FM1)
- Informal dialogues	- There is a lot of informal consultations, in particular on things that are wrong. It may be that a week after an account conversation in which it was indicated that all was well, I get an email saying that it's all wrong. I find that laborious (FM3)
	- There is quite often informal consultation with the management team and education. Equally well students enter the room (FM8)
- Informal group meetings	- There is also a lot of informal consultation. People know to find each other very easy to share things in one-on-one conversations (TM2)

3.4.3 Monitoring

Table 3.4 shows the observed top manager's and facility manager's commentary on monitoring key words.

Table 3.4. Nature of reported applied monitoring instruments at user.

Observed key words	Top manager's and facility manager's commentary
- Dutch National Students Survey (NSE)	- Which are of course things that are standard in the NSE (reflecting on customer satisfaction) (TM1)
- Satisfaction surveys among students and employees	- We have student and staff satisfaction surveys, but you have to look at the results with imagination to be able to get an idea of how this relates to facilities (FM3) - I especially have discussion about what we exactly measure. We have up-times, availability, number of disruptions, but the debate that I have with the facilities department is whether the customer is really happy now? How do we measure this properly and can we measure it? The challenge for the coming period is to substantiate this (TM5)
- Intermediate surveys (topic-related surveys e.g. flexible workplaces, new cleaning concept)	- You obviously examine because you want to know for sure whether a particular concept that you have implemented in a building works out so well that it is worthwhile to expand. If there is a very specific indication to go in depth, we conduct an inquiry. Then we interview or survey 400 to 500 people in a building. Then you know something (FM2)
- Service calls	- The number of calls at the service desk is an indicator of quality (FM2) - We do not know whether we are on the right track in terms of quality. If the organisation is quiet, and I get no incidents from the facility management department, then it's okay (TM4)
- Complaints handling	- Complaints we get, though we measure this not right yet (FM1)
- Observations and walk-through audits	- My feeling is that we manage to provide a very stable basis in which teaching is possible. Almost no distortion, almost no dissatisfiers (FM2) - If you walk around and it's no mess and there are no incidents it will be good (TM4) - One facility manager termed this "personal observation and irritation" (FM4) - I very often discuss with support services about the facility sense of everyone working there. Do janitors notice now that ... I always cry: you have to ensure that I have nothing to nag about (TM5) - We think facility services contribute to the functioning of the university. To find out whether that is the case, you have to walk around, you have to experience how users experience the building (TM6)

The analysis showed that the institutions use a wide variety of monitoring instruments. The key measurements were satisfaction surveys among students and employees, and sector benchmarks at the institutional level (i.e. NSE). All studied higher education institutions took part in the NSE. Respondents indicated, however, that it is not the outcome itself that is

important, but the tendency of this compared to previous years and the ranking compared to peer institutions. The benchmark showed corresponding evaluations for all seven institutions, with a mean score of 3.4 or 3.5 per institution in 2014 (see Table 1). Over the past five years, as of 2010, these evaluations fluctuated only slightly (in some cases hardly) from 3.3 to 3.5 per institution.

All top managers and facility managers reported that satisfaction surveys were conducted. The typical frequency would be annually. If necessary, intermediate surveys were held. Furthermore, especially facility managers mentioned service calls (i.e. service desk) as a means to receive questions and requests, sometimes complemented by complaints handling. Observations and walk-through audits were referred to as informal feedback mechanisms, using what is said in the corridors or the picking up of signals. None of the respondents indicated to measure the impacts of facility design on its users, or evaluating the contribution of facility design to achieving organisational and/or marketing goals.

Despite the use of aforementioned measurements, the majority of the top managers and facility managers indicated they really didn't have a clue whether or not the facility design reflects the needs of users, and what particular control action they should or could take to make this fit in case of discrepancies. Especially, the outcomes of surveys were considered insufficient to make informed decisions. Notably, in the cases where respondents indicated having pursued certain design goals (e.g. transparency, user interaction, sustainability), no specific monitoring was reported on these aspects of facility design.

3.4.4 Control action

Table 3.5 shows the observed top manager's and facility manager's commentary on control action key words.

Table 3.5. Nature of reported control actions at facility design.

Observed key words	Top manager's and facility manager's commentary
- Examine adjustments	- We ask the director of FM to take action (TM3) - Once a year, that survey comes along and then we discuss that thoroughly. Hans (FM) is the director who is responsible for the NSE, to increase the response and to see where we need to do something (TM4)
- Gradual adjustments	- It would be stupid if you do nothing with feedback. But there is also always a 'but' to it. Sometimes I suggest not do something, but I always give a reason for it, be it the top manager or the user (FM6) - We do point end users to the fact that modifications have to fit within the limited (allocated) resources (TM1)
- Urgent problems solving	- We get comments which concern acute problems, that must be solved quickly (FM7)

Facility managers responded foremost in terms of specific procedures they would follow to take action, whereas top managers responded in terms of results from feedback to be discussed with the facility manager as the responsible actor. General impression was that control action focused on urgent problems. In most cases, it was mentioned that modifications and improvements were always in the context of budgets and financial reservations that were made or not. None of the respondents hinted to the fact that user feedback can be used in the context of the learning organisation.

3.4.5 Students' response

At each higher education institutions two or three group discussions with 3 to 5 students per group were held. A total response of 60 students was obtained from 17 group discussions of seven higher education institutions (see Table 3.6). Each group discussion would typically last about ten minutes.

Table 3.6. Response of group discussions (item scores ranging from 1, strongly disagree to 5, strongly agree; standard deviations between parentheses; highest scores are bold, lowest scores are italic).

Case	Group discussions	Respondents	User-centric	Organisation-centric
1	2	7	3.7 (1.1)	3.0 (0.8)
2	2	8	3.8 (0.7)	3.3 (0.9)
3	3	10	4.0 (0.5)	3.1 (0.9)
4	3	13	3.9 (0.8)	**3.5** (0.7)
5	2	6	**4.5** (0.5)	*2.8* (0.8)
6	2	7	*3.3* (1.0)	3.4 (0.5)
7	3	9	3.9 (0.6)	3.0 (0.9)
	17	**60**	**3.9 (0.7)**	**3.2 (0.8)**

Based on the average items scores, the overall facility design at all institutions is perceived more user-centric (M = 3.9, SD = 0.7) than organisation-centric (M = 3.2, SD = 0.8). Most prominently is case 5, whose facility design is perceived as the most user-centric (M = 4.5, SD = 0.5) and the least organisation-centric (M = 2.8, SD = 0.8) of all seven institutes, also confirmed by relatively low standard deviations. The facility design of case 6, as one of the smallest institutions, is perceived least user-centric (M = 3.3, SD = 1.0), confirmed by a relatively high organisation-centric score (M = 3.4, SD = 0.5). Of the larger institutions, the facility design of case 4 is perceived to be a mixture of user-centric (M = 3.9, SD = 0.8) and organisation-centric (M = 3.5, SD = 0.7).

Table 3.7 shows the observed student' commentary in the group discussions.

Table 3.7. Observed student's commentary in group discussions.

Design perspective	Case	Student's commentary
- User-centric	1	- It does not strike me that the organisation's interests are paramount. I also do not make extreme demands, because that is not possible at a higher education institution
	2	- It is nice that the student desk and canteen are immediately in sight upon entering
	3	- Everything is easy to find, it is clearly indicated where things are. Our school has its own section within the building. I don't really notice the organisation interest in this
	4	- I think they really have looked at both, student interest and organisation interest, with a slight tendency to student
	5	- In terms of colour and the like, facility design is aimed at young people; there is a coffee shop right at the entrance. I do think, however, that image is also an important issue
		- In some cases they work with groups of students to come to the right facilities. Sometimes I see emails pass by that you can get in a student council
	6	- There are special quiet rooms and sufficient computers. I do not think they carry out extreme savings, but it is also difficult to judge
	7	- It all looks nice, it is attractive and easily accessible
- Organisation-centric	1	- It's all so spread out through the buildings, if I want to report something and I know finally where I can do this, the staff does not know how to solve my problems
		- There is not really asked for feedback. Moreover, I would not know where to go with a complaint. It has been requested to actively take part in the NSE. They obviously want to show positive in that survey
	2	- For three years I already indicate that I am unhappy about the workstations, but all the time nothing has changed. If you indicate something about teachers, immediately something is done with it
	3	- The organisation thinks they know what the needs of students are
	4	- In my opinion eventually something will be done with the feedback, but it takes a long time before such action is taken
		- In fact, I often hear power outlets really would be a disaster, but nothing is done with it
	5	- Eventually something is done with your feedback, but it takes a long time before something has changed
	6	- We have no influence on the furnishing here. Although it fits me, they never asked our opinion
	7	- The opening time is short and there is lack of space. The university has grown rapidly and is not furnished accordingly
		- Perhaps that's organised through these committees we have, although you do not hear anything from it
		- As a class representative I am closely involved in the consultation. Now I heard from a second-year student that some of the problems we have now were there also last year, and nothing was done about it

Obviously, students' opinions varied strongly within institutions. When asked, they primarily addressed specific conveniences or inconveniences. Students' interest was foremost associated with the convenience of having adequate and sufficient workplaces (e.g. quiet

areas), cafeteria, coffee shop and student desk. They indicated to have difficulty assessing whether the organisation's interests are paramount. This was also not simply referred to as negative; as representation is an important goal, students also benefit from it. Students confirmed they are little involved in assembling physical facilities and services. If this is possible at all, it is organised through committees in which a few students voluntarily can participate. According to students these committees unlikely represent the majority opinion. Students confirmed the possibility of being able to give feedback through surveys, but also indicated that they hardly experienced changes in the facility design accordingly. In many cases students referred to the NSE. There seemed a sense of resignation amongst the students about these surveys. They make little impression. The overall impression students have is facility design is decided for them, not with them.

3.5 Discussion and conclusions

This study examined whether there is alignment between decision makers' efforts regarding facility design and related user experiences at interpersonal services organisations. In doing so, we made some revealing findings. With regard to facility design perspective, we found that facility design is foremost considered a hygiene factor, in particular with an operational contribution to the primary process and to some extent with an aesthetic appeal. The underlying coordination appears a mutual affair between top managers and facility managers, in which users, as primary actors are hardly involved. The monitoring is barely informative regarding the fit between facility design and user needs, and considered insufficient to make informed decisions. Consequently, control action focuses on urgent problem solving. Based on aforementioned we make several theoretical contributions to the service literature.

First, it is clear that decision makers do not associate facility design to be critical for interpersonal service delivery. Facility management decision-making appears independent of the nature of the work processes, opposed to its, by definition (Barrett and Baldry 2003), presumed contribution to their effectiveness. Apparently top management, concerned with long-term goals of the organisation, perceive only (basic) functional and aesthetic significance of facility design. They do have awareness however that facility design causes a certain response among users. Yet, unaware of its potential value-add in terms of the contribution of facility design to educational achievement, and maybe non-influential recommendations of facility managers, their perception is strongly bound to visible aspects. Decision makers exhibited a particular emphasis on marketing goals such as brand reputation and attracting students, and considered facility design a hygiene factor; when proper functioning, causing no dissatisfaction. The question remains whether, by erecting a majestic building, giving it a spacious layout with modern furnishings, providing fancy catering for low prices, having Wi-Fi all over the place and taking care of sufficient workplaces with power sockets, the integral position of the physical evidence in the interpersonal services delivery as suggested in literature (e.g. Bitner 1992; Goldstein et al. 2002), is adequately taken into account. Would the maximum achievable benefits of these relatively expensive resources be captured in terms

of improving the interpersonal service delivery? In addition, the employee, as a permanent user of the facility design, may favour other physical facilities and services. Especially the frontline employee should not be the forgotten factor, since their interaction with customers obviously determines organisational performances. How to deal with that and what different design features would that need? This also requires different competences and knowledge of facility managers, who must manage to deal with board room forces that go towards marketing and costs and not maybe detailed design measures (i.e. certain aspects of the so-called micro-design such as seating arrangements, day-to-day maintenance and cleaning, and Wi-Fi as we saw earlier in Section 2.3.1) that are required to truly enhance the learning. Their position should be that of (pro) active linking pin between user and organisation.

Second, facility design principles are not used to assess the quality of the facility design, and judging from the user feedback that is organised (e.g. satisfaction surveys, benchmarks) decision makers do not really know whether the facility design meets the user requirements. Is it that design intentions are confused with performance? Maybe decision makers like to believe the facility design, as they have determined, contributed to organisational performances based on narratives, since the monitoring is not set on the use effects of facility design. Feeling welcome and comfortable may not be a good proxy for performance after all. This will remain a guess until the interpersonal services organisations start to measure use effects based on the right metrics. Since decision makers are particularly busy with each other while the (structural) coordination with users is piecemeal, they may have a distorted view of reality with a focus on the financial planning and control cycle. From that perspective standardisation of facility design is preferred to a user-centric design. However, as long as this abstract way of governing is not supplemented with a sense of reality, facility design decisions remain rooted in - what a user very indicative said - what the organisation thinks that the needs and wishes of the users are.

Third, in the confrontation of decision makers' efforts regarding facility design and user experiences, the latter seem not at all that much concerned whether the physical facilities and services are designed with them in mind as the beneficiary or whether organisational interests are paramount. A frequently heard comment indicating this was "I never thought about it much". As long as they do not experience major shortcomings in the support facilities, which are of interest to them, it is fine: catering, reception or student desk, workplaces for group work and quiet areas, Wi-Fi and power outlets. Is it really that students see themselves as visitors who may not make excessive demands, or do they simply accept the service level that they encounter? Don't they feel at home and therefore don't feel the need to influence the facility design to their advantage? Maybe this shows that just organising user feedback by means of a periodical survey and occasionally having users participate in a panel to express their opinions is not enough to align between decision makers and users. Therefore, the user population is just too large for individuals to really get involved in facility management decisions. Also, their involvement with facilities seems rather ephemeral; their opinion is primarily based on a number of special events and not a prolonged use of facilities. This may indicate they have a poor (i.e. unilateral or inexperienced) observation of the complex setting of the service facility. Or do they find the considerations of decision-makers not at all

important and reason particularly from a personal perspective? This misalignment between decision makers and students may then indicate gaps between the two with regard to facility design needs and priorities.

Chapter 4

Different employees' quality perceptions

This chapter is based upon:

Kok, Herman B., Mark P. Mobach, and Onno S.W.F. Omta (2015), "Facility design consequences of different employees' quality perceptions," *The Service Industries Journal*, 35 (3), 152-178.

4.1 Introduction

Since Bitner (1992) introduced the term servicescape in service literature, there is a strong tendency towards spatial association of services and their relationships with customer and employee behaviour. A systematic literature review of Mari and Poggesi (2013) showed that researchers focus on the impact that simultaneous presence of multiple environment cues exert on customer attitudes and behaviour, a holistic approach to the analysis of the impact of the servicescape on quality perceptions and customer loyalty, how customers' peculiarities (e.g. cultural, physical) relate to how servicescape features are perceived, and how the physical environments might influence customers' behavioural intentions and satisfaction in certain service industries (e.g. school, restaurant, bank). Despite the fact that the design of a servicescape can have a significant impact on an organisation's key metrics, including costs, brand perceptions, and employee satisfaction and loyalty, in most organisations it is not a well-established practice (Ostrom et al. 2010). To this regard the physical work environment is not given any consideration, unless it deviates from acceptable conditions and values (Edvardsson and Gustavsson 2003). A better understanding of how different characteristics of the work environment relate to employees' perceptions could help managers in making knowledgeable decisions when (re)designing this commonly used servicescape.

Servicescape design decisions may be made by the facility management department (Zeithaml, Bitner and Gremler 2009). Following definitions by scholars (e.g. Friday and Cotts 1995; Atkin and Brooks 2000; Barrett and Baldry 2003; Booty 2006; Rondeau, Brown, and Lapides 2006) and the European standard EN 15221-1 (Comité Européen de Normalisation 2006), facility management (FM), as it is defined today, is mostly about providing internal services and managing/changing physical environments to support the effectiveness of primary processes of an organisation. Following Grönroos (1990), internal services, with respect to the service facility, are activities or a series of activities of more or less intangible nature that normally, but not necessarily, take place in interactions between employees (i.e. staff) and frontline employees (e.g. reception desk, concierge) and/or goods and/or systems (e.g. catering, print) of the internal service provider (i.e. FM). Generally, service design features are where (location), when (time or period), and how (e.g. method of service delivery, lay-out) to employ services. The physical environment consists of the environmental dimensions, being ambient conditions (e.g. temperature, air quality, noise, cleanliness), spatial layout and functionality (e.g. layout, equipment, furnishings), and signs, symbols, and artifacts (e.g. signage, interior decoration) (Bitner 1992). Thus, the sphere of influence of facility managers comprises a mixture of separate, but yet closely related, designed features of physical facilities and services, which we term facility design.

A purposeful facility design is rooted in the needs of the employees and the goals of the organisation (Bitner 1992; Comité Européen de Normalisation 2006). However, it is also clear that facility managers have to deal with a wide variety of employees, with different positions within the organisation like operational staff and (top) management. All these employees have different tasks and expectedly corresponding support needs, and, following Bitner (1992) and

Fitzsimmons and Fitzsimmons (2011), different internal responses to facility design. The attractiveness of the facility design is ultimately determined by the quality of all its different tangible and intangible aspects (Bitner 1992), which is an individual assessment based on perceptions (Parasuraman, Zeithaml, and Berry 1985; Zeithaml 1988; Zeithaml, Berry, and Parasuraman 1993); Brady and Cronin 2001). Although differences in judgement can be expected, too little coherence in the employees' perceptions of the facility design might cause problems. This would mean that there is no alignment, which may impede organisational performance (Heskett et al. 1994; Marhall, Baker, and Finn 1998; Tanis and Duffy 1999). Following Goldstein et al. (2002) and Del-Palacio, Sole, and Berbegal (2011), a major challenge for facility managers, in such a complex situation of multiple stakeholders, is to design an appropriate mix of physical facilities and services in a way that it fits the support needs, and, in addition for all employees it is the best place to work. To obtain input for facility design requirements and act in response to employees' feedback, and consequently, to ensure an improved organisational performance, an evidence-based approach may be set forward. First of all, this requires an exploration of the possible differences between the perceptions of different employee categories. Secondly, if perception gaps exist, the facility manager should decide on what measures to take leading to a facility design that performs best for all the different employees.

Facility design for, amongst others, educational institutions, as interpersonal services organisations (e.g. educational setting, hospital, restaurant), are the most challenging because social interaction between employees (i.e. lecturer) and customers (i.e. students) should be facilitated by the servicescape (Bitner 1992; Fitzsimmons and Fitzsimmons 2011). Within this physical environment, with elaborate complexity (Bitner 1992), lecturers as frontline employees are the core actors, besides other staff, like management and supervisors. Although these employees have different positions, yet all work together in a particular way, a coherence of their perceptions then would mean an overall good support of the primary process. We aim to determine whether job position specifically within higher education institutions has an effect on the perceived facility design. The following research question was formulated:

RQ3: Are there differences in the perceived quality of facility design between the different employee categories (top manager, education manager, lecturer, facility manager) at higher education institutions, and, if so, what importance do they place on the different facility design dimensions?

By answering this question, our research contributes to the service literature with an empirical study on the possible perception gaps of facility design for interpersonal services between different employee categories. We relate these differences, amongst others, to the different strategic roles the facility design can play for employees. Additionally, we follow up on how to deal with these different perceptions in order to improve the facility design, and consequently the organisational performance. Finally, our research has relevance for the FM practice, and especially those involved in decision-making on the facility design, to achieve alignment in the case of different user groups. This chapter will first specify the different

employee categories at higher education institutions and their expected differences in perceived facility design. Then the methods and data collection will be described, followed by results, conclusions and discussion.

4.2 Theoretical background

4.2.1 Employee categories

According to Ware and Carder (2012) and Coenen, Alexander and Kok (2013), no matter where FM is situated within the organisation, it is embedded in a complex web of relationships, each presenting particular challenges to facility managers. They sometimes become entangled in a web of interests, so that the desired facility design, which meets all employees' needs, gradually turns out to be unattainable (Mobach 2013). This relates to the different employee categories, and their respective use purposes and needs of the facility design, all working for the same organisation, but with different tasks and work processes that require different support because of their interdependencies (Thompson 1967; Porter 1985).

According to management literature (e.g. Mintzberg 1979) and the European standard EN 15221-1 (Comité Européen de Normalisation 2006) there is a clear distinction between three organisational levels of decision making and tasks being the strategic or corporate level that consists of top management (i.e., Board of Directors), the tactical level or middle management that comprises the managers of functional units, and the operational or functional level that comprises the executive staff members (i.e., frontline employees and other staff). The services triangle (Zeithaml, Bitner, and Gremler 2009) to this respect distinguishes between management (i.e. top-level manager and supervisor) and provider (i.e. frontline employee). From these perspectives facility managers have to deal with three different stakeholders, and all with different support requirements depending on their organisational position, as argued by Sarshar and Pitt (2009). Also, the three stakeholders have different roles within the organisation in terms of interaction with customers for interpersonal services delivery. Frontline employees are closest to the customer, followed by supervisor and top-level management.

To create a facility design that is consistent with the needs of different employees and contributing to the effectiveness of the primary process, four organisational positions were identified as being relevant for this study, being top managers, supervisors, frontline employees (primary actors), and facility managers who, as a linking pin, are responsible for translating the needs of different employees into a coherent facility design. The challenge of facility managers then is to integrate the facility design, as a complex and comprehensive construct of different service processes and physical elements, into a meaningful and functional service facility for all employees. The challenge is not only to prevent dissatisfaction, but also to unlock the enormously persuasive and eloquent capacity of facility design to reinforce organisational performance (Duffy 2000).

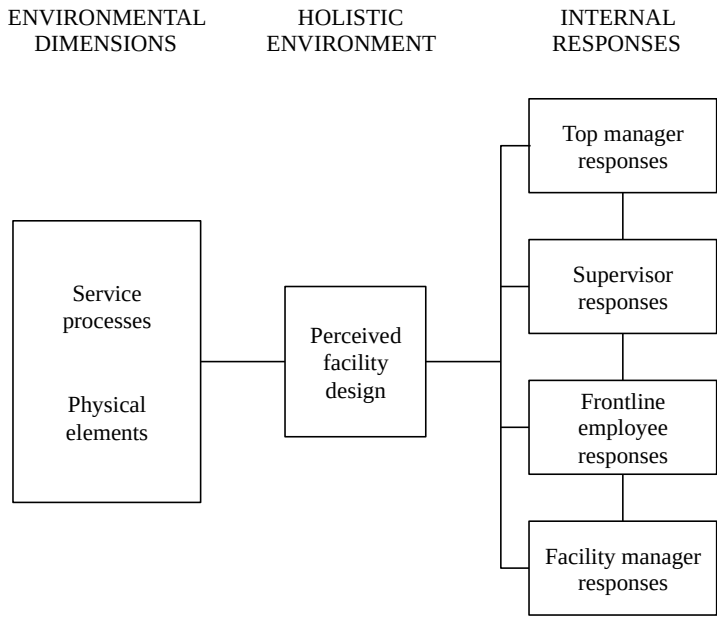

Figure 4.1. Framework for understanding environment-user relationships (adapted from Bitner 1992).

4.2.2 Differences in perceptions

Facility design thus has multiple stakeholders. It is to be seen whether every stakeholder or employee category share their perceptions, or could it be that, because of their position, different employees may perceive the same facility design differently. Although many individual factors influence the perceptual process, including experience, personality, and cognitive complexity (Gibson and Early 2007), also organisational characteristics (e.g. membership of different departments or different hierarchical layers) influence perceptions of individuals greatly (Watson and Baumler 1975; Stauss 1995). The differences in interpretation reflect the departmental identification (Dearborn and Simon 1958), differences in the nature of the task and in the environmental uncertainty (Watson and Baumler 1975). Also, Lewis and Entwistle (1990) argue that if internal relationships between internal service providers and internal customers are not managed effectively, then various "gaps" will appear which have implications for internal service quality. To understand this environment-user relationship we adapted the framework of Bitner (1992), as shown in Figure 4.1, and suggest that a variety of environmental factors are perceived by different employee categories and that every category may respond differently to the environment, influencing individual behaviour (e.g. approach, avoid, social interaction).

What forms do perception gaps take? Three scenarios can be envisaged between two stakeholders A and B; (1) An overestimation in which A perceives a higher quality than B perceives it, (2) a small or non-existent perception gap, in which A and B have the same perception of the quality, and (3) an overestimation in which B perceives a higher quality than

A does. Potential perception gaps may thus indicate a misalignment between different employee categories, resulting in a facility design that does not work properly for certain employees leading to their possible inconvenience. Even more, given the variety of service processes and physical elements that are offered integrally, and their relationship with organisational performance, especially perception gaps between decision-makers and work floor are not good. Perception gaps may therefore give rise to discussion between different employees about whether or improper functioning of the facility design.

It is inevitable that differences in perceptions will always exist, and also the importance employees place on different facility design dimensions may vary, as argued by Marhall, Baker, and Finn (1998). The question is where do they exist, are they consistent with our theoretical expectations, and, if so, in what way can they be managed best? Given the interrelationship between the four organisational positions, six possible gaps may exist. To visualise this, we opted for a graphical representation separate from the previously introduced framework, shown in Figure 4.2. In order to indicate the gap, we have expressed this as the relative number of statistically significant different observations between two employee categories (here indicated as x), with $x \leq 20\%$ considered limited gaps, $20\% < x \leq 50\%$ considered moderate gaps, and $x > 50\%$ considered considerable gaps. This scale has criterion-related validity and is merely concerned with predicting the gap as a practical issue (DeVellis, 2003).

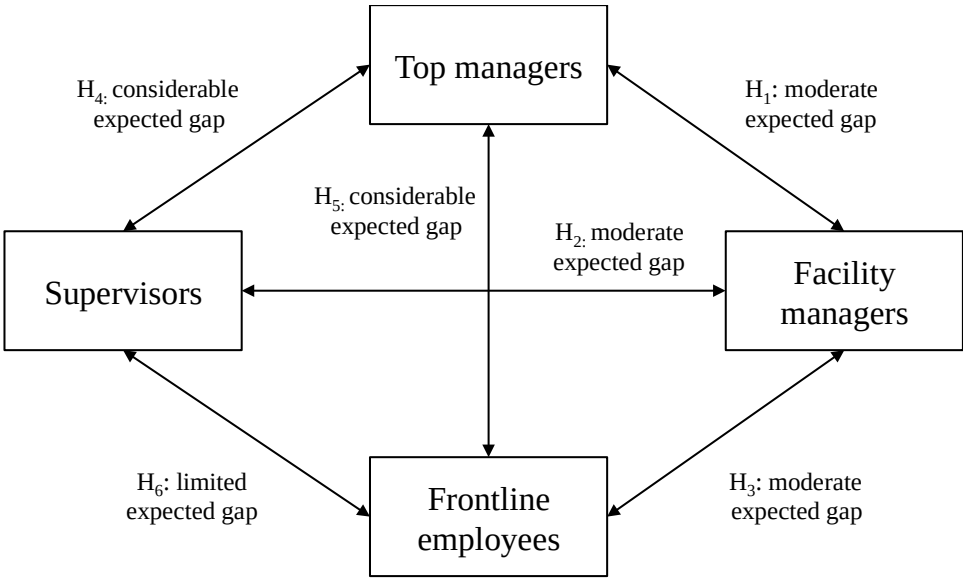

Figure 4.2. Representation of expected gaps in perceived facility design between different employee categories for interpersonal services.

In this paragraph we will set out to address the theoretical expectations of each of these gaps. The gaps in the perceptions of facility design between different employee categories, as we expect them, all have different grounds and may differ from their theorized roles as previously described. Overall, we expect a distinction between top managers with a typical strategic perspective concerned with effectiveness, and the typical operational perspective of both

supervisors and frontline employees, focusing on the efficacy and efficiency of the facility design for their primary process (Checkland 1981). We also expect facility managers to balance in between, in an arena where different employees with different interests due to their organisational position manifest themselves.

Expected gap 1: Top managers-Facility managers

Top managers are the key decision-makers and determine organisational policy, with a general and/or key function in the relationship between FM and the primary process. They strongly affect the FM arrangements by policymaking and elaborating guidelines (Chotipanich and Nutt 2008). From their position, we expect their design intent come from the strategic role the facility design can play in differentiating the organisation from competitors and signal customers that the core service is intended for (Zeithaml, Bitner, and Gremler 2009). Yet, top managers also see facilities as one area where savings must be found when seeking to reduce organisational costs (Langston and Lauge-Kristensen 2002). Facility managers may have a professional opinion regarding the required facility design and a willingness to improve, but herein are not autonomous. Their role can become more operational as a direct result of trying to keep everything going under enormous budgetary pressure (Langston and Lauge-Kristensen 2002). Because top managers have a general responsibility with regard to the social and competitive position of the organisation, they may find facility design less important and consider this of no priority as long as the organisation's image and continuity are not compromised. These are most probably also the facility manager's professional concerns, even if it was only because they are accountable to the top manager. Consequently, we hypothesise the following:

H_1: For interpersonal services, between top managers and facility managers there will be a moderate gap in their perceptions of the facility design, with top managers being more positive than facility managers.

Expected gap 2: Supervisors-Facility managers

Facility design is often overlooked as a source of competitive advantage (Alexander 1996) and tends to be undervalued by primary process management (Barrett 2000; Nutt 2004). Consequently, due to strong visual aspects, facility design has only an operational meaning to supervisors (Kaya et al. 2004). This may likely cause a misperception of facility design, especially if supervisors cannot affect its quality, or in case of transfer pricing, when, according to Zimmerman (1979), cost allocations are being used to control the overconsumption and discourage the use of services and physical elements. Since both employee categories' role within the organisation is that of facilitating and supporting employees who are closest to the customer, and provided that the primary process is not compromised, we hypothesise the following:

H_2: For interpersonal services, between supervisors and facility managers there will be a moderate gap in their perceptions of the facility design, with supervisors being more negative than facility managers.

Expected gap 3: Frontline employees-Facility managers

Frontline employees, as those responsible for the core services, are probably very critical users of the facility design with respect to how it affects their interaction with customers and personal comfort. A well-designed, functional facility can make the core service a pleasure to perform from the employee's point of view (Zeithaml, Bitner, and Gremler 2009). For core actors, a high level of operational responsiveness (e.g., to technical issues) is the most important feature of FM (Barrett 2000). After all, they encounter the problems immediately at first hand. One expects that their support needs are primary in the facility design decisions, also given that the interests of the primary process by definition (Comité Européen de Normalisation 2006) are paramount in FM. The question however is, whether that happens, and if so, what do facility managers do or what can they do to meet such needs. Especially, since Duffy (2000) argued that the history of FM has been one of rationalization (i.e., cost cutting), and because of their customary technical and support role they have never had the power, or even the will, to articulate and to stand up for user requirements. Considering this ambiguity, and facility managers still being able to provide a decent operational support, we hypothesise the following:

H_3: For interpersonal services, between frontline employees and facility managers there will be a moderate gap in their perceptions of the facility design, with frontline employees being more negative than facility managers.

Expected gap 4: Top managers-Supervisors

In the relationship between the top management and middle management, there is the delegation of responsibility for primary processes to supervisors in exchange for resources (budget, staff) and a certain level of authority. However, cutting costs is part of the overall process of managing with tight financial constraints that top managers face, with impacts within organisational units (Langston and Lauge-Kristensen 2002). The possible contradiction that this yields is, when it comes to organisational support, that the top managers aims for minimizing costs, while the supervisors in this regard strive to maximize core process outcome. Because supervisors are much closer to the primary process than the top managers, we expect them also to have different expectations and perceptions of the facility design, especially when it comes to its contribution to primary processes. Also motivated by the frequency of alignment – typically yearly a limited number of bilateral meetings between top managers and supervisors versus probably daily informal feedback that supervisors receive from frontline employees regarding the progress of interpersonal services provision and the extent to which the facility design is or is not contributing to the primary process. Therefore, we hypothesise the following:

H_4: For interpersonal services, between top managers and supervisors there will be a considerable gap in their perceptions of the facility design, with top managers being more positive than supervisors.

Expected gap 5: Top managers-Frontline employees

Between the top managers and the frontline employees, there is a large hierarchical distance with no direct functional link between the two. Top managers set organisational goals and, according to Bitner (1995), make promises to customers regarding what is to be delivered. In interpersonal services, frontline employees are critical to the success of the service organisation by delivering the promise (Zeithaml, Bitner, and Gremler 2009). Frontline employees often face the conflict between the organisation and the customer when they have to choose whether to follow policies and rules or satisfy customer demands. This is likely to cause a different view of the contribution that the facility design may have to interpersonal services. According to the top managers the facility design is expected to be particularly appealing, creating an environment that helps to attract and retain the best people, and communicating with customers and shaping their experiences. For frontline employees, the facility design in all its aspects should foremost provide physical evidence, contributing to serving the customer and enjoying personal comfort on a daily basis. Their common understanding will probably be that the facility design should not entail too much operational inconvenience. Therefore, we hypothesise the following:

H_5: For interpersonal services, between top managers and frontline employees there will be a considerable gap in their perceptions of the facility design, with top managers being more positive than frontline employees.

Expected gap 6: Supervisors-Frontline employees

Frontline employees' role is in delivering the promise to customers (Bitner 1995). It is in the decisive moment of interaction between the frontline employees and customers when the organisations' services are actually delivered. Supervisors provide support to them from behind the scenes. Their role is to aid the frontline employees in their ability to deliver on the service promise: recruiting, training, motivating, rewarding, and providing equipment and technology (Zeithaml, Bitner, and Gremler 2009). Although the supervisor and the frontline employee have a hierarchical relationship, their primary goals are both related to the core service. Likely, with respect to facility design, the supervisor may strongly reason from an operational perspective as well, and only because of their management role have other expectations with respect to some elements of facility design. Therefore, because the supervisors and the frontline employees work so close together in this, we hypothesise the following:

H_6: For interpersonal services, between supervisors and frontline employees there will be a limited gap in their perceptions of the facility design.

4.3 Methodology

This study assesses how different employee categories evaluate facility design. For the comparison of the perceptions to be informative, our study population was drawn from

educational institutions of the same academic level, being Universities of Applied Sciences in The Netherlands. We identified four employee categories at the institutions with respect to the use of facility design, being Board of Directors, education managers, lecturers and facility managers. The research first identifies educational facility design dimensions, as perceived by the four employee categories. Second, this study measures the similarities and differences of perceptions of the facility design between the employees and will examine the six expected perception gaps as presented earlier in Figure 4.2. Finally, if gaps do exist, recommendations for bridging between gaps will be set forth.

4.3.1 Sampling and data collection

All 39 Dutch Universities of Applied Sciences were invited to participate in the study by sending an invitation letter to the portfolio holder of FM within the Board of Directors. In the subsequent weeks, between two and ten (follow-up) phone calls with each institution were made to explain the objectives of the research, and to get approval on participation. Finally, 18 institutions agreed to participate in the study. The sample population varies in size, with the smallest institution including 504 students, the largest 34,765 students. In general, the reasons for not participating in the research were diverse. This varied from a) timing, b) corporate policy restrictions, c) not relevant, d) too busy, e) tumultuous times, f) administrative restrictions, and g) no reason given.

Given the targeted population exceeding 14,000 potential participants, an online survey was employed to obtain information about the perceptions of Board members, education managers, lecturers, and facility managers. For the present study, the perceptions of all four employee categories were simultaneously surveyed. In order to minimize any time bias, the data was collected from the four groups as much at the same time. The participants were invited through an email that was used as a cover letter and included the URL for the website that by clicking automatically gave access to the electronic survey tool. The survey required approximately 5 minutes to complete, as was pretested on a group of academics and lecturers. Respondents were asked to fill in the questionnaire within two weeks. After one week a reminding email was sent, with an appeal to non-respondents to respond.

4.3.2 Measurement of variables

From the variety of facility design dimensions of importance for a good conduct of education (Jamieson et al. 2000; Clark 2002; Temple 2007; Blackmore et al. 2011; Kok, Mobach, and Omta 2011), we selected 40 items as our independent variables that constitute the educational facility design. All employees answered the same items. Since employees as users have underlying beliefs, assumptions and priorities that influence their evaluation (Zeithaml 1988), these items were formulated as statements about their use value (Woodruff 1997; Bowman and Ambrosini 2000), which relates to the specific qualities of a product or service

experienced by the users regarding their requirements. In order to measure (the intensity of) respondents' attitude towards different aspects of the facility design, we used a seven-point scale from 1, very poor to 7, very good, assuming each item on the scale has equal attitudinal value (Kumar 2011). By presenting this as a numerical scale, this would show the strength of one respondent's opinion in relation to that of another, and not the absolute attitude. By doing so, we were able to treat the attitudinal scores more like an interval-level measurement (Jamieson 2004). One additional item, "The contribution of all the above facilities to the quality of education", was used as an overall evaluation of the relative importance of facility design, and to be used as dependent variable. This item measured the holistic response of employees to their environment as the combined effect on all their senses (Fitzsimmons and Fitzsimmons 2011).

We calculated gaps in two different ways. On one hand in terms of size as the difference between the overall mean perception of the facility design between two employee categories concerned. On the other hand expressed as a percentage of the number of items relative to the forty items in total (here indicated as x) which showed statistically significant perception gaps between two employee categories, as earlier indicated ($x \leq 20\%$ limited gaps, $20\% < x \leq 50\%$ moderate gaps, and $x > 50\%$ considerable gaps).

Table 4.1. Distribution of respondents

	Higher education institutions																			
Type of respondents	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	**Sample (n)**	**Population (N)**	**Response**
Board of Directors	0	1	0	0	2	1	0	1	1	2	0	1	1	1	1	2	2	1	17	45	37,8%
Facility managers	3	7	1	1	2	1	0	1	10	4	5	13	9	2	3	8	5	1	76	134	56,7%
Education managers	30	32	2	2	31	2	1	11	20	10	5	12	15	2	3	5	17	11	211	598	35,3%
Lecturers	116	412	28	20	221	42	14	96	165	82	33	116	44	44	9	39	212	62	1.755	13.552	13,0%
Total	149	452	31	23	256	46	15	109	196	98	43	142	69	49	16	54	236	75	2.059		

4.4 Results

The participation of eighteen of the 39 institutions in this study corresponds with a response rate at institution level of 46%. A total of 2,277 questionnaires were returned. After deleting incorrect and insufficient answered questionnaires, 2,059 questionnaires could be analysed. The response differed per employees group, with 17 Board members (37.8%), 76 facility managers (56.7%), 211 education managers (35.3%), and 1,755 lecturers (13.0%). The distribution of these four groups of respondents is shown in Table 4.1. The population (N) corresponds to the number of staff, as specified by the participating organisations, employed in the respective function. Online surveys feature the impossibility of calculating the response rate (Van Selm and Jankowski 2006) as "There is no way in which to know how many individuals might have seen the survey or its links but declined to participate. Only the number of completed surveys is known and not the number of refusals" (Kaye and Johnson 1999). Therefore, response rates were calculated based on the number of completed surveys. The overall reliability of the questionnaire was very good, with Cronbach's α of .96, and values between .94 and .97 for each of the four respondent groups (see Table 4.2). To

establish to what extent differences in perceptions of facility design of different employees of higher education institutions exist and relate facility managers', Board of Directors', education managers', and lecturers' perceptions, data were aggregated at the position level.

Table 4.2. Means and standard deviations (between parentheses) of perception scores of facility design dimensions of different employee categories (7-point scales).

Item	Facility managers (*N* = 76)	Board of Directors (*N* = 17)	Education managers (*N* = 211)	Lecturers (*N* = 1,755)	Item mean
Classrooms					
Category mean	**4.97**	**5.22**	**4.56**	**4.57**	**4.83**
Availability lecture spaces	5.10 (1.26)	5.77 (0.83)	4.26 (1.36)	4.58 (1.38)	4.93
Availability practicum spaces	5.23 (1.05)	5.54 (1.21)	4.36 (1.36)	4.55 (1.37)	4.92
Setup of classrooms	5.17 (1.06)	5.62 (0.77)	4.67 (1.30)	4.66 (1.29)	5.03
Audio-visual equipment	5.43 (1.05)	5.43 (1.09)	5.19 (1.28)	5.13 (1.29)	5.30
Furniture in classrooms	5.08 (1.37)	5.00 (1.47)	4.74 (1.30)	4.80 (1.27)	4.91
Acoustics in classrooms	5.05 (1.25)	5.29 (0.83)	4.86 (1.28)	4.78 (1.30)	5.00
Day lighting classrooms	4.97 (1.33)	5.15 (1.21)	4.91 (1.30)	4.82 (1.42)	4.96
Artificial lighting classrooms	5.41 (0.80)	5.77 (0.44)	5.23 (0.96)	5.10 (1.10)	5.38
Indoor climate classrooms	4.46 (1.40)	4.69 (1.18)	4.11 (1.44)	4.09 (1.51)	4.34
Self-regulate classroom climate	3.84 (1.47)	3.91 (1.64)	3.30 (1.52)	3.21 (1.54)	3.57
Building and environment					
Category mean	**4.93**	**5.43**	**4.40**	**4.36**	**4.78**
Layout for cooperation	5.07 (1.11)	5.71 (1.16)	4.66 (1.55)	4.62 (1.45)	5.02
Layout for knowledge sharing	4.92 (1.15)	5.31 (1.20)	4.61 (1.49)	4.58 (1.41)	4.86
Fitting out for collaboration	4.96 (1.23)	5.71 (0.77)	4.62 (1.50)	4.62 (1.41)	4.98
Fitting out for knowledge sharing	4.97 (1.14)	5.65 (0.79)	4.57 (1.51)	4.62 (1.38)	4.95
Possibilities working at fixed places	5.50 (1.22)	5.73 (0.96)	4.96 (1.53)	4.60 (1.79)	5.20
Availability concentration workspaces	4.39 (1.37)	4.94 (1.09)	3.72 (1.58)	3.57 (1.65)	4.16
Availability meeting rooms	4.67 (1.33)	5.24 (1.20)	3.84 (1.42)	3.97 (1.45)	4.43
Indoor climate buildings	4.35 (1.38)	4.94 (1.56)	3.67 (1.43)	3.88 (1.57)	4.21
Self-regulate building climate	3.97 (1.47)	4.33 (1.72)	3.28 (1.48)	3.22 (1.55)	3.70
Atmosphere and appearance	5.70 (1.02)	6.24 (0.66)	5.29 (1.50)	5.11 (1.47)	5.59
Tidiness of outdoor area	5.77 (0.77)	5.88 (0.60)	5.14 (1.31)	5.20 (1.27)	5.50
Cleaning					
Category mean	**5.16**	**5.18**	**4.51**	**4.76**	**4.90**
Cleanliness sanitary areas	5.09 (1.12)	5.24 (1.20)	4.40 (1.46)	4.76 (1.43)	4.87
Cleanliness own workplace	5.20 (0.99)	5.41 (0.71)	4.62 (1.42)	4.79 (1.32)	5.01
Cleanliness other interior	5.18 (0.93)	4.88 (1.11)	4.51 (1.39)	4.74 (1.30)	4.83
Maintenance					
Category mean	**5.39**	**5.56**	**5.09**	**5.19**	**5.31**
Maintenance condition buildings	5.28 (1.19)	5.76 (1.03)	5.12 (1.36)	5.23 (1.24)	5.35
Maintenance condition interior	5.46 (0.94)	5.71 (0.85)	5.13 (1.30)	5.12 (1.25)	5.36
Adequacy of call handling	5.26 (1.23)	5.24 (1.15)	4.88 (1.32)	5.08 (1.21)	5.12
Execution of concierge tasks	5.57 (1.02)	5.53 (1.18)	5.24 (1.24)	5.32 (1.11)	5.42

Item	Facility managers (*N* = 76)	Board of Directors (*N* = 17)	Education managers (*N* = 211)	Lecturers (*N* = 1,755)	Item mean
Reception desk					
Category mean	**5.81**	**5.71**	**5.49**	**5.65**	**5.66**
Helpfulness reception	6.01 (0.90)	5.88 (1.22)	5.68 (0.96)	5.78 (0.94)	5.84
Level of knowledge reception	5.61 (1.11)	5.53 (0.87)	5.29 (1.07)	5.51 (1.00)	5.49
Coffee and catering facilities					
Category mean	**5.51**	**5.92**	**4.96**	**4.96**	**5.34**
Availability coffee and tea	5.79 (0.99)	6.12 (0.60)	5.29 (1.18)	5.24 (1.27)	5.61
Availability catering facilities	5.64 (0.98)	6.06 (0.75)	5.07 (1.24)	5.12 (1.25)	5.47
Accessibility catering facilities	5.73 (0.89)	6.35 (0.61)	5.38 (1.02)	5.37 (1.11)	5.71
Variation catering offer	5.28 (1.37)	5.65 (1.32)	4.65 (1.42)	4.67 (1.53)	5.06
Supply of healthy food	5.10 (1.32)	5.41 (1.06)	4.39 (1.51)	4.41 (1.60)	4.83
Repro and print					
Category mean	**5.82**	**5.85**	**4.99**	**5.00**	**5.41**
Availability local printing	5.75 (1.12)	5.76 (1.09)	4.91 (1.41)	4.90 (1.36)	5.33
Accessibility local printing	5.89 (0.91)	5.94 (0.90)	5.06 (1.30)	5.09 (1.26)	5.50
ICT					
Category mean	**5.57**	**5.62**	**5.03**	**4.96**	**5.29**
Quality digital media	5.59 (1.05)	5.76 (1.20)	5.12 (1.31)	4.93 (1.41)	5.35
Availability digital media	5.67 (1.00)	5.56 (1.21)	5.22 (1.26)	5.08 (1.30)	5.38
Off-site working digital media	5.45 (1.06)	5.53 (1.13)	4.75 (1.45)	4.87 (1.41)	5.15
Overall mean	**5.21**	**5.48**	**4.72**	**4.74**	**5.04**
Cronbach's α	0.94	0.97	0.95	0.96	0.96

4.4.1 Perceptions scores

First we calculated overall mean item scores and overall item category means. These results are shown in Table 4.2. The overall mean perception score of facility design was 5.04, with category means varying from 5.66 (reception desk) to 4.78 (building and environment). Item scores varied from 5.84 (helpfulness of the reception of visitors) to 3.57 (possibilities to self-regulate classroom climate).

Then we calculated the overall mean, category means, item means, and standard deviations of the perception score of facility design for the four employee categories. By all means, Board members were the most positive about the facility design. However, the judgement of facility managers tended towards that of the Board'. Both employee categories repeatedly showed an above average score, opposed to education managers' and lecturers' under average score. Education managers were the most negative with regard to their perceptions of the facility design, followed closely by lecturers. The standard deviations of the measured items of all four employee categories were all, given a few exceptions, well over 1, and considering the use of seven-point scales relatively large. This may indicate there were (considerable)

differences of perceptions between and/or at the different institutions and/or their multiple buildings.

Table 4.3. Gaps in perception scores of facility design dimensions between different employee categories.

Item	FM-BoD	FM-EM	FM-Le	BoD-EM	BoD-Le	EM-Le
Classrooms						
Availability lecture spaces		0.84***	0.52**	1.51***	1.19**	-0.32**
Availability practicum spaces		0.87***	0.68***	1.18**	0.99**	
Setup of classrooms		0.50**	0.51**	0.95**	0.96**	
Audio-visual equipment						
Furniture in classrooms		0.34*	0.28*			
Acoustics in classrooms						
Day lighting classrooms						
Artificial lighting classrooms			0.31*	0.54*	0.67*	
Indoor climate classrooms			0.37*			
Self-regulate classroom climate		0.54*	0.63**			
Building and environment						
Layout for cooperation	-0.64*		0.45*	1.05**	1.09**	
Layout for knowledge sharing					0.73*	
Fitting out for collaboration	-0.75*		0.34*	1.09**	1.09**	
Fitting out for knowledge sharing	-0.68*			1.08**	1.03**	
Possibilities working at fixed places		0.54*	0.90***	0.77*	1.13*	0.36*
Availability concentration workspaces		0.67**	0.82***	1.22**	1.37**	
Availability meeting rooms		0.83***	0.70***	1.40***	1.27***	
Indoor climate buildings		0.68***	0.47*	1.27**	1.06**	-0.21*
Self-regulate building climate		0.69**	0.75***	1.05*	1.11*	
Atmosphere and appearance	-0.54*		0.59**	0.95**	1.13***	0.18*
Tidiness of outdoor area		0.63***	0.57***	0.74*	0.68*	
Cleaning						
Cleanliness sanitary areas		0.69***		0.84*		-0.36***
Cleanliness own workplace		0.58**	0.41*	0.79*		
Cleanliness other interior		0.67***	0.44**			-0.23*
Maintenance						
Maintenance condition buildings						
Maintenance condition interior			0.34*			
Adequacy of call handling		0.38*				-0.20*
Execution of concierge tasks						
Reception desk						
Helpfulness reception		0.33**	0.23*			
Level of knowledge reception		0.32*				-0.22**
Coffee and catering facilities						
Availability coffee and tea		0.50**	0.55***	0.83**	0.88**	
Availability catering facilities		0.57***	0.52***	0.99***	0.94***	

Item	FM-BoD	FM-EM	FM-Le	BoD-EM	BoD-Le	EM-Le
Accessibility catering facilities	-0.62**	0.35**	0.36**	0.97***	0.98***	
Variation catering offer		0.63***	0.61***	1.00**	0.98**	
Supply of healthy food		0.71***	0.69***	1.02*	1.00*	
Repro and print						
Availability local printing		0.84***	0.85***	0.85**	0.86**	
Accessibility local printing		0.83***	0.80***	0.88**	0.85**	
ICT						
Quality digital media		0.47*	0.66***	0.64*	0.83**	
Availability digital media		0.45**	0.59***			
Off-site working digital media		0.70**	0.58**	0.78*		
Identified gaps[b]	12.5%	67.5%	75.0%	62.5%	57.5%	20.0%

Note: FM, Facility managers; BoD, Board of Directors; EM, Education managers; and Le, Lecturers.
[a]Gaps shows significance values for rejecting or retaining the null hypothesis indicating whether the distribution of items scores is the same across categories of position using Mann-Whitney U tests of sample pairs. When the test is significant ($p < .05$) the null hypothesis is rejected, indicating that there is a difference in perception between the two groups concerned.
[b]Percentages calculated as the number of gaps found relative to the total number of sampled items (40).
*$p < .05$.
**$p < .01$.
***$p < .001$.

4.4.2 Hypothesis testing

For hypothesis testing, perception gaps between the different employee categories were calculated. Considering the examined groups are independent and of unequal size (different number of participants), we used Mann–Whitney U tests to analyse the specific sample pairs for significant differences. The results are presented in Table 4.3, and a graphical representation is given in Figure 4.3. Between Board of Directors (i.e. top managers) and facility managers the difference in overall mean was 0.27, with statistically significant gaps found at five out of forty items (12.5%), ranging from 0.54 to 0.75. As a result, H_1 is rejected. Between education managers (i.e. supervisors) and facility managers the difference in overall mean was 0.49, and twenty seven out of forty items showed statistically significant gaps (67.5%), ranging between 0.32 and 0.87. Given this result, H_2 is not supported. Between lecturers (i.e. frontline employees) and facility managers the difference in overall mean was 0.47, and thirty out of forty items showed statistically significant gaps (75%), ranging from 0.23 to 0.90. Therefore H_3 is rejected. Between Board of Directors (i.e. top managers) and education managers (i.e. supervisors) the difference in overall mean was 0.76, and twenty five out of forty items were statistically significantly perceived different (62.5%), with gaps varying from 0.54 to 1.51. This indicated support for H_4. Board of Directors (i.e. top

managers) and lecturers (i.e. frontline employees) perceived twenty three out of forty items (57.5%) statistically significantly different, with gaps between 0.68 and 1.37, and a difference in overall mean of 0.74. Therefore, H_5 is retained. Education managers' (i.e. supervisors) and lecturers' (i.e. frontline employees) perceptions were equal except for eight out of forty items (20%) with gaps ranging from 0.18 to 0.36, and a difference in overall mean of 0.02, which indicated support for H_6. The gaps were mainly observed for the perception of the physical elements availability of classrooms and workplaces, building indoor climate and appearance, and service elements catering, print, and digital media. The perceptions were mostly similar with respect to the classrooms' ambient conditions and functionality (i.e. equipment), cleaning, maintenance and reception desk.

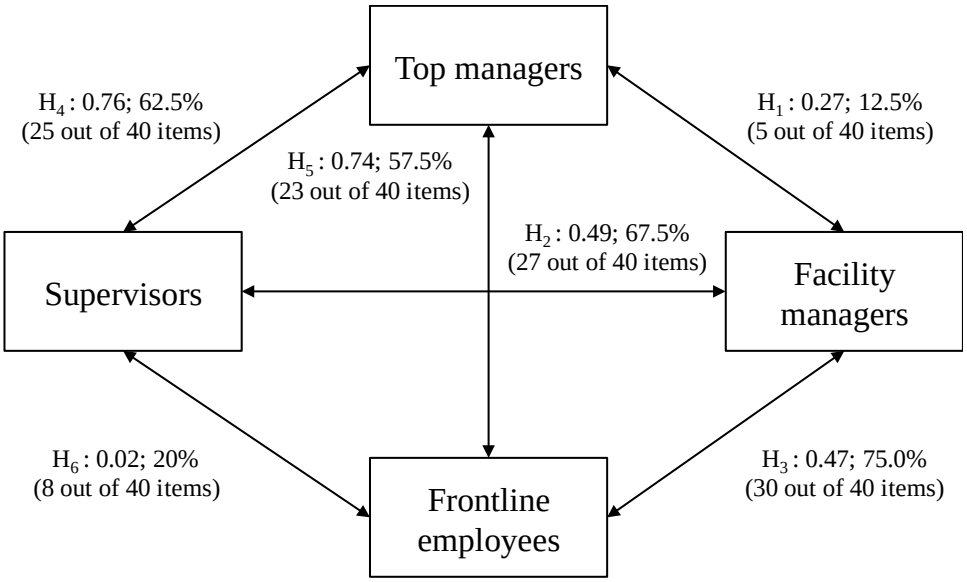

Figure 4.3. Representation of observed gaps in the perceived facility design between different employee categories in Dutch higher education institutions, both in size and percentage (calculation between parentheses).

4.4.3 Design assumptions

The limited gaps found between facility managers and Board members on the one hand, and education managers and lecturers on the other, indicated support for converging each of both employee categories into one for further analysis, considering them two homogeneous respondents groups in terms of their perception of service processes and physical elements. Then we looked at what importance both groups place on the forty items in relation to their expected contribution to the quality of education. However, because people perceive environments holistically (Bitner 1992), merging the facility design elements together into a whole through observation and interaction, and its properties cannot be explained by just taking the sum of the separate elements (Mobach 2013), we reduced dimensionality and identified the groups of items that co-vary with one another (DeVellis 2003). Statistical reason was that with so many different dimensions, it is difficult to comprehend or even

visualize the patterns of association among them (Lattin, Carroll, and Green 2003). Therefore, a principal component analysis (PCA) was conducted on the forty predictor items with varimax rotation and pairwise deletion of missing values. We verified the sampling adequacy for the analysis using the Kaiser-Meyer-Olkin measure, which was very good with KMO = .926. Bartlett's test for sphericity χ^2 (780) = 48549.57, $p < .001$, indicated correlations between items were sufficiently large for PCA. Table 4.4 presents the component structure. Only the components with an eigenvalue above 1.0 and component loadings above .5 are presented. Nine components appeared accounting for 69.6% of the variance of the original data.

The first component was labelled "representation", and included eight physical elements that, with Rapoport (1982) and Fitzsimmons and Fitzsimmons (2011), without words, communicate a message to its users and employees. Although highly subjective and very prone to personal taste and preferences, apparently all the included items serve as cues for the perceived overall representation of the higher education institution according to the respondents. E.g. a poorly maintained exterior could act as a negative cue for the image of the education institution, whereas a well-maintained exterior most probably appeals to its observers and is associated with a well-run education institution. The second component, labelled "classrooms", consisted of eight physical elements related to the availability and characteristics (e.g. setup, acoustics, day lighting) of classrooms. The third component, labelled "catering", included five service elements related to the availability and supply of food and drinks. The fourth component was labelled "workplaces", and included five physical elements that relate to possibilities and places to meet and work. The fifth component, termed "indoor climate", consisted of four physical elements related to the (possibilities to regulate the) indoor climate. The sixth component was labelled "ICT", and included four service elements related to digital media and audio-visual equipment. The seventh component was termed "cleaning", and included three physical elements related to cleanliness. The eighth component was labelled "front office", and concerned four service elements of interaction between FM staff and employees. Finally, the ninth component, labelled "local printing", had two items related to the availability and accessibility of local printing services. Three items (layout for knowledge sharing, layout for cooperation, and audio-visual equipment) appeared in several components, which indicates that they are a mix of service and physical elements and, depending on the context, communicate different meanings to its users.

Table 4.4. Component structure of the employees' (N = 2,059) perceptions of facility design.

Facility Design Component	Cronbach's α	Item	Loading	VAF[a]
Representation	.92			11.9%
		Atmosphere and appearance	.732	
		Fitting out for collaboration	.701	
		Maintenance condition interior	.684	
		Maintenance condition buildings	.682	
		Fitting out for knowledge sharing	.681	
		Layout for knowledge sharing	.628	
		Layout for cooperation	.620	
		Tidiness of outdoor area	.596	
Classrooms	.86			8.9%
		Setup of classrooms	.675	
		Acoustics in classrooms	.632	
		Availability lecture spaces	.625	
		Availability practicum spaces	.586	
		Furniture in classrooms	.580	
		Artificial lighting classrooms	.574	
		Day lighting classrooms	.521	
		Audio-visual equipment	.502	
Catering	.87			8.6%
		Variation catering offer	.852	
		Supply of healthy food	.796	
		Availability catering facilities	.789	
		Accessibility catering facilities	.744	
		Availability coffee and tea	.511	
Workplaces	.83			8.0%
		Availability meeting rooms	.668	
		Availability concentration workspaces	.614	
		Possibilities working at fixed places	.583	
		Layout for knowledge sharing	.558	
		Layout for cooperation	.568	
Indoor climate	.89			7.8%
		Self-regulate building climate	.761	
		Self-regulate classroom climate	.758	
		Indoor climate buildings	.742	
		Indoor climate classrooms	.731	
ICT	.86			7.4%
		Availability digital media	.820	
		Quality digital media	.819	
		Off-site working digital media	.762	
		Audio-visual equipment	.543	
Cleaning	.88			6.5%
		Cleanliness own workplace	.816	
		Cleanliness other interior	.800	
		Cleanliness sanitary areas	.762	
Front office	.80			5.9%
		Helpfulness reception	.849	
		Level of knowledge reception	.848	
		Execution of concierge tasks	.552	
		Adequacy of call handling	.509	
Local printing	.91			4.7%
		Accessibility local printing	.819	
		Availability local printing	.791	
Cumulative				69.9%

[a]VAF = Variance accounted for.

Next we regressed the components against their perceived contribution to the quality of education according to both groups using a stepwise method. These results are presented in Table 4.5. As regards facility managers and Board members three components significantly contribute to the quality of education, being representation (b = .459, p < .001), front office (b = .341, p < .01), and classrooms (b = .280, p < .05), explaining 42.1% of its variance ($\overline{R}^2$ = .421, p < 0.05). According to lecturers and education managers all nine components significantly contribute to the quality of education, explaining 71.1% of its variance ($\overline{R}^2$ = .711, p < .001), with representation (b = .500, p < .001), workplaces (b = .390, p < .001), classrooms (b = .386, p < .001), ICT (b = .310, p < .001), catering (b = .240, p < .001), indoor climate (b = .253, p < .001), front office (b = .239, p < .001), local printing (b = .203, p < .001), and cleaning (b = .197, p < .001).

Table 4.5. Linear regression of facility managers' and Board members' (N = 93) and lecturers' and education managers' (N = 1,966) perception of facility design, and contribution to quality of education.

	Board members and facility managers		Education managers and lecturers	
Predictors	*B*	*p*	*B*	*p*
(Constant**)**	(5.377)	.000***	(4.814)	.000***
Representation	.459	.000***	.500	.000***
Classrooms	.280	.011*	.386	.000***
Front office	.341	.003**	.239	.000***
Catering			.240	.000***
Workplaces			.390	.000***
Indoor climate			.253	.000***
ICT			.310	.000***
Cleaning			.197	.000***
Local printing			.203	.000***
R^2	.456	.011*	.713	.000***
Adjusted R^2	.421	.011*	.711	.000***

* p < .05.
** p < .01.
*** p < .001.

4.5 Discussion and conclusions

4.5.1 Physical facilities versus services

With an overall mean of 5.04, and overall category means which are all fairly close together, between 5.66 and 4.78, the perceived facility design seems reasonably consistent. However,

when zooming in on the evaluations of the different physical facilities and services, both overall and for the different employee categories, the disparities become larger, and with especially more negative outliers. The indoor climate of classrooms and buildings (e.g. air, temperature), and the possibilities to self-regulate this indoor climate, had the lowest evaluations of all facility design dimensions by all employees, followed by the availability of concentration workspaces and meeting rooms, as indicated by supervisors and frontline employees. This consistency may indicate corresponding basic needs of all employee categories in relation to their general functioning that must be addressed; a good and adjustable indoor climate and the possibility of enjoying territorial privacy. This is consistent with earlier research that has shown that individuals should have an opportunity to exercise influence and control over their work situation (Edvardsson and Gustavsson 2003). It appears that once these basic needs are met, needs and expectations diverge depending on organisational position and associated tasks, and are mainly reflected in catering facilities, local printing, and digital media. May we consider this analogous to the Maslow (1943) hierarchy of needs, which says that once basic needs are met, individual differences with respect to other needs, like at self-expression, become larger? Or is it just facility managers failing to meet these basic needs of all employees to the same extent? Actually we must conclude that FM does succeed to achieve an overall satisfactory quality level of facility design, but there are differences between the perceptions of different employee categories.

The results also show that there is a tendency that service elements (i.e. reception desk, repro and print, coffee and catering facilities, ICT) are valued higher than physical elements (i.e. building and environment, classrooms, cleanliness). This may highlight a demarcation between services and physical environment whereas the former, in terms of Herzberg, Mausner, and Snyderman (1959), being motivator factors, satisfying employees more and giving them the possibility to choose whether or not to use these elements, and the latter seem, in terms of Herzberg, Mausner, and Snyderman (1959), hygiene factors, of which the employees may have the feeling it all just befalls them, and just have to deal with it. In the comparison of services and physical environment there would be the analogy with soft versus hard, or dynamic versus static, whereby, in the design process, it may seem much more difficult to establish an overall satisfactory quality level with regard to the hard and static physical elements. On the other hand, perhaps that, at first instance, errors and shortcomings in design features of services can be compensated in the interactions between provider and employee and/or goods and/or systems of the service provider. Empowering frontline employees (i.e. internal service providers) can then turn a service failure into a service delight (Fitzsimmons and Fitzsimmons 2011).

4.5.2 Organisational position related perception gaps

Hypothesis 1

Contrary to the expected moderate gap in the perceptions of facility design between top managers and facility managers, we observed only a limited perception gap, and this gap was also relatively small. As expected, top managers were more positive than facility managers.

Does this indicate that top managers and facility managers do have similar expectations and, as it appears, also similar perceptions because of their close collaboration, or have facility managers come to terms with what the top managers want and overrated the facility design to, in reference to Festinger (1957) and Festinger and Carlsmith (1959), reduce cognitive dissonance caused by forced compliance? Considering the clear trend towards the outsourcing of FM tasks to service providers (Duffy 2000; Roberts 2001), there may be close contact between the top managers and facility managers regarding outsourcing decisions, and consequently the required service levels. Outsourcing provides clear accountabilities, and also helps facility managers to operate much more strategically in the long term (Ware and Carder 2012). Consequently there may be much coordination between top managers and facility managers. Their corresponding assessment may also be the result of both are of the opinion that a satisfactory, and perhaps standardised facility design is offered in the context of efficiency measures, and especially where the two together align without involving other employee categories in their decision.

Hypothesis 2

We expected a moderate gap in the perceptions of the facility design between supervisors and facility managers, however we observed considerable perception gaps between the two. As hypothesized, supervisors consistently were more negative than facility managers. This may point to an undervaluation of facility design by supervisors, as proposed by Barrett (2000) and Nutt (2004). However, the gaps may also be rooted in facility managers ignoring the needs and use purposes of supervisors, not allowing them a say in the facility design process, either intentionally or unintentionally. The opposite may also be true; supervisors failing to provide relevant input to facility managers for the facility design process. In case of transfer pricing supervisors will trade off the benefits of the facility design against its costs and risks, as proposed by Kok, Mobach, and Omta (2011). If facility managers then fail to demonstrate this added value of facility design to their primary process, supervisors will remain to under evaluate the facility design compared to facility managers. Another possible explanation may be that supervisors more closely relate to the primary process because of their hierarchical relationship with frontline employees, and therefore they receive more information about the weal and woe in the service facility than facility managers do.

Hypothesis 3

The largest deviation from our expectations regarding perceptions, was the gap found between frontline employees and facility managers. These gaps were not moderate, as earlier proposed, but considerable, and also most of all gaps found. With respect to three quarters of the assessed facility design elements frontline employees were significantly more negative than facility managers. This may indicate that facility managers fail to act in the interests of the primary process, in contrast to what is theorized in the European standard (Comité Européen de Normalisation 2006), and that maybe Duffy (2000) was right: facility managers have not the power, and maybe not even the will, to articulate and stand up for user requirements. This possible lack is reflected all along the facility design, with just a few exceptions. Looking at these, this may indicate that although frontline employees clearly expect a better quality of facility design, with respect to some, not all, core physical elements for primary process

purposes frontline employees and facility managers have the same ideas, and that possible operational discomforts are still well resolved. It is not so much that facility managers are able to guarantee facility design quality in advance, but does manage service recovery.

Hypothesis 4

As we expected, we found a considerable gap between top managers' and supervisors' perceptions of the facility design. The gaps calculated were also among the largest in size. Here we may have found evidence for the conflicting interest of the top managers in pursue of strategic effectiveness versus the supervisors in pursue of operational efficacy and efficiency. The clear overestimation of the facility design by the top managers compared to supervisors, as hypothesized, may also indicate that the former keeps up appearances because of their external orientation in 'selling' the organisation, while the latter deals with keeping up the primary process quality and frontline employee motivation. This may also indicate that supervisors somehow have a common knowledge that a positive evaluation of facility design can (and will) contribute to organisational performance, or at least that a lack of this may lead to discomforts and impede interpersonal services. Their undervaluation as opposed to the top managers' may then well reflect their operational perspective of how to evaluate facility design.

Hypothesis 5

Between top managers and frontline employees we also found a considerable gap in their perceptions of the facility design, with also a clear overrating by the top managers, as we expected. Although the expectations and experiences of both employee categories in some areas run parallel (e.g. ambient classroom conditions, cleanliness, and front office services), for all other facility design elements, the perception gaps were substantial. Here we probably found evidence for the mutual misunderstanding between top managers and frontline employees with regard to the latter's facility support, caused by a strategic versus operational perspective when it comes to the required features of facility design. The top managers may not really be on top of what takes place, and may simply be too distant from the actual work being done as argued by Mintzberg and Van der Heyden (1999). Although it is only perceptions of the facility design that do not match, the question is whether this is so convenient. After all, for interpersonal services it is all about employee-customer interaction and hence the effectiveness of primary process support. The top managers' perceptions, for that purpose, do not reflect the feedback from the primary actors.

Hypothesis 6

We found a limited gap of the perceptions of the facility design between supervisors and frontline employees, as we expected. Since supervisors were less positive with regard to the few service processes and physical elements concerned, this may indicate that supervisors, as the responsible actors to provide stability for frontline employees to work effectively, and when bearing the financial consequences of the use of facility design, are more critical with regard to some elements of facility design than frontline employees are. Apart from that, both employee categories are representatives of the primary process and face the same challenges of keeping up interpersonal services quality. Amongst others, they may evaluate the facility

design to the extent it serves as a facilitator in aiding the performances of persons in the environment. It seems that supervisors strongly associate with primary processes, and feel committed to act to the benefit of frontline employees.

4.5.3 Different design assumptions

We examined many buildings of different higher education institutions, of which the perceived facility design varies greatly, given the relatively large observed standard deviations, and still it appears each time that top managers and facility managers have a corresponding more positive judgement about this, and education managers and lecturers a corresponding more negative. This means that, following Rapoport (1982), the meaning of the facility design is perceived differently depending on one's role within the organisation; either management and decision-maker with respect to facility design, or provider of education and end-user of facility design. This was confirmed by an analysis of the importance that both groups place on facility design in terms of its contribution to interpersonal services. According to facility managers and top managers the evaluation of physical facilities and services contributes for slightly more than 40% to the quality of education, versus over 70% according to lecturers and their managers. The latter attribute thus a more important role to facility design than facility managers and top managers do. The misfit is reinforced when looking at the type of items that both groups expect to affect the quality of education. Management is more pronounced about what does contribute to good education and are limited to physical facilities and services that relate to how the organisation looks like, the physical point of contact and the 'first aid for discomfort'. Does this restriction denote a modesty or lack of understanding with regard to the contributing forces of facility design to create the proper setting for the educational process? Or is it indicative for their decision-maker's perspective in which they are only concerned to the visible aspects as housing and furnishings and the extent to which operational inconvenience is solved? Very remarkable here is the modest attitude of facility managers, who consider that a large part of the facility design for which they are responsible, does not contribute to the quality of education. That raises the debate on the extent to which facility managers and top members really believe that facility design is an integral part of and a precondition for the primary process. According to lecturers and education managers, every aspect of the facility design significantly adds to the quality of education. It becomes quite clear that both groups have different interests and different thoughts in regimes when it comes to the importance of the facility design. According to lecturers and education managers, the facility design has a facilitator role, aiding or hindering the ability to carry out their respective activities. According to top managers and facility managers the facility design foremost provides a visual metaphor for the organisation's total offering.

That top managers and facility managers seem aligned is perhaps not so surprising after all. They have the most to lose from a negative evaluation of the facility design, primarily their credibility as responsible actors in this. They probably suffer from a self-serving bias (Miller and Ross 1975; Gioia and Sims 1985), positively responding to their facility design decisions.

On the other hand, lecturers and educations managers most probably express their experiences with respect to facility design without reluctance, signalling to the benefit of the quality of education.

Chapter 5

Predictors of study success

This chapter is based upon:

Kok, Herman B., Mark P. Mobach, and Onno S.W.F. Omta (2015), "Predictors of study success from a lecturer's perspective of the quality of the built environment," *Management in Education*, 29 (2), 53-62.

5.1 Introduction

Educational institutions endeavour to create the most favourable conditions that contribute to their primary process of teaching and consequently to learning outcomes. But how can this be done? This is not an easy task, because many aspects impact the learning outcomes directly and indirectly, for instance, the quality of lecturers and students, as well as their motivation and discipline (Bridge 1979), prior achievement, instructional time, and home environment (Reynolds and Walberg 1991), and religious identity or so called faith schooling (Jeynes 2002; Pughm and Telhaj 2008). Other reported variables are university entry scores, self-efficacy, and student institution integration (McKenzie and Schweitzer 2001), principal leadership and their collaboration with teachers (Marks and Printy 2003; Opdenakker and Van Damme 2007), students' evaluations of the academic environment in terms of clear goals, good teaching, and appropriate assessment (Lizzio, Wilson, and Simons 2002), student engagement (Carini, Kyh, and Klein 2006), students' racial, ethnic, and immigrant differences (Kao and Thompson 2003), students' academic and social integration (Rienties et al. 2012), students' experienced emotions and approaches to learning (Trigwell, Ellis, and Han 2012), their neighbourhood (Ainsworth 2002; Gibbons 2002), family characteristics (Chevalier and Lanot 2002; Mensah and Kiernan 2010), learning style (Dunn et al. 2009), and school resources (Greenwald and Hedges 1996; Wenglinsky 1997; Wößmann 2003). However, it was expected that the built environment would also contribute to learning outcomes (Schneider 2002; Hutchinson 2003; Oblinger 2006; Temple 2007; Blackmore et al. 2011).

Consequently, the present study explores if the built environment of educational institutions may affect learning outcomes. The built environment comprises different spatial aspects (e.g., workplaces, layout, cleanliness, lighting, ventilation) designed for users to function. From a user's perspective however, with Bonaiuto et al. (2004), the spatial aspects cannot be isolated from the functional aspects of available services that cater to complementary needs of users such as hospitality (e.g., catering, helpdesk) and ICT, and together form the built environment. The built environment, as a mixture of separate, but yet closely related designed features of physical facilities and services, that suit both lecturers' and students' needs may function as an enabler for learning outcomes. A growing body of evidence links the quality of the built learning environment to outcomes of their users (e.g., Fraser and Fisher 1982; Clark 2002; Mendell and Heath 2005; Uline and Tschannen-Moran 2008). In most cases, causal relationships have yet to be established (Bosch 2006). In a literature review, Kok, Mobach and Omta (2011) have argued that this effect is strongest for physical facilities and services that directly affect the educational process, such as temperature, air quality, lighting and acoustic conditions. However, it remains yet unclear to what extent the relationship between the quality of the built environment and learning outcomes is prevalent in practice. This study aims to explore this relationship with the following research question:

RQ4: Is, and if so, to what extent the perceived quality of facility design at higher education institutions positively related to the learning outcomes of the students?

To answer this research question a nationwide cross-sectional non-experimental study was designed. The present paper first presents an overview of the relevant theory and research model. Then the research methods used and the data collection are detailed. We continue by elaborating on the results followed by discussion and conclusions.

5.2 Theoretical background

5.2.1 The educational built environment

Educational buildings and their fitting out create an environment in which lecturers and students can engage in teaching and learning. This built environment should be able to motivate lecturers and students and promote learning as an activity and support collaborative and formal practice. To support the educational processes and take care of the built environment, there has been a long tradition that all kinds of more or less specialized employees separately provide services such as concierge, canteen, reprographics, and maintenance. Basically the idea is that lecturers and students can focus on teaching and learning and are not distracted by performing support tasks, which can also be done well by others. Nowadays these tasks, although still being performed by different in-house or outsourced employees, have become the responsibility of facility management (FM) as the integral and integrative function within organisations that supports primary activities (Barrett and Baldry 2003). It is the role and challenge of FM to add value to the primary process in terms of enabling teaching and learning for achieving academic objectives at minimum costs and risks. In order to establish and influence this contribution of FM, information about the effects that the use or non-use of physical facilities and services have on the outcome of the customer's work processes must be obtained (Kok, Mobach, and Omta 2011).

5.2.2 Research model

For our research we adapted the research model focusing on the impact of the built environment on the educational process that consists of teaching and learning, for example, in the form of lectures and seminars (see Figure 5.1), as earlier introduced in Section 2.3.1. Learning outcome indicators of this process are dealt with variously throughout the literature as attainment, pedagogical effects, social, affective, well-being, and behavioural changes (Blackmore et al. 2011). Jansen (1996) continues that in higher education learning outcomes can be measured at an individual level or at student and group level. Domain-specific outcomes at group level are distinguished, i.e. the so-called "numerical returns" or study success concerns the percentage of students who pass an exam, e.g. a propaedeutic (foundation year) or final master's degree exam, within one or four years, respectively, after starting the study programme (Jansen 1996). Besides the numerical returns, a more commonly used outcome measure is the dropout rate (Tinto 1975; Munro 1981). Whereas study success can be enhanced by a prolonged positive influence of enjoying a good quality of education,

and perhaps also of physical facilities and services, poor student adjustment to the university environment affects dropout decisions (Park and Choi 2009).

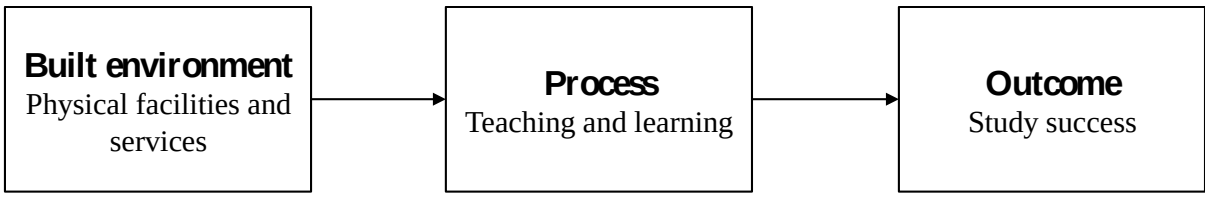

Figure 5.1. Research model.

5.2.3 Operationalization of the built environment

Physical facilities and services as the deliveries of FM come in a wide variety, and supposedly each having a different relation to the educational process and its outcome. Both standard FM-literature (Friday and Cotts 1995; Booty 2006; Rondeau, Brown, and Lapides 2006) and existing standards (Comité Européen de Normalisation 2006) provide a comprehensive overview of physical facilities and services, such as accommodation, workplace (e.g., furniture, equipment), technical infrastructure (e.g., maintenance, lighting, climate control), cleaning, fitting out, security, hospitality (e.g., helpdesk, catering and vending), ICT, and logistics (e.g., internal mail, repro and print). This present study looks at the built environment from the user's perspective – not merely from a technical viewpoint, but also from a social viewpoint. To categorise these different facility design dimensions, as independent variables, for our purposes we take a reductionist theoretical position in which the built environment consists of different aspects to which individual interventions may be committed. Considering achieving a certain spatial or functional condition (e.g. to promote learning), it is important to establish what measures are needed to change the current setting. Assessing end-user experiences of workplace environments can then help improving existing work environments and creating new ones, as proposed by Rasila, Rothe, and Nenonen (2010), who's study is based on a walk-through survey to understand how people use the premises and what they want from it. For our purposes, the quality of physical facilities and services can then be assessed as the subjective quality their users experience in relation to their needs, also termed use value (Bowman and Ambrosini 2000). Building on Woodruff (1997) and Vargo and Lusch (2004) use value is defined as a customer (as users)'s outcome, purpose or objective that is achieved through delivered services. Use value therefore is strongly related to the effectiveness of FM. Besides the effectiveness of physical facilities and services in general, in an educational setting there is probably also a specific effectiveness resulting from their use in the designated learning spaces. In general, we expect that different qualities of facility design dimensions of educational institutions have a different effect on the educational achievement. More specific, we assume that the perceived quality of physical facilities and services is positively related to educational processes and subsequently to their outcome. Thus, high performance of educational institutions reflects in both educational and support processes. Therefore the following hypothesis was formulated:

H *The perceived quality of the physical facilities and services at higher education institutions, and learning outcomes will be positively related.*

5.3 Methodology

5.3.1 Participants

For the comparison of learning outcomes, our study population was drawn from educational institutions of the same academic level, being all 39 Universities of Applied Sciences in the Netherlands. Eighteen institutions agreed to participate in the study (a response rate at institution level of 46%). Because the sample population includes some of the larger institutions, it represents a total of 13,552 lecturers and 230,461 students, which is respectively 53.7% and 57.2% of the total size of this higher education sector. The sample population varies in size; the smallest institution included 504 students, the largest 34,765 students. By using an online survey questionnaire, empirical data were collected during the fall of 2011. The participants were the teaching staff with an appointment at the University of Applied Sciences (part-time, fulltime) and were invited through an email that was sent to them either by the principal or the facility manager on a predetermined day. Apart from the appeal of participation in the study, there were no incentives. The number of questionnaires returned was 1,795, representing an overall response rate of 13.2%. There were differences across institutions with response rates varying from 2% to 44%.

5.3.2 Measures

The questionnaire consisted of 47 items in total. Firstly, six demographic aspects were asked to indicate the respondent. The demographic data included name of the institution, position, gender, age, number of years in current position and years working within the institution. This was followed by an assessment of the lecturers' perception of the quality of the physical facilities and services. Finally, respondents were invited to share any remarks, tips, or other comments.

Dependent variables

For learning outcomes we used study success as indicator defined as percentage of students that earn their bachelor's degree within five years after attending the University of Applied Sciences. This concerns the figures from 2010 reported at institution level, and which is composed of the study results of all of the underlying programmes per institute. Especially at the larger institutions these programmes are taught at different locations and in multiple buildings. Study success varied between institutions, with 72.6% as the highest outcome, and 50.4% as the lowest. The data source was The Netherlands Association of Universities of

Applied Sciences. Amongst other activities, this association provides facts and figures administered by the Dutch Ministry of Education, Culture and Science.

Independent variables
The questionnaire covered a comprehensive set of variables of both spatial and functional aspects that together describe the lecturers' built environment. For each of these aspects, several response items were developed, resulting in a total of 40 items. We included spatial conditions with regard to classrooms (e.g. lighting, acoustics, furniture and indoor climate), maintenance, and building (e.g. layout, fitting out, cleanliness, and indoor climate) for their reported relation with educational achievement (e.g., Cooper 1985; Earthman 2002; Uline and Tschannen-Moran 2008; Earthman and Lemasters 2009). Furthermore, functional aspects such as reception desk, ICT-equipment, and catering facilities were included, because they are part of the social space which is likely to increase lecturers' and students' motivation and may even have an impact on students' ability to learn as argued by the Joint Information Systems Committee (JISC) (2006). The items were posed in such a way that the respondent would indicate the use value of that item using seven-point scales from 1, very poor to 7, very good. For instance, respondents were asked to indicate the possibilities to self-regulate the indoor climate in the classrooms. Likewise, respondents were asked to appraise the layout of the building(s) as a meeting place for knowledge sharing.

Control variables
Via desk research, additional data were gathered of the different institutions being school size in terms of the number of students enrolled on the 1 October of the Academic year 2010-2011, type of institution (educational study programme being either multi sector, or single sector), and religious identity (either none, or Christian).

5.3.3 Analytic approach

After deleting insufficient answered questionnaires 1,755 questionnaires could be analysed. First, we analysed the data from the survey with factor analysis, using principal components with varimax rotation and replace missing with mean, to reduce the data set and to identify the patterns of association underlying the lecturers' quality judgement and explain their relationship to the observed data. Scale reliability analysis was performed to check the reliability of the questionnaires. Second, multiple linear regression was used (ordinary least-squares) to estimate the relationship between size, type of institution, religious identity, the factor solution (predictor variables), and study success (outcome variable).

Table 5.1. Descriptive statistics and factor loadings for the eleven factors of the lecturers' perceived quality of physical facilities and services (40 items) (N = 1,755).

Factor and survey items	Mean (*SD*)	Loading (α)
Spatial representation		(.92)
The maintenance condition of your building(s) (e.g. ceilings, floors, walls, and windows)	5.23 (1.23)	.733
The maintenance condition of your interior (including furnishings, colour, materials)	5.12 (1.25)	.716
The atmosphere and appearance of your building(s)	5.11 (1.46)	.689
The tidiness of the outdoor area of your University	5.20 (1.26)	.557
Informal spaces		(.96)
The layout of your building(s) as a meeting place for cooperation	4.62 (1.44)	.872
The layout of your building(s) as a meeting place for knowledge	4.58 (1.40)	.901
The fitting out of your building(s) to support collaboration	4.61 (1.39)	.895
The fitting out of your building(s) to support knowledge sharing	4.62 (1.36)	.889
Traditional workplaces		(.74)
The availability of meeting rooms	3.97 (1.43)	.587
The availability of spaces for concentrated work	3.57 (1.63)	.742
The possibilities for working at fixed workplaces (traditional work)	4.59 (1.75)	.835
Catering facilities		(.87)
The variation in the catering offer (such as choice, quality, preparation, portioning)	4.67 (1.51)	.853
The availability of the catering facilities (e.g. issuing places, opening hours)	5.13 (1.24)	.794
The supply of healthy food (including variation, freshness, low-fat)	4.41 (1.57)	.792
The accessibility of the catering facilities (e.g. proximity, accessibility)	5.37 (1.11)	.754
The availability of coffee and tea facilities	5.23 (1.27)	.532
ICT facilities		(.86)
The quality of the digital media (e.g. computers, internet) to support work and study	4.93 (1.40)	.826
The availability of the digital media to support work and study	5.08 (1.29)	.825
The support that the digital media provide to work and study at other locations	4.87 (1.38)	.770
The audio-visual equipment in the classrooms	5.13 (1.28)	.555
Indoor climate		(.89)
The possibilities to self-regulate the indoor climate of your building(s)	3.22 (1.51)	.786
The indoor climate in your building(s) (e.g. air, temperature)	3.88 (1.57)	.813
The possibilities to self-regulate the indoor climate in the classrooms	3.21 (1.48)	.824
The indoor climate in the classrooms (e.g. air, temperature)	4.09 (1.50)	.835
Cleanliness		(.88)
The cleanliness of your own workplace	4.79 (1.31)	.822
The cleanliness of the other interior	4.74 (1.29)	.802
The cleanliness of the sanitary areas	4.76 (1.43)	.781
Classrooms		(.81)
The availability of spaces for lectures	4.58 (1.33)	.795
The availability of spaces for practicum	4.55 (1.35)	.741
The setup of the classrooms	4.66 (1.27)	.837
Classroom conditions		(.79)
Artificial lighting in the classrooms	5.09 (1.09)	.714
Day lighting in the classrooms	4.82 (1.40)	.711
The acoustics (e.g. audibility, background noise) in the classrooms	4.78 (1.29)	.615
The furniture (e.g. comfort) in the classrooms	4.79 (1.26)	.419
Front office		(.81)
The level of knowledge of the reception in informing visitors and employees	5.51 (0.95)	.841
The helpfulness of the reception of visitors	5.78 (0.91)	.837
The execution of the so-called concierge tasks (e.g. jobs, repairs)	5.32 (1.06)	.545
The adequate handling of calls (failures, complaints, requests)	5.09 (1.18)	.492
Local printing		(.90)
The accessibility of local printing facilities	5.09 (1.23)	.847
The availability of local printing facilities	4.90 (1.33)	.824
Cumulative explained variance 71.3%		

5.4 Results

Eleven factors had eigenvalues over Kaiser's criterion of 1 and in combination explained 71.3% of the variance of the quality measurements of facility design dimensions. Only those items that loaded .4 or more on a component were included. With all communalities above .4 and the large sample size, the factors are deemed reliable (Field 2009; Lattin, Carroll, and Green 2003). Table 5.1 presents the factor solution and descriptive statistics of the response items of the lecturers' perceived quality of spatial and functional aspects. The scales for all factors had high reliabilities, with coefficient Cronbach's α from .74 to .96.

Table 5.2. Results of multiple linear regression analysis for variables predicting students' study success (N = 1,755).

Predictor variables	R^2	Adjusted R^2	Δ Adjusted R^2	B (unstandardized)	p
Constant (study success)				.639	
Size[a]	.399	.399	.399	-0.003	.000***
Type of institution[b]	.399	.399	.000	-0.003	.351
Religious identity[c]	.470	.469	.070	0.075	.000***
Component structure	.507	.504	.035		
Spatial representation				0.001	.295
Informal spaces				0.001	.425
Traditional workplaces				-0.009	.000***
Catering facilities				-0.001	.225
Indoor climate				-0.001	.602
Cleanliness				0.005	.000***
Classrooms				0.003	.005**
Classroom conditions				0.002	.056±
ICT facilities				0.002	.067±
Front office				0.003	.001**
Local printing				0.002	.043*

±p < .10.
*p < .05.
**p < .01.
***p < .001.
[a]Size concerns the number of students enrolled at the higher education institution (in units of one thousand).
[b]Type of institution is either multi sector, or single sector.
[c]Religious identity is either none, or Christian.

Table 5.2 presents the results from the multiple linear regression analysis. The size of the different institutions in this study was negatively related to study success (b = -0.003, indicating the size of the effect per 1,000 students), explaining 39.9% of its variance. After controlling for size, type had no statistically significant relationship with study success. Religious identity, however, was positively related to study success (b = 0.075), explaining 7% of its variance. Additionally, the identified factors indicated that 3.5% of the variance in

study success can be explained by the perceived quality of the different physical facilities and services, with traditional workplaces (*b* = -0.009), ICT facilities (*b* = 0.002), cleanliness (*b* = 0.005), classrooms (*b* = 0.003), classroom conditions (*b* = 0.002), front office (*b* = 0.003), and local printing (*b* = 0.002). Spatial representation, informal spaces, catering facilities, and indoor climate were not statistically significant.

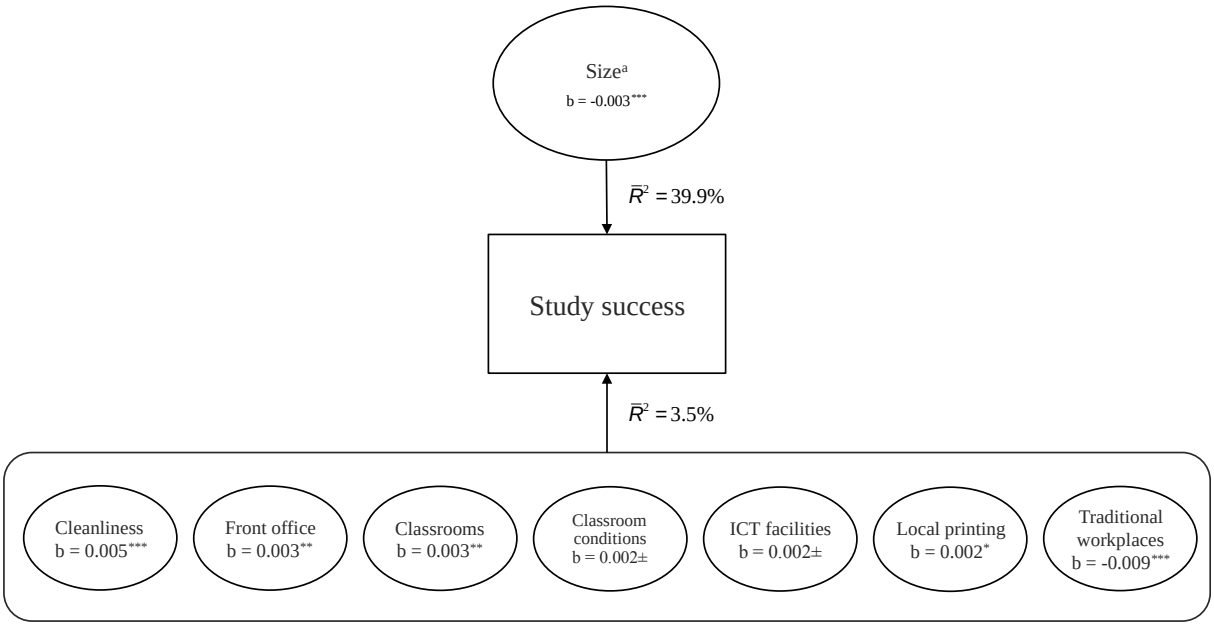

Figure 5.2. Regression model of the effects of spatial and functional aspects, and size on study success.
±$p < .1$.
*$p < .05$.
**$p < .01$.
***$p < .001$.
[a]Size concerns the number of students enrolled at the higher education institution (in units of one thousand).

5.5 Discussion and conclusions

The present study focuses on the relation between those aspects of the higher education institution's built environment and study success that can be influenced by FM, and therefore quality of spatial and functional aspects and size are further discussed. Where type of institution and religious identity are a given, the quality of spatial and functional aspects, as well as size reflected in the design of the built environment are subject to possible intervention. Considering earlier findings and the results from our study, there might be many factors that can explain the variation in study success between higher education institutions, but our overall model can explain 43.4% of this variance, of which a graphical representation is shown in Figure 5.2. This means that our model cannot explain 56.6% of this variation in

study success, which is not surprising given the myriad of variables that impact learning outcomes also, as reported earlier.

5.5.1 Quality of physical facilities and services

This study provides evidence that the higher education institution's built environment can produce conditions, influence motivation and establish a social culture, that may actually improve teaching and learning, as suggested by Van Note Chism (2002) and Blackmore et al. (2011). Studied from a lecturer's use value perspective, results show two sets of predictors for study success that relate to the built environment. The first set consists of six facility components with a statistically significant positive relationship with study success. The second set consists of one facility component with a statistically significant negative relationship with study success. Four other facility components that emerged from factor analysis have no statistically significant relationship with study success. This partly supports the hypothesis that if there is a good perceived quality of certain physical facilities and services, the higher education institution performs well. Within the first set, the perceived quality of cleanliness is most strongly positively related to study success, followed by front office and classrooms, classroom conditions, ICT facilities and local printing. These spatial and functional aspects should be seen as distinguishing factors that contribute to the good feeling and convenience of lecturers, and also give them the opportunity and the means to perform their core tasks properly. In terms of Herzberg, Mausner, and Snyderman (1959), they serve as motivator factors of lecturers, with consequently a positive impact on study success. The relatively strong relationship between cleanliness and front office and study success, in particular, was unexpected. Although these factors are not directly related to the primary process of education, their perceived high quality does tell something about respectively the order and discipline that exists at the institute and the extent to which the FM organisation can respond rapidly to any temporary discomfort of its users. This appears to create circumstances that are beneficial to teaching and learning. Therefore we argue that being attentive to the small things, signals quality in the great things. The availability of classrooms, their fitting out and ambient conditions, as well as ICT facilities are logically enablers for the educational process, and therefore their positive relationship with study success does not come as a surprise. However, that these relationships were not as strong as that of cleanliness was unexpected.

Traditional workplaces is the second set of predictors of study success, and consists of offices and meeting rooms, whose perceived quality is negatively related to study success. This may indicate that the more lecturers can and do enjoy privacy, the more students may experience a barrier when having questions and wanting to interact with lecturers, with possible negative effects on study success. According to Becker (2002), although closed environments like offices and meeting rooms can reduce unwanted interactions and disruptions, social interactions then rely more on formal mechanisms. As a consequence this blocks lecturers off from potential encounter with students. This probably indicates that lecturers, during their presence at the institution, should be approachable and accessible for students to enhance

learning. Silins and Mulford (2002) found that the social and relationship factors of lecturers and students interacting are critical for learning. Closed offices are very much associated with the comfort zone of older workers, but they may conflict organisational priorities (Becker 2012). Our results are consistent with those of Kuntz's (2012), who found a strong tendency towards individualism among lecturers, and a corresponding hesitancy to engage in academic communities for collaboration, which would explain the negative relationship between perceived quality of traditional workplaces and study success.

Spatial representation, informal spaces, catering facilities, and indoor climate seem to serve a common purpose of constituting the social space of the educational institution. This is both a public facility providing meals and refreshments, and a place where learners and staff can meet for short discussions, collaboration and study both before and after class (JISC 2006). These facility components not being statistically significant may indicate that according to lecturers they are, in terms of Cadotte and Turgeon (1988), neutrals with little effect on (dis)satisfaction. With Earthman and Lemasters (2009), this does not have to influence lecturers' performance, for lecturers tend to compensate for unsatisfactory conditions and tolerate inferior surroundings, and, according to Van Note Chism (2002), users of academic spaces often take the limitations of the built environment for granted. Provided that a basic quality level of social-spatial aspects is met, their users may well succeed in education. The social space may, however, have a significant relation with the attractiveness and appearance of the higher education institution, and may to that effect be deployed for marketing purposes and the recruitment of students and lecturers.

5.5.2 Size effect

Furthermore, we found that school size strongly negatively affects study success, which indicates that, as the number of students increases, we can expect a lower study success rate. If the effect of all other predictors is held constant, an increase of 1,000 students is associated with -0.003 (-0.3%) less study success. However, given the variety of reported variables that influence study success, the negative or positive impact of size on study success most probably has a ceiling - it may not be as linear as we found. Although this influence seems substantial, it is consistent with earlier findings in elementary and secondary schools that the academic achievement in small schools is at least equal, and often superior, to that of large schools (Barker and Gump 1964; Cotton 1996; Leithwood and Jantzi 2009). Smaller schools are associated with greater student engagement (Kumar, O'Malley, and Johnston 2008; Leithwood and Jantzi 2009), which is found to be a predictor of student achievement (Lee and Smith 1993; Leithwood et al. 1993). With Horsburgh (1995), the character of an educational institution must have a subtle balance between human scale and community scale, whereas incongruity of scale makes the observer (e.g. students and lecturers) feel small and unimportant. The anonymity associated with the large scale of some institutions may therefore adversely affect the social aspect of learning. For larger institutions it also may be more difficult to become a meaningful environment that appeals to all individuals in terms of identification. In general, Schneider (2002) summarizes school size is tied to other desirable

outcomes besides better academic performance, especially reduction of violence and disruptive behaviour, improvement of a wide range of student attitudes and behaviour, and of lecturer attitudes.

Along with size also comes the organisational-spatial complexity. As the number of tasks and interdependencies increases, structuring issues become more complicated, and the outcome of processes less predictable (Thompson 1967). The way in which higher management operates and makes decisions may be far from what is happening on the ground among lecturers and students. In the pursuit of a fit between the physical setting and the different work processes to improve individual and organisational performances (Atkin and Brooks 2005), a larger scale will make FM more complex. The obvious differences amongst institutions in terms of size and study success might also lead to respondents being influenced by the vibe at the institutions, whereby lecturers at top institutions with strong management and support will feel content, while lecturers at institutions that are at risk will feel much more negative (irrespective of the actual quality of the built environment). As a result, the strong effect of size might be the result of other institutional differences apart from size itself.

Chapter 6

Discussion and conclusions

This book discusses whether, and if so, how facility management (FM) can contribute to educational achievements at Dutch higher education institutions. Facility management is the responsible function within organisations that takes care of the buildings and the people within it. For long they have not been concerned with the discussion to enhance educational performance. The challenges, however, that administrators of educational institutions and consequently FM faces nowadays (e.g. improve performance, increase of students, tight budgets, transparency) has given momentum to opening a scientific black box with respect to a relatively new scientific discipline. Although deeply rooted in practice, the abstractions that have existed until now have hardly led to a fundamental understanding of the contribution of FM in its social context, in the present case education. Therefore, the main objective of this book is as follows.

To analyse how higher education institutions can improve the added value of facility management for their primary processes.

From a theoretical point of view, this study adds to the existing literature about facility management in several ways. To be able to measure FM added value first we needed a clear definition, and second a measurement model. Both are presented in Chapter 2. To arrive at such findings, besides facility management, we explored theories from several other disciplines, for instance environmental psychology, architecture, real estate, education, sociology, service management and management studies. Whereas according to management literature (e.g. Mintzberg 1979) and the European standard EN 15221-1 (Comité Européen de Normalisation 2006) there is a clear distinction between three organisational levels of decision-making and tasks being corporate level, middle management and the operational or functional level, we identified the different perceptions of facility design of these multiple stakeholders. These findings run like a thread throughout the book and are emphatically presented in Chapters 3 and 4. Finally, we explored the contribution of FM to education in terms of the effects of various facility design dimensions on educational achievement. These findings are presented in Chapter 5. It seems that in the myriad of variables that impact learning outcomes, the different aspects to which FM may commit individual interventions do explain some of this variance.

In this chapter in Section 6.1 the main findings and conclusions will be presented by answering the different research questions. Next, in Section 6.2 the contributions of the different studies will be combined to arrive at our overarching contribution to literature. In Section 6.3 we continue with the managerial implications of the present study. This chapter ends with limitations and recommendations for future research in Section 6.4.

6.1 Main findings and conclusions

In Chapter 2 we aim to conceptualise the added value of facility management in the educational environment into a measurable construct. In addition, and to be able to do this, we aim to define the added value of facility management and to develop a typology of facility design dimensions based on their added value in the educational built environment. Chapter 2 answered the following research question:

Research Question 1 *(RQ1): How can the use of different facility design dimensions and their effects on educational achievements be conceptualised into a measurement model of FM added value?*

This chapter is based on a comprehensive literature review in which first the concept of added value was interpreted. Despite the differences in definition and scope of analysis, there seems to be broad consensus about added value being the ratio between benefits and sacrifices for the customer (e.g. Porter 1985; Monroe 1991; Woodruff 1997). Risk is also mentioned in literature as a separate aspect of added value (Kemperman and Van Engelen 1999). In fact, the assessment of and decision about added value involve a trade-off and a choice between different criteria – namely benefits, costs and risks – which are difficult to compare in themselves. The assessment concerns the functional or emotional advantages offered by a product or service in relation to the financial costs and efforts as well as the risks involved in using (or not using) the product or service. The actual assessment of added value is context dependant and is determined by customer perception and is also dynamic and relational. Therefore, we defined FM added value as the following:

FM added value is the customer perceived contribution of the different facility design dimensions to the organisation in terms of benefits in comparison to costs and risks.

For the conceptualisation of the added value of FM into a measurement model in the educational environment, we used the healthcare quality model of Donabedian (1988). This conceptualisation focuses on the structure in which care occurs and the process of care, which affect the outcomes. The analogy with education consists in the fact that educational achievement (i.e. study success) is partly the result of the organisational-spatial attributes of the setting (i.e. facility design and coordination) in which the education takes place. The process relates to the education itself, whereas the outcome of this process is the educational achievement.

There is a growing body of research that connects the design and physical school environment to academic achievement (Uline and Tschannen-Moran 2008; Tanner 2009; Duyar 2010; Fram 2010). Duyar (2010) found that the conditions of natural lighting, air conditioning, indoor air quality, acoustics or noise control, physical condition of ceilings, floors, walls,

windows and doors and the size or configuration of classrooms significantly contributed to predicting the delivery of instruction in schools. There are indications that certain aspects of the so-called micro-design such as seating arrangements (Strange and Banning 2001; Hutchinson 2003), scheduled and day-to-day maintenance and cleaning (Temple 2008) and wireless/wired information technology (Tibúrcio and Finch 2005) affect the teaching and learning processes. Hutchinson (2003) found room temperature, seating comfort, background noise and visual distractions are all factors of the environment that can influence learning because they affect concentration and motivation. Based on their different levels of adaptability we developed a typology of facility design dimensions on the basis of their added value in the educational environment. The typology is constructed around two dimensions based on the questions "what effect do facility design dimensions have on the educational outcome?" and "what level of fixity and costs have the facility design dimensions within the educational dimension?" The typology is useful for deriving priorities for adjusting the current use situation of facility design to enhance their effectiveness in both a time and financially efficient manner. Based on the matrix, modifications of the educational built environment could be prioritised to positively influence the educational achievement.

It is a consideration of top managers and facility managers how facility design is used in terms of design features relative to costs and risks. In Chapter 3, we then want to find out how top managers and facility managers come about these decisions, what efforts are driving the features and the use of facility design and, eventually, how users experience this. To do so, we answered the following research question.

Research Question 2 *(RQ2): To what extent are top managers' and facility managers' efforts to design their facilities consistent with user experiences?*

Chapter 3 builds on an empirical study at seven Dutch Universities of Applied Sciences, is based on fourteen in-depth interviews with top managers and facility managers, and group discussions including 60 students in total. It appeared that facility design is essentially a matter between top managers and facility managers who both act from an organisational perspective and not necessarily a customer perspective. Top managers exhibited a particular emphasis on marketing goals such as brand reputation and attracting students, and considered facility design a hygiene factor; when proper functioning, causing no dissatisfaction. It is also clear that top managers did not associate facility design to be critical for education. Apparently top management, concerned with long-term goals of the organisation, perceive only (basic) functional and aesthetic significance of facility design. Facility managers, on the other hand, were very much hands-on and had a predominant operational focus. This organisation-centric approach to facility design must be seen in the constellation in which these facility design decisions are made. At the studied educational institutions it appeared that the coordination related to facility design was predominantly a mutual affair between top managers and facility managers only. Structural contact with end users (i.e. students) to obtain input for facility design was the exception rather than the rule, and when, it was rather rudimentary. Students as primary actors were little involved, and when this was limited to committees or panels with a small delegation of users.

To monitor whether the facility design would be congruent with user needs, the institutions used a variety of monitoring instruments, but key measurements were satisfaction surveys among students and employees, and sector benchmarks at the institutional level (i.e. NSE). Despite the use of these measurements, the majority of the top managers and facility managers indicated they really didn't have a clue whether or not the facility design reflects the needs of users, and what particular control action they should or could take to make this fit in case of discrepancies. Notably, in the cases where respondents indicated having pursued certain design goals (e.g. transparency, user interaction, sustainability), no specific monitoring was reported on these aspects of facility design. Control action focused on urgent problems, whereas modifications and improvements of facility design were always in the context of budgets and financial reservations that were made or not.

In a subsequent Paragraph 4.5.2 we found additional empirical evidence for this practice; top managers are busy with the position and the continuity of the organisation as a whole, and consider growth in student numbers and possibly attracting good lecturers. Top managers hardly attach any significance to educational buildings in terms of a possible contribution to educational achievement. They do consider the big picture and that it all should look appealing. Oversimplified, it is the job of the facility manager to keep things tidy and working. Their responsibility for facility operations is a hands full. However, both top managers and facility managers seemed to miss out on taking certain aspects of the so-called micro-design into account, such as seating arrangements, day-to-day maintenance and cleaning, and Wi-Fi, which affects the educational process, as we saw earlier in Paragraph 2.2.3. It would be of value if these topics, in terms of the potential contribution of facility design to education, would be discussed in the boardroom. However, it seems that the facility manager for that matter is insufficiently equipped. In fact, they even seem to go along with the considerations of the board, which corresponds to our findings that we reported in Chapter 4.5; top managers and facility managers seem aligned and have a corresponding more positive judgement about facility design than users.

This all eludes students, as it seemed, and causes misalignment between decision makers on the one hand and users on the other. In the confrontation of top managers' and facility managers' efforts regarding facility design and related student experiences, the latter were hardly concerned with the facility design features and certainly not with the decision makers' considerations underlying it. They take the facility design highly as it is. A frequently heard comment indicating this was "I never thought about it much". Their involvement with facility design seemed rather ephemeral; their opinion is primarily based on a number of special events and not a prolonged use of physical facilities and services. As long as they would not experience major shortcomings in the facility design dimensions which are of interest to them, it is fine: catering, reception or student desk, workplaces for group work and quiet areas, Wi-Fi and power outlets. Just organising user feedback by means of a periodical survey and occasionally having users participate in a panel to express their opinions appeared not enough to align between top managers, facility managers and users. Therefore, the user population is just too large.

The possible gap between top managers and facility managers on the one hand and students on the other may affect the effective use of facility design. Possibly this results to impaired performance of students, although they themselves may not so much be aware of it other than occasional inconvenience. Their somewhat standoffish attitude towards facility design and the mounting evidence of the lecturer making a difference to education (Marzano 2007; Mourshed, Chijioke, and Barber 2010), gave rise to explore the existence of possible gaps between different actors. In this context the possible gap between lecturer and decision maker is interesting. Therefore, in Chapter 4 we aim to determine whether job position within higher education institutions has an effect on the perceived quality of facility design according to employees. To do so, we answered the following research question.

Research Question 3 *(RQ3): Are there differences in the perceived quality of facility design between the different employee categories (top manager, education manager, lecturer, facility manager) at higher education institutions, and, if so, what importance do they place on the different facility design dimensions?*

As we can infer from the typology or facility design dimensions based on their added value in the educational environment, as presented in Paragraph 2.3.2, that an important challenge for facility management is to integrate the complex and comprehensive construct of different physical facilities and services of the educational built environment into a meaningful and functional facility design. The difficulty of this task is clearly indicated in this chapter that shows that different employee categories in higher education have quite different perceptions of the facility design that stem from different but coherent needs and interests. We identified four employee categories at the institutions with respect to the use of facility design, being Board of Directors, education managers, lecturers and facility managers. This chapter first identifies educational facility design dimensions, as perceived by the four employee categories. Second, this study measures the similarities and differences of perceptions of the facility design between the employees and will examine the six expected perception gaps as presented earlier in Figure 4.2.

This chapter is based on responses of 18 higher education institutions using an online survey questionnaire. 2,059 questionnaires could be analysed. To answer RQ3, first of all we assessed the opinion about the facility design of the four different employee categories using a seven-point scale from 1, very poor to 7, very good. We worked with data from 2,059 respondents in total. We found that the Executive Board (N = 17; M = 5.48) and facility managers (N = 76; M = 5.21) have a corresponding more positive picture of the quality of physical facilities and services versus education managers (N = 211; M = 4.72) and lecturers (N = 1,755; M = 4.74) with a corresponding more negative perception. This indicates a clear misfit between opinions about the facility design between different employee categories, whereas the four employee categories converge towards two distinct groups with similar opinions: the Executive Board and facility managers on the one hand and education managers and lecturers on the other.

To answer the second part of RQ3 we used multivariate analysis. According to the Executive Board and facility managers three factors of physical facilities and services significantly contribute to the quality of education: representation, lecture rooms and front office. According to education managers and lecturers all factors of physical facilities and services significantly contribute to the quality of education. End users attribute thus a more important role to facility design than decision makers do regarding its contribution to the quality of education. This indicates that the importance of facility design is perceived differently depending on one's role in the organisation; either decision makers and responsible for the design of physical facilities and services, or end users and responsible for the primary process (i.e. education). Consequently, if the design of physical facilities and services is carried out in accordance with the needs of decision makers, this could possibly lead to an educational built environment that does not reflect the needs and desires of end users, with dissatisfaction and possible decreased academic performance as a result. In this specific case of employees with a strategic versus operational perspective, this may even lead to neglect of the primary process of teaching and learning.

In the previous chapters we have identified differences of perception of facility design, and also found theoretical evidence for a possible added value of FM in education. However, how large this contribution in terms of impact on learning outcomes is and which facility design dimensions causes these effects is still unclear so far. In Chapter 5 we explored whether the perceived quality of facility design of higher education institutions does affect learning outcomes. We answered the following research question.

Research Question 4 *(RQ4): Is, and if so, to what extent the perceived quality of facility design at higher education institutions positively related to the learning outcomes of the students?*

Chapter 5 aims to search for predictors for study success from a lecturer's perspective that relate to the educational built environment. To answer RQ4 we have examined the quality perceptions of physical facilities and services using the large sample of lecturers (N = 1,755) from the eighteen participating higher education institutions that we also used to answer RQ3. Lecturers know by a long and frequent use of physical facilities and services perfectly how to assess these, much better than students. Multivariate data analyses were used to test the hypothesis that the quality of spatial, and functional aspects at educational institutions, are positively related with study success.

In search of the added value of facility management in the educational environment, the most striking conclusion is that the opinion of lecturers about the facility design is indeed related to study success. Results from multi linear regression analysis showed that the perceived quality of 11 facility design components (covering 40 items of physical facilities and services) explains for 3.5% of the variance in study success. Of course, various facility design components relate differently to study success, both in a positive and negative way. There were statistically significant positive relationships between the perceived quality of cleaning, front office, availability, layout and spatial conditions of classrooms, and IT, and study

success. The opinions about these physical facilities and services prove to be the best predictors of study success, wherein cleanliness is the most important. The perceived quality of traditional workplaces (i.e. offices and meeting rooms) was relatively strongly negatively related to study success. Spatial representation, layout and design of the buildings, catering facilities and indoor climate had no statistically significant relation with study success. A graphical representation of our regression model was earlier presented in Paragraph 5.5 (see Figure 5.2).

So, facility design does matter! But we also must be somewhat modest in it. Because it explains 3.5% of the variance of study success, there are many other factors that also have an impact, as we already knew from the education management literature. Controlling for size of the higher education institutions, we found this strongly negatively affects study success, explaining a substantial 39.9% of its variance. As the number of students increases, we can expect a lower study success rate. If the effect of all other predictors is held constant, an increase of 1,000 students is associated with -0.003 (-0.3%) less study success. However, given the variety of reported variables that influence study success, the negative or positive impact of size on study success most probably has a ceiling - it may not be as linear as we found. Given the research findings it is clear that a prime consideration in the design of educational spaces is to facilitate social interaction, and to create meaningful, clean, self-contained and small-scale physical settings for users within large institutions. FM should not spoil the primary process, but support this and respond quickly when there are problems because of its strong connection to the primary process.

6.2 Main discussion

With this book we set out to analyse how higher education institutions can improve the added value of FM for their primary processes, in this section we first will reflect on the contribution to literature we made in Paragraph 6.2.1. In Paragraph 6.2.2. we will reflect on the limitations that are inevitably connected to scientific research. Finally, in Paragraph 6.2.3. we will give directions for future research.

6.2.1 Contribution to literature

The FM literature exhaustively reports of the added value of facility management (and thereby implicitly the use of facilities), but it remains unclear what is meant by this added value, how it can be influenced and what the effects are thereof. Man-environment studies have learned that the facility design can influence people's behaviour in several ways as a cognitive, emotional, and physiological response to the perceived environment (Rapoport 1982; Russel and Ward 1982; Bitner 1992). In his pivotal work, Donabedian (1988) argues "there must be pre-existing knowledge of the linkage between structure and process, and between process and outcome, before quality assessment can be undertaken". This book

contributes to the academic debate on the added value of FM with a clear definition and a measurement model on the one hand, and empirical research on this added value and how that may be affected (e.g. by decision-making on the use of facility design) on the other.

Whereas according to the existing literature FM decision-making is profoundly rooted in a costs and risks association of FM, we introduce the aspect of potential benefits of the use of facility design. This is also in line with the existing European definition EN 15221-1 (Comité Européan de Normalisation 2006), which emphasizes the possible contribution of physical facilities and services to support the effectiveness of primary processes of an organisation. Earlier, judging by the vast amounts of money continuously spent on FM by organisations and the fact that the application of FM in a more or less professional manner is found wherever people operate, there were already enough indications that there should be potential returns, otherwise FM would not exist. There seemed to be a problem to make this demonstrable, other than in terms of customer satisfaction. That also partly triggered this study. A major aspect of the concept of FM added value is that organisations have a choice regarding the use of facility design. They need to and / or can make a trade-off between the three modifiable factors benefits, costs and risks. This aspect of choice will also cause FM added value to vary by organisation and by application (e.g. type of primary process, use situation, decision makers). The benefits of FM can be found in the effects that the use (or non-use) of facility design have on the outcome of customer's work processes. Facility design has differing effects on people's performance in and around organisations due to different internal responses to its tangible and intangible aspects (e.g. perceived workload, vitality, satisfaction, comfort, knowledge exchange, social interaction). To fully establish the FM added value, information is also needed about the costs of facility design and the risks associated with utilising this.

Added value is, in any case, a construct with three variables, benefits, costs and risks, each of which is difficult to quantify in itself. Also in the comparison, it is difficult. As regards benefits, we found, this involves use effects of facility design dimensions as independent variables, which by - for instance - regression analysis can become predictors in terms of their effects on dependent variables as the outcome of a user (work) process. Cost is primarily about money, but also time and effort should be seen as a cost. Cost obviously needs other measurements than benefits. Risk is of a different kind and concerns the probability that something will occur, and the consequences involved of the use or not to use physical facilities and services of a certain quality level. To measure risks, time, money, loss of lives and other indicators may be used. All in all, this means that the interpretation of added value still is difficult. From a user perspective, the assessment of the added value of physical facilities and services is partially dependent on whether the user does or does not bear the costs and perceives or bears the risks in using or not using them. We demonstrated that in assessing the added value in all cases it is about perceptions of benefits. For example, real productivity gains of a lecturer is difficult to measure (if it possible at all), so what we measure in that case is perceptions of the educational built environment in relation to quantifiable effects (academic achievement, but also recruitment of students). Although the

effect of facility design to study success is modest, 3.5%, it is still a reference of which, in the case of follow-up studies, can be referred to.

In addition, apart from an understanding of the contribution of FM to education, we also have very clearly unravelled perception differences between decision makers and users of facility design. Top managers and facility managers as decision makers on the one hand are more positive about the facility design than education managers and lecturers, as primary actors, on the other. Also, with the primary actors attributing a more important role to facility design than the decision makers regarding its contribution to the quality of education, there is a risk of not capturing the maximum achievable benefits of these relatively expensive resources in terms of improving academic achievement. Decision makers do not associate facility design to be critical for education, and facility management decision-making appears to be independent of the nature of the primary process. This requires different competences and knowledge of facility managers, who must manage to deal with board room forces that go towards marketing and costs and not maybe detailed design measures that are required to truly enhance the learning. Therefore, we advocate that the position of the facility manager should be that of (pro) active linking pin between user and organisation.

6.2.2 Limitations

In Chapter 2 we conceptualised a measurement model of FM added value and developed a typology of facility design dimensions based on their added value in the educational environment. This was entirely based on a literature study into the effects of facility design dimensions to educational achievement. However, this should be qualified slightly. So far, literature has only provided proof of this for spatial characteristics in particular. Up to now, little is known about the influence on educational achievement of the many other facility design dimensions, such as catering, distribution and security. We can argue that this influence exists, but the extent of it is unclear. According to current educational literature, the effect of facility design on educational achievement is limited anyway. We can confirm that with the 3.5% explained variance that we reported in Chapter 5. When studying and interpreting these effects, we need to bear in mind that learning depends on many other factors as well, e.g. engagement of the learner (Hutchinson 2003), quality of the teacher and student (Keohane 2006), the socio-psychological climate of the classroom (Walberg and Anderson 1968), home environment, students' motivation and instructional time (Reynolds and Walberg 1991). Also, when designing classroom space, one should bear in mind how little learning happens in the classroom itself (Brown and Lippincott 2003; Bennett 2007). The concept of the classroom is evolving, driven by the emergence of new teaching and learning methods made possible by the rapid development and adoption of information technology (Brown and Lippincot 2003).

In Chapter 3 we engaged in qualitative research and collected data from top managers and facility managers using in-depth interviews, and from students using group discussions. The findings are bound to the particular social context of facility design at Dutch higher education

institutions, and therefore are not generalizable to other populations. Second, in Chapter 3 we make an argument for facility design from a user perspective as opposed to organisation-centric. This assumption is based on Zeithaml, Bitner, and Gremler (2009), who argue that because education involves interaction between lecturers and students as users. Their involvement in choosing how the physical evidence and services should be designed and implemented can be very beneficial. However, this does not mean that this actually leads to better organisational performance. Therefore, in this study, it lacks the evidence. For instance, comparing 2010 and 2013, all studied institutions dropped in study success rate. That is probably not due to failing facilities at all higher education institutions.

In Chapters 4 and 5 we used an online survey questionnaire, which could pose some limitations. Due to self-selection bias in online survey research, respondents may have selected an improper position or others than only the selected sample may have completed the questionnaire. Given the relatively large sample sizes (apart from top managers), this may have affected the representativeness of the results in the case of frequent abuse. Although this is not likely, we must, again, make a reservation regarding generalizability of the results. In Chapter 4 we identified perception gaps of facility design between different employee categories, but we have not studied whether this indication of misalignment actually causes inconveniences or flawed organisational performances. However, this study does show the importance of the role of facility managers to act as a linking pin in the facility design between top management on the one hand, who seems too distant from the actual educational process, and users (i.e. lecturers and students) on the other. Facility managers can bridge the differences in perceptions, and hence differences in needs and expectations. Whilst in this study facility managers obviously do not fulfil this role and seem aligned with top management, we cannot thoroughly explain these gaps without also having assessed the administrative considerations involved in facility design decisions and the nature of the collaboration between management and providers.

In Chapter 5, the study suffered from several shortcomings, the most obvious being that it was the lecturers who were used as respondents. As primary actors in education, lecturers are being responsible for the carrying out of the study programme, but the learning outcome is ultimately a students' performance. Although students cannot be ignored, early work of Cooper (1985) shows that lecturers are very informative when it comes to assessing the environmental conditions necessary for, and conducive to, the practice of education. Second, the study estimates the relationship between the perceived quality of physical facilities and services and learning outcomes at the organisational level. We do acknowledge that in multiple building situations different results per building may occur if the relationship between the quality of spatial and functional aspects of different buildings and building related learning outcomes could be identified unambiguously. Measuring this, however, can lead to enormous complexity, dealing with programmes taught at different locations with varying quality of facility design. Third, the present study does not identify the specifications of the different spatial and functional aspects of which the quality is positively related to study success. To be able to improve the quality of the physical facilities and services, we need to establish performance indicators for this quality.

6.2.3 Future research

This book is only the beginning of the quest into how higher education institutions can improve the added value of facility management for teaching and learning. Although some clear findings and conclusions could be reported, there are still some untouched areas that need to be explored. This broadly refers to FM governance and a broader base of quantitative research among users of facility design.

How the use of facility design dimensions can best be organised to optimize their contribution is still unclear. We do suggest that the collaborative relationship and alignment between the user and FM, cost allocation and decision rights are elements of the issue of coordination of FM, as is part of the measurement model presented in Chapter 2. Subsequent research must show which of these elements is related to the added value of FM and what their influence is. In this book we demonstrated the possible benefits of facility design, as part of the equation only. Whether or not to outsource service delivery and performance monitoring are also issues, which need to be resolved. It is interesting to consider the role of the facility manager in this and what influence FM will have on the educational outcomes. Therefore, we encourage other scholars to engage in future research to focus also on the collaborative relationship between FM and the different employee categories, and assessing the coordination mechanisms in place (e.g. policies, meetings, transfer pricing) for them in order to align. Subsequently, quantitatively and qualitatively assessing these aspects of FM governance in relation to educational achievement may then explain for the differences in their contribution of FM.

We suggest this study to be conducted on a longitudinal comparative base to measure the effects of interventions to the educational built environment on study success and to identify the potential success factors amongst the different physical facilities and services. This will improve the predictability of our regression model and hence the accuracy of decision-making on its use. For comparison and to obtain a comprehensive picture of supportive or constraining potential of the built environment, we also recommend this study to be performed amongst students. Complemented by qualitative research into the perceptions of the participants in the learning process, this may develop our understanding of environment-user relationships, their respective responses (cognitive, emotional, and physiological) and resulting individual and social behaviours as suggested by Bitner (1992). We also suggest quantitative follow-up research into user involvement (i.e. students) in the facility management and consequently the establishment of the facility design.

6.3 Implications of findings

The aim of this book is to increase the understanding of how higher education institutions can improve the added value of facility management for their primary processes. Consequently, this book can be used by educational institutions to improve educational performance by

means of facility management. For this, the bottom line is to use facility design in such a way that for lecturers and students, as primary actors, the educational built environment substantiates the teaching and learning. Also, this book is of interest of facility managers for whom reflections on current affairs and means to deal with the multiple stakeholders in higher education institutions and how to adjust facility design accordingly to improve performances are provided. Therefore, this section is divided into two paragraphs. Paragraph 6.3.1 reflects on the implications for top managers of higher education institutions, and Paragraph 6.3.2 covers the managerial implications for facility managers.

6.3.1 Top managers

The practice of FM shows a strong preference for performance measurements based on (financial) benchmarks and customer satisfaction surveys. Herewith, top managers claim this to demonstrate the contribution of FM to the organisation. However, these metrics applied by practitioners are insufficiently when it comes to indicate the effectiveness of FM and fuels the enduring discussion on efficiency. But what is it that top managers could do that contributes to improve the added value of FM?

In answering this question it would be very bland to say; hire the right people! But that's just what top managers must do. But, of course, there is more to it. They should first be *open minded* to the interconnectedness of facility design and educational achievement that exceeds the operational and aesthetic significance of facility design. There is evidence, of which this book reveals a part, that justifies this attitude. Top managers should not at all distract from their strategic perspective of looking at facility design. Marketing goals, efficiency, and foremost attract, hire and retain quality lecturers is paramount. But this is already what top managers practise on a daily base. What they could do in addition is to pay attention to or have a willing ear for the aspects of the so-called micro-design (e.g. seating arrangements, day-to-day maintenance and cleaning) that truly enhance learning. To make a comparison, top managers could learn from hotel managers who do an excellent job in running an interpersonal services facility (just like educational institutions are), by knowing how to deal with the subtleties of this micro design. They know that *the devil is in the detail*, that small things can make a large difference, and that people respond to elements of facility design, be it physical or services, cognitively, emotionally, and physiologically.

For this is far off their strategic perspective, they need the help of an informed, well-educated facility manager who speaks the language of top management, and knows how to bridge the gap between top manager and user in terms of translating the potential added value of facility design into board room considerations and metrics.

6.3.2 Facility managers

With this study it could not be demonstrated that the focus of the participating educational institutions was emphatically on the effectiveness of the primary process. We have reservations about that. In order to improve the added value of FM, the focus should particularly be on the potential benefits of FM, and not only on costs and / or risks as part of the equation. That can in practice in different ways. The question that comes up then is: how can we equip FM to develop a comprehensive approach to physical facilities and services to improve FM added value? We will address five topics to accomplish this: 1) User emancipation, 2) Integral quality system, 3) Evidence-based facility design, 4) Perceived small scale, and 5) Quick wins.

User emancipation - The primary question for facility managers is, do you want users to be engaged and improve the added value of facility management? As literature already suggests, then the voice of the customer and the voice of the employee must resonate in the facility design. We argue that, in order to contribute to the effectiveness of the primary process and bridge the perception gaps between decision makers and users, facility managers should pursue a cross-functional cooperation with core actors, and establish design features that also meet their needs. Following Fitzsimmons and Fitzsimmons (2011), the nature of the core service should dictate the parameters of its facility design. Therefore, we advocate that the final facility design should be the outcome of a process of co-creation, in reference to Prahalad and Ramaswamy (2004), creating an environment in which lecturers (primary) and students can have active dialogue and allowing them to co-construct the facility design experience to suit their context. There is both a pragmatic and a moral premise to this participatory design approach (Carroll and Rosson 2007). The pragmatic premise state that direct inclusion of primary actor' input will increase the probability of a design outcome that is successful. By carrying out a participatory approach lecturers become co-creators of the facility design resulting in a dynamic coherence between work and different stakeholders (i.e. top managers)' interests (e.g. finance, technology, politics, architecture) (Seim and Broberg 2010). The moral premise is that core actors have a right, and possibly an obligation, to be directly involved in the processes of development. Building on Alves (2013), when facility design is for employees, then it should be designed and implemented in conjunction with them and not for them. By employing users as co-creators of facility design, facility managers can respond much better to the needs and wants of the primary process. Participatory design, lead users, and living labs are examples to give shape to a well-functioning facility design according to end users. Following the path from needs-finding and context assessment towards implementations in real-life environments then serves not only as a proof of concept, but also as a starting point for creating an attractive and consequently successful physical evidence of an education institution.

However, with a large population of end users a participatory design where users are involved through panels and committees soon becomes arbitrarily. The results presented in this book also show, this goes far beyond just organising user feedback. This requires comprehensive (in) formal structures to effectuate the bottom-up cascading of user preferences. This so called

user emancipation in facility design enables decision makers to make informed decisions based on bottom-up indications of user preferences and needs. Then facility managers must find a way to deal with large populations of users (e.g. students). This requires an *on-going flow of users feedback* and enter into a dialogue that must be kept going. That is not possible with conventional techniques, but requires media that support permanent communication and would thus be based on the Internet. For that purpose especially the use of social media (e.g. Twitter, Facebook) may bridge the gap between decision makers and users (but also generations regarding the conceptual and social environment of students), with the possibility of generating big data if invited or there is opportunity to do so. Systems alone are not enough. Also, there must be an attitude of *constantly willing to learn from users*, make adjustments and communicate. The motto should be: **"Getting a little bit better every day"**. If the challenge is to really ensure that the educational built environment is designed to effectively serve the people who use them, facility managers can make use of *segmentation techniques*, wherein in the total population homogenous groups of users are identified with a corresponding response to stimuli (Dickson and Ginter 1987). Then facility managers can create a differentiated offering by adapting the building layout and decor, and the additional services to these subsets of users (e.g. employee versus customer, front stage staff versus back stage staff, innovators versus followers). Like users outside the service facility also swarm to their favourite spot, they then can also do so within the service facility by designing and implementing specific sections in accordance with segments' needs and priorities. In an educational building for example traditionally the library, the cafeteria and the classroom are such sites, but that could be much more sophisticated in other areas also. For that matter it should be stressed that the effective use of the building (with all its nooks and crannies) also represents value from both a user perspective and an organisational perspective (as the one who pays for the use). A different way of budgeting and dealing with building-related projects fits to this as well. On a large scale, the impact is usually accordingly and major investments are involved. *Small-scale (segmented) experiments* can then be beneficial to test the (potential) added value of adjustments to the facility design in terms of user experiences and utility at low costs and risks. This touches the implementation of perceived small scale also, which will be addressed further on.

Integral quality system - Before user emancipation takes place at all, it also means facility managers should do some homework by mapping of critical processes in the interpersonal service delivery and shape design features of physical facilities and service processes to this from a user's perspective. This also involves a change in the use of metrics; the presupposed effects of facility design (e.g. openness, user interaction, sustainable) should be translated into metrics and then be part of an *integral quality system*. Then, when a decision is made, they, and neither top management, cannot possibly know whether it is good or bad. Decision quality, when measured by results, can only be known as the consequences of the decision become known. The decision makers must wait for the decision to be implemented and for its consequences to become clear (Pfeffer 1992). Once decisions have been made, Pfeffer (1992) suggests one can succeed by being flexible, by *learning and adapting*, and by working to have decisions to turn out right in terms of a better fit between facility design, educational

processes and user outcomes. Paying close attention to detail and the immediately solving of (small) defects should become second nature in order to pursue service excellence.

Evidence-based facility design - Considering the diversity of variables that all have a relationship with learning outcomes, and the quality of facility design dimensions explaining for 3.5% of its variance, we argue that physical facilities and services are part of a complex setting of organisational, spatial, and functional (available services) aspects that seriously deserves attention to constitute a successful educational built environment. Although no causal inferences can be made, and many other aspects impact the learning outcomes too (e.g., Reynolds and Walberg 1991; Lizzio, Wilson, and Simons 2002), the results may be used by school administrators and facility managers to engage in *evidence-based decision-making* on the use of facility design when seeking to improve their effectiveness in terms of achieving academic objectives. Taken into account the vast amount of money spent on buildings and related services (Amaratunga, Baldry, and Sarshar 2000; Kuntz 2012), we suggest educational institutions would better use these scarce resources in an effective manner. Therefore, as long as education requires buildings, the challenge is to design better buildings and related services to achieve educational goals that transcend architecture.

To accomplish this, by using "the right metrics", top managers and facility managers should engage in a close collaborative relationship based on the *awareness of the interdependencies* between the facility design and user outcomes. This adds to top manager's understanding of the relationship between facility design and the objectives of the organisation as suggested by Loosemore and Hsin (2001) and Then and Tan (2006). It also seems that competent facility managers should be given the space of top management and/or get hold on it. They should operate in a more (pro) active role for both users and administrators, and know how to influence appreciable facility design decisions towards their (expert) view, as opposed to those who do not know how to bridge the gap between top management and user. Competence, then, does not seem to be in substantial facility management knowledge and skills, but much more in being able to translate strategic issues into facility management operations and vice versa. Apparently, competent facility managers *speak the language of top management*, as argued by Jensen (2011), but perhaps they should learn more languages to improve the alignment of facility design with users.

Perceived small scale - This study shows that designing and decision making about the commonly used service facility in everyone's interest is difficult. It seems it all depends on whose wants and needs are driving the process. Focussing on specific user categories may result in a facility design that, following Woodruff (1997), facilitates the target user category in achieving their goals and use purposes, however blocks these achievements for other users. We demonstrated that the different employee categories in higher education institutions all have different perceptions of the same reality; the facility design. Because they work in the same organisation, it is useful that these perceptions are aligned. A coherence of perceptions then would mean that FM succeeds to offer an appropriate facility design for all different employees. Since people engage in different activities, matching the complex and comprehensive construct of different physical facilities and services to these activities into a

meaningful and functional facility design for all employees therefore is critical. In order to cope with possible differences in needs and preferences and align with different users' expectations, a facility design that matches the different users' activities, and hereby the creation of small-scale areas in a large commonly used service facility may lead to an overall satisfactory facility design. May (1993), with respect to the geography of services, coined this the spatial division of labour, that is, a sharpening of socio-spatial disparities on a reduced scale and a discontinuity between contiguous spaces. Given the negative size-effect on study success we found, a prime consideration in educational built environment design is creating a users' perceived meaningful, clean and intact small-scale physical setting in large institutions where social interaction and quality of education, and consequently study success is paramount, instead of putting down majestic accommodation for its impressive look to serve image building and marketing purposes. Then, with Wasley et al. (2000), education can improve by creating small, intimate learning communities where students are well known and can be encouraged, and reduce isolation that adversely affects many students.

Quick wins - In terms of possible interventions, the quality of cleanliness, front office and the availability of classrooms, with Rapoport (1982), are ambient aspects of the educational built environment whose design features can easily be changed by task adjustments of service employees. Given their positive relationship with study success we consider it a quick win for educational institutions to have their quality improved and consequently contribute to successful education. Especially since quality improvement with respect to classrooms conditions and ICT facilities, because of their semi-fixed character (Rapoport 1982), is much more substantial. However, this should also be considered. Given the negative relationship between isolating environments and study success, with Becker (2002), the office might be designed primarily as a social setting, from which one occasionally seeks out more private places for contemplation, concentration and confidentiality. In addition, given the apparent importance of facility conditions to learning outcomes, Boards should not tolerate the situation that the built environment hinders educational effectiveness as argued by Roberts (2009). An equally daunting challenge faces facility managers. Their major priority is to put users' interests first and to learn to work much better with architects and designers (Duffy 2000).

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Summary

This book discusses whether, and if so, how facility management (FM) can contribute to educational achievements at Dutch higher education institutions. Although there is increasing evidence that the quality of the lecturer is decisive for the performance and development of students (Marzano 2007; Mourshed, Chijioke and Barber 2010), and in addition, educational leadership can shape the necessary boundary conditions for these primary actors to succeed, nowadays this must be considered as a too narrow conception of what good education is all about. Up to date, in literature there is a lively debate about the effective use of facility design, as a mixture of designed features of physical facilities and services, to contribute to education as well. We have seen many examples of the so-called human factor being negatively influenced by seemingly fringe events, but that suddenly appears to be precondition for education. Too warm, too cold, too crowded, too loud, too messy, and no idea why this device doesn't work are phrases that come to mind. We now know that the built school environment and facility services that are offered are among the elements that can influence good education. The evidence comes from a multiple disciplines, such as environmental-psychology (Durán-Narucki 2008; Hygge and Knez 2001), medicine (Hutchinson 2003), educational research (Blackmore et al. 2011; Oblinger 2006; Schneider 2002; Temple 2007), and real estate and facility management (Daisey, Angell and Apte 2003; Duyar 2010; Barrett et al. 2013). Considering all the above, there seems to be a scientific black box with respect to the relatively new scientific discipline of FM. Deeply rooted in practice, the abstractions that have existed until now have hardly led to a fundamental understanding of the contribution of FM to education. Therefore, the main objective of this book is as follows.

To analyse how higher education institutions can improve the added value of facility management for their primary processes.

From a theoretical point of view, this study adds to the existing literature about facility management in several ways. First we aim to conceptualise the added value of facility management in the educational environment into a measurable construct. In addition, and to be able to do this, we aim to define the added value of facility management and to develop a typology of facility design dimensions based on their added value in the educational built environment. Therefore, in Chapter 2 we answered the following research question:

Research Question 1 *(RQ1): How can the use of different facility design dimensions and their effects on educational achievements be conceptualised into a measurement model of FM added value?*

Based on a comprehensive literature review we found that the assessment of added value concerns the functional or emotional advantages offered by a product or service in relation to the financial costs and efforts as well as the risks involved in using (or not using) the product or service. The actual assessment of added value is context dependant and is determined by

customer perception and is also dynamic and relational. Therefore, we defined FM added value as the following:

FM added value is the customer perceived contribution of the different facility design dimensions to the organisation in terms of benefits in comparison to costs and risks.

For the conceptualisation of the added value of FM into a measurement model in the educational environment, we used the healthcare quality model of Donabedian (1988). This conceptualisation focuses on the structure in which care occurs and the process of care, which affect the outcomes. The analogy with education consists in the fact that educational achievement (i.e. study success) is partly the result of the organisational-spatial attributes of the setting (i.e. facility design and coordination) in which the education takes place. The process relates to the education itself, whereas the outcome of this process is the educational achievement. Based on their different levels of adaptability we developed a typology of facility design dimensions on the basis of their added value in the educational environment. The typology is constructed around two dimensions based on the questions "what effect do facility design dimensions have on the educational outcome?" and "what level of fixity and costs do the facility design dimensions have within the educational dimension?" The typology is useful for deriving priorities for adjusting the current use situation of facility design to enhance their effectiveness in both a time and financially efficient manner.

It is a consideration of top managers and facility managers how facility design is used in terms of design features relative to costs and risks. In Chapter 3, we then want to find out how top managers and facility managers come about these decisions, what considerations are driving the features and the use of facility design and, eventually, how users experience this. To do so, we answered the following research question.

Research Question 2 *(RQ2): To what extent are top managers' and facility managers' efforts to design their facilities consistent with user experiences?*

Chapter 3 builds on an empirical study at seven Dutch Universities of Applied Sciences, is based on fourteen in-depth interviews with top managers and facility managers, and group discussions including 60 students in total. It appeared that facility design is essentially a matter between top managers and facility managers who both act from an organisation perspective and not necessarily a customer perspective. Top managers exhibited a particular emphasis on marketing goals such as brand reputation and attracting students, and considered facility design a hygiene factor; when proper functioning, causing no dissatisfaction. It is also clear that top managers did not associate facility design to be critical for education. Apparently top management, concerned with long-term goals of the organisation, perceive only operational and aesthetic significance of facility design. Facility managers, on the other hand, were very much hands-on and had a predominant operational focus. In the confrontation of top managers' and facility managers' efforts to design their facilities and student experiences, the latter were hardly concerned with the facility design features and certainly not with the decision makers' efforts underlying it. They take the facility design

highly as it is. A frequently heard comment indicating this was "I never thought about it much". Their involvement with facility design seemed rather ephemeral; their opinion is primarily based on a number of special events and not a prolonged use of physical facilities and services. As long as they would not experience major shortcomings in the facility design dimensions which are of interest to them, it is fine: catering, reception or student desk, workplaces for group work and quiet areas, Wi-Fi and power outlets.

The possible gap between top managers and facility managers on the one hand and students on the other may affect the effective use of facility design. Possibly this results to impaired performance of students, although they themselves may not so much be aware of it other than occasional inconvenience. Their somewhat standoffish attitude towards facility design and the mounting evidence of the lecturer making a difference to education (Marzano 2007; Mourshed, Chijioke and Barber 2010), gave rise to explore the existence of possible gaps between different actors. In this context the possible gap between lecturer and decision maker is interesting. Therefore, in Chapter 4 we aim to determine whether job position within higher education institutions has an effect on the perceived quality of facility design according to employees. To do so, we answered the following research question.

Research Question 3 *(RQ3): Are there differences in the perceived quality of facility design between the different employee categories (top manager, education manager, lecturer, facility manager) at higher education institutions, and, if so, what importance do they place on the different facility design dimensions?*

We identified four employee categories at the institutions with respect to the use of facility design, being Board of Directors, education managers, lecturers and facility managers. This chapter is based on responses of 18 higher education institutions using an online survey questionnaire. 2,059 questionnaires could be analysed. To answer RQ3, first of all we assessed the opinion about the facility design of the four different employee categories using a seven-point scale from 1, very poor to 7, very good. We worked with data from 2,059 respondents in total. We found that the Executive Board (N = 17; M = 5.48) and facility managers (N = 76; M = 5.21) have a corresponding more positive picture of the quality of physical facilities and services versus education managers (N = 211; M = 4.72) and lecturers (N = 1,755; M = 4.74) with a corresponding more negative perception. This indicates a clear misfit between opinions about the facility design between different employee categories, whereas the four employee categories converge towards two distinct groups with similar opinions: the Executive Board and facility managers on the one hand and education managers and lecturers on the other.

To answer the second part of RQ3 we used multivariate analysis. According to the Executive Board and facility managers three factors of physical facilities and services significantly contribute to the quality of education: representation, lecture rooms and front office. According to education managers and lecturers all factors of physical facilities and services significantly contribute to the quality of education. End users attribute thus a more important role to facility design than decision makers do regarding its contribution to the quality of

education. This indicates that the importance of facility design is perceived differently depending on one's role in the organisation; either decision makers and responsible for the design of physical facilities and services, or end users and responsible for the primary process (i.e. education).

In the previous chapters we have identified differences of perception of facility design, and also found theoretical evidence for a possible added value of FM in education. However, how large this contribution in terms of impact on learning outcomes is and which facility design dimensions causes these effects is still unclear so far. In Chapter 5 we explored whether the perceived quality of facility design of higher education institutions does affect learning outcomes. We answered the following research question.

Research Question 4 *(RQ4): Is, and if so, to what extent the perceived quality of facility design at higher education institutions positively related to the learning outcomes of the students?*

Chapter 5 aims to search for predictors for study success from a lecturer's perspective that relate to the educational built environment. To answer RQ4 we have examined the quality perceptions of physical facilities and services using the large sample of lecturers (N = 1,755) from the eighteen participating higher education institutions that we also used to answer RQ3. Lecturers know by a long and frequent use of physical facilities and services perfectly how to assess these, much better than students. Multivariate data analyses were used to test the hypothesis that the quality of spatial, and functional aspects at educational institutions, are positively related with study success.

In search of the added value of facility management in the educational environment, the most striking conclusion is that the opinion of lecturers about the facility design is indeed related to study success. Results from multi linear regression analysis showed that the perceived quality of 11 facility design components (covering 40 items of physical facilities and services) explains for 3.5% of the variance in study success. Of course, various facility design components relate differently to study success, both in a positive and negative way. There were statistically significant positive relationships between the perceived quality of cleaning, front office, availability, layout and spatial conditions of classrooms, and IT, and study success. The opinions about these physical facilities and services prove to be the best predictors of study success, wherein cleanliness is the most important. The perceived quality of traditional workplaces (i.e. offices and meeting rooms) was relatively strongly negatively related to study success. Spatial representation, layout and design of the buildings, catering facilities and indoor climate had no statistically significant relation with study success. A graphical representation of our regression model was earlier presented in Paragraph 5.5 (see Figure 5.2).

So, facility management does matter!

Samenvatting

Dit boek behandelt de vraag of, en zo ja, hoe facility management (FM) kan bijdragen aan de onderwijsprestaties van Nederlandse hogescholen. Hoewel er steeds meer aanwijzingen voor zijn dat de kwaliteit van de docent bepalend is voor de prestaties en ontwikkeling van studenten (Marzano 2007; Mourshed, Chijioke en Barber 2010), en bovendien, dat leiderschap in het onderwijs de noodzakelijke randvoorwaarden kan creëren voor deze primaire actoren om te kunnen slagen, moet dit tegenwoordig worden beschouwd als een te enge opvatting over waar het bij goed onderwijs om gaat. Zo wordt er momenteel in de literatuur ook een levendige discussie gevoerd over het effectief inzetten van het facilitair ontwerp, als een mix van ontworpen eigenschappen van fysieke faciliteiten en diensten, om bij te dragen aan het onderwijs. Er zijn talloze voorbeelden waarbij de zogeheten menselijke factor negatief wordt beïnvloed door ogenschijnlijke randgebeurtenissen, maar die plotseling een voorwaarde blijken te zijn voor het onderwijs. Te warm, te koud, te druk, te luid, te rommelig, en geen idee waarom dit apparaat niet werkt zijn uitdrukkingen die te binnen schieten. We weten nu dat de gebouwde schoolomgeving en facilitaire diensten die worden aangeboden behoren tot de elementen die goed onderwijs kunnen beïnvloeden. Het bewijs hiervoor komt uit verschillende disciplines, zoals omgevingspsychologie (Durán-Narucki 2008; Hygge and Knez 2001), geneeskunde (Hutchinson 2003), onderwijskunde (Blackmore et al. 2011; Oblinger 2006; Schneider 2002; Temple 2007), en vastgoed- en facility management (Daisey, Angell and Apte 2003; Duyar 2010; Barrett et al. 2013). Al het bovengenoemde overwegende, lijkt er een wetenschappelijke black box te zijn met betrekking tot de relatief nieuwe wetenschappelijke discipline van FM. Met z'n fundamenten diep in de praktijk, hebben de abstracties die bestaan tot nu nauwelijks geleid tot een fundamenteel begrip van de bijdrage van FM aan het onderwijs. Daarom is de belangrijkste doelstelling van dit boek als volgt.

Om te analyseren hoe hogescholen de toegevoegde waarde van facility management voor hun primaire processen kunnen verbeteren.

Vanuit een theoretisch oogpunt voegt deze studie op verschillende manieren iets toe aan de bestaande literatuur over facility management. Eerst willen we de toegevoegde waarde van facility management in de onderwijsomgeving conceptualiseren tot een meetbaar construct. Bovendien, en om in staat zijn om dit te doen, willen we de toegevoegde waarde van facility management definiëren en een typologie ontwikkelen van de dimensies van het facilitair ontwerp op basis van hun toegevoegde waarde in de gebouwde onderwijsomgeving. Daarom hebben we in hoofdstuk 2 de volgende onderzoeksvraag beantwoord:

Onderzoeksvraag 1 (RQ1): Hoe kan de inzet van verschillende dimensies van het facilitair ontwerp en hun effecten op de onderwijsprestaties worden geconceptualiseerd tot een meetmodel van FM toegevoegde waarde?

Op basis van een uitgebreide literatuurstudie vonden we dat de beoordeling van toegevoegde waarde betrekking heeft op de functionele of emotionele voordelen van een product of dienst ten opzichte van de financiële kosten en inspanningen, evenals de risico's verbonden aan het gebruik (of het niet gebruiken) van het product of de dienst. De feitelijke beoordeling van de toegevoegde waarde is contextafhankelijk en wordt bepaald door de klantperceptie en is ook dynamisch en relationeel. Daarom hebben we FM toegevoegde waarde als volgt gedefinieerd:

FM toegevoegde waarde is de door de klant gepercipieerde bijdrage van de verschillende dimensies van het facilitair ontwerp aan de organisatie in termen van voordelen in vergelijking met de kosten en risico's.

Voor de conceptualisering van de toegevoegde waarde van FM in een meetmodel in de onderwijsomgeving gebruikten we het gezondheidszorgkwaliteitsmodel van Donabedian (1988). Deze conceptualisering richt zich op de structuur waarin de zorg plaatsvindt en het proces van zorg, die de resultaten beïnvloeden. De analogie met het onderwijs ligt in het feit dat de onderwijsprestaties (dat wil zeggen studiesucces) mede het gevolg zijn van de organisatorische-ruimtelijke kenmerken van de instelling (het facilitair ontwerp en coördinatie) waarin het onderwijs plaatsvindt. Het proces heeft betrekking op het onderwijs zelf, terwijl de uitkomst van dit proces de onderwijsprestaties zijn. Gebaseerd op hun verschillende niveaus van aanpasbaarheid ontwikkelden we een typologie van dimensies van het facilitair ontwerp aan de hand van hun toegevoegde waarde in de onderwijsomgeving. De typologie is opgebouwd rond twee dimensies op basis van de vragen "welk effect hebben dimensies van het facilitair ontwerp op het onderwijsresultaat?" en "welk niveau van aanpasbaarheid en kosten hebben dimensies van het facilitair ontwerp binnen de omgevingsdimensie?" De typologie is nuttig om prioriteiten aan af te afleiden voor het op een efficiënte manier in termen van tijd en geld aanpassen van het bestaande facilitair ontwerp om hiervan de effectiviteit te verbeteren.

Het is een afweging van topmanagers en facility managers hoe het facilitair ontwerp wordt ingezet in termen van ontwerpkenmerken in relatie tot de bijbehorende kosten en risico's. In hoofdstuk 3 willen we vervolgens te weten komen hoe topmanagers en facility managers komen tot deze beslissingen, welke overwegingen ten grondslag liggen aan de ontwerpkenmerken en het gebruik van het facilitair ontwerp en, uiteindelijk, hoe gebruikers dit ervaren. Om dit te doen, beantwoordden we de volgende onderzoeksvraag.

Onderzoeksvraag 2 (RQ2): In hoeverre zijn de inspanningen van topmanagers en facility managers om te komen tot een facilitair ontwerp in overeenstemming met gebruikerservaringen?

Hoofdstuk 3 bouwt voort op een empirisch onderzoek bij zeven Nederlandse hogescholen, en is gebaseerd op veertien diepte-interviews met topmanagers en facility managers, en groepsdiscussies met in totaal 60 studenten. Het bleek dat de totstandkoming en aanpassing van het facilitair ontwerp feitelijk een zaak is tussen topmanagers en facility managers die beide handelen vanuit een organisatieperspectief en niet per se een klantperspectief.

Topmanagers lieten een specifieke aandacht zien voor marketingdoelstellingen zoals de reputatie van (het merk) de hogeschool en het aantrekken van studenten, en beschouwden het facilitair ontwerp als een hygiëne factor die bij goed functioneren geen ontevredenheid veroorzaakt. Het is ook duidelijk dat topmanagers het facilitair ontwerp niet associëren als iets van cruciaal belang voor het onderwijs. Blijkbaar is het topmanagement bezig met de lange termijndoelstellingen van de organisatie en zien ze alleen de operationele en esthetische betekenis van het facilitair ontwerp. Facility managers, daarentegen, waren vooral erg hands-on en hadden een overwegend operationele focus. In de confrontatie tussen de inspanningen van topmanagers en facility managers ten aanzien van het facilitair ontwerp en de ervaringen van studenten hiermee, waren de laatstgenoemden nauwelijks bezig met de facilitaire ontwerpkenmerken en zeker niet met de inspanningen van de beslissers die daaraan ten grondslag liggen. Ze nemen het facilitair ontwerp bovenal zoals het is. Een vaak gehoorde opmerking die dit aangeeft was: "Ik dacht er nooit veel over na". Hun betrokkenheid bij het facilitair ontwerp leek nogal vluchtig; hun oordeel is voornamelijk gebaseerd op een aantal speciale gebeurtenissen en niet op een langdurig gebruik van faciliteiten. Zolang ze geen grote tekortkomingen ervaren in die kenmerken van het facilitair ontwerp die voor hen van belang zijn, is het prima: catering, receptie of studentenbureau, werkplekken voor groepswerk en stiltegebieden, Wi-Fi en stopcontacten.

De mogelijke kloof tussen topmanagers en facility managers aan de ene kant en de studenten aan de andere kant kan de effectieve inzet van het facilitair ontwerp beïnvloeden. Mogelijk leidt dit tot verminderde prestaties van studenten, hoewel ze zich daar zelf misschien niet zozeer bewust van zijn, anders dan van incidenteel ongemak dat ze ervaren. Hun ietwat afstandelijke houding ten opzichte van het facilitair ontwerp en het toenemende bewijs dat de docent een verschil maakt in het onderwijs (Marzano 2007; Mourshed, Chijioke en Barber 2010), gaf aanleiding om het bestaan van mogelijke perceptieverschillen tussen de verschillende actoren te verkennen. In dit verband is de mogelijke kloof tussen docent en beslisser interessant. Daarom proberen we in hoofdstuk 4 te bepalen of functie binnen hogescholen een effect heeft op de door medewerkers waargenomen kwaliteit van het facilitair ontwerp. Om dit te doen, beantwoordden we de volgende onderzoeksvraag.

Onderzoeksvraag 3 (RQ3): Zijn er verschillen in de waargenomen kwaliteit van het facilitair ontwerp tussen de verschillende medewerkerscategorieën (topmanager, onderwijsmanager, docent, facility manager) van hogescholen, en, zo ja, welk belang hechten zij aan de verschillende facilitaire ontwerpkenmerken?

We identificeerden vier categorieën medewerkers bij de hogescholen met betrekking tot het gebruik van het facilitair ontwerp, namelijk college van bestuur, onderwijsmanagers, docenten en facility managers. Dit hoofdstuk is gebaseerd op de antwoorden van 18 hogescholen bij het gebruik van een online enquête. Om RQ3 beantwoorden, hebben we in de eerste plaats de mening over het facilitair ontwerp van de vier verschillende categorieën medewerkers vastgesteld aan de hand van een zeven-puntsschaal van 1, zeer slecht tot 7, zeer goed. In totaal konden 2059 vragenlijsten worden geanalyseerd. We hebben vastgesteld dat het College van Bestuur (N = 17; M = 5.48) en facility managers (N = 76; M = 5.21) een

overeenkomstig positiever beeld hebben van de kwaliteit van de fysieke faciliteiten en diensten versus onderwijs managers (N = 211; M = 4.72) en docenten (N = 1755; M = 4,74) met een overeenkomstig meer negatief beeld. Dit geeft een duidelijk misfit aan tussen de meningen over het facilitair ontwerp tussen verschillende categorieën medewerkers, waarbij de vier medewerkerscategorieën convergeren naar twee verschillende groepen met dezelfde meningen: het College van Bestuur en facility managers aan de ene kant en onderwijsmanagers en docenten aan de andere kant.

Om het tweede deel van RQ3 te beantwoorden hebben we multivariate analyse gebruikt. Volgens het College van Bestuur en facility managers dragen drie factoren van fysieke faciliteiten en diensten significant bij aan de kwaliteit van het onderwijs: representatie, onderwijsruimten en front office. Volgens onderwijs managers en docenten leveren alle factoren van fysieke faciliteiten en diensten een belangrijke bijdrage aan de kwaliteit van het onderwijs. Eindgebruikers schrijven dus een belangrijkere rol toe aan het facilitair ontwerp dan beslissers wat betreft de bijdrage ervan aan de kwaliteit van het onderwijs. Dit geeft aan dat het belang van het facilitair ontwerp verschillend wordt waargenomen, afhankelijk van iemands rol in de organisatie; ofwel beslissers en verantwoordelijk voor het ontwerp van de fysieke faciliteiten en diensten, of eindgebruikers en verantwoordelijk voor het primaire proces (dat wil zeggen onderwijs).

In de voorgaande hoofdstukken hebben we verschillen geïdentificeerd in de waarneming van het facilitair ontwerp en hebben we ook het theoretische bewijs gevonden voor een mogelijke bijdrage van FM aan het onderwijs. Echter, hoe groot deze bijdrage is in termen van invloed op de onderwijsresultaten en welke facilitaire ontwerpkernmerken deze effecten veroorzaken is nog onduidelijk tot nu toe. In hoofdstuk 5 hebben we onderzocht of de waargenomen kwaliteit van het facilitair ontwerp van de hogescholen invloed heeft op onderwijsresultaten. We beantwoordden de volgende onderzoeksvraag.

Onderzoeksvraag 4 (RQ4): Is, en zo ja, in welke mate de waargenomen kwaliteit van het facilitair ontwerp van hogescholen positief gerelateerd aan de leerresultaten van de studenten?

Hoofdstuk 5 heeft als doel om te zoeken naar voorspellende variabelen voor studiesucces vanuit het perspectief van een docent die verband houden met de gebouwde onderwijsomgeving. Om RQ4 te beantwoorden hebben we de kwaliteitspercepties ten aanzien van de fysieke faciliteiten en diensten onderzocht aan de hand van de grote steekproef van docenten (N = 1755) van de achttien deelnemende hogescholen die we ook gebruikt hebben om RQ3 te beantwoorden. Docenten weten door een lang en veelvuldig gebruik van fysieke faciliteiten en diensten perfect hoe deze te evalueren, veel beter dan studenten. Multivariate data analyses werden gebruikt om de hypothese te testen dat de kwaliteit van de ruimtelijke en functionele aspecten van onderwijsinstellingen positief gerelateerd is aan studiesucces.

In de zoektocht naar de toegevoegde waarde van facility management in de onderwijsomgeving, was de meest opvallende conclusie dat de opvatting van docenten over het facilitair ontwerp inderdaad verband houdt met het studiesucces. De resultaten van

meervoudige lineaire regressieanalyse toonden aan dat de waargenomen kwaliteit van 11 facilitair ontwerpcomponenten (met betrekking tot 40 items van fysieke faciliteiten en diensten) 3,5% van de variantie in studiesucces verklaren. Natuurlijk houden de diverse facilitair ontwerpcomponenten een verschillend verband met studiesucces, zowel in positieve als negatieve zin. Er waren statistisch significante positieve relaties tussen de waargenomen kwaliteit van de reiniging, front office, beschikbaarheid, lay-out en ruimtelijke condities van klaslokalen en IT, en studiesucces. De meningen over deze fysieke faciliteiten en diensten blijken de beste voorspellers te zijn voor studiesucces, waarbij reinheid het belangrijkste is. De waargenomen kwaliteit van de traditionele werkplekken (dat wil zeggen kantoren en vergaderzalen) was relatief sterk negatief gerelateerd aan studiesucces. Representatie, inrichting en het ontwerp van de gebouwen, cateringfaciliteiten en binnenklimaat hadden geen statistisch significante relatie met studiesucces. Een grafische weergave van het regressiemodel werd eerder gepresenteerd in Paragraaf 5.5 (zie figuur 5.2).

Dus, facility management doet ertoe!

About the author

Herman Kok was born in Coevorden (The Netherlands) on 8 February, 1966. In 1988 he received a bachelor degree in Commerce (Marketing Management) from the Eindhoven University of Applied Sciences (nowadays Fontys). This was followed by taking the NIMA-C (Strategic Marketing) programme in 1995-1996. In 2009 he started his doctorate research in the Department of Management Studies at Wageningen University as an external PhD.

After his graduation in 1988 Herman first worked as a software and IT entrepreneur. Since 1996 he is involved in management consultancy related to service management and facility management innovation, both as an independent consultant and in partnerships. He is the author of four books and co-author of two books on facility management and marketing, and has published over 60 professional articles.

At present, he combines his professional career with lecturing Facility, health and innovation Management at Wageningen University, The Netherlands, and Marketing and Service Management at the Zurich University of Applied Sciences (ZHAW), Switzerland. His research focuses on facility design and facility management related to organisational performance, with a special interest in the education and healthcare sector. Besides his publications related to the PhD thesis, he published three scientific articles (of which two book chapters) on FM added value.

Herman Kok
Wageningen School of Social Sciences (WASS)
Completed Training and Supervision Plan

Wageningen School of Social Sciences

Name of the learning activity	Department/Institute	Year	ECTS*
A) Project related competences			
Writing a PhD proposal	Mansholt Graduate School	2009	6
Advanced Facility Management – MST-31806	MST, WUR	2009	6
"FM alignment - Creating added value through a multi-level collaborative relationship"	10th Wageningen International Conference on Chain and Network Management (WICaNeM), Wageningen, The Netherlands	2012	1
"Can FM contribute to Study Success?"	European Facility Management Conference, Prague, Czech Republic	2013	1
"Gaps in perceived Quality of Facility Services"	European Facility Management Conference, Prague, Czech Republic	2013	1
"Towards an effective workspace design by end-users' emancipation"	European Facility Management Conference, Berlin, Germany	2014	1
B) General research related competences			
Mansholt Introduction course	Mansholt Graduate School	2009	1.5
Scientific Publishing	WGS	2011	0.3
Research Methodology II: From topic to proposal	WGS	2011	4
Qualitative Data Analysis: Procedures and Strategies – YRM-60806	RME, WUR	2011	6
Quantitative Data Analysis: Multivariate Techniques – YRM-60306	RME, WUR	2012	6
C) Career related competences/personal development			
Teaching: Introduction Facility Management - MST-52806	MST, WUR	2010-2012	2
Teaching: Advanced Facility Management - MST-31806	MST, WUR	2010-2012	2
Supervising BSc/MSc thesis	MST, WUR	2011-2015	PM**
Additional teaching	MST, WUR	2013-2015	PM***
Total			**37.8**

*One credit according to ECTS is on average equivalent to 28 hours of study load

** Students who were also supervised by PhD candidate are:

1.	Supervising MSc Thesis Judith Borgijink (MST-FM)	2011
2.	Supervising MSc Thesis Frank Hols (MST-FM)	2011
3.	Supervising BSc upgrade Moniek Dekker (MST-FM)	2012
4.	Supervising BSc upgrade Susan Reedijk (MST-FM)	2012
5.	Supervising MSc Thesis Moniek Dekker (MST-FM)	2012-13
6.	Supervising MSc Thesis Jeanet Houterman (MST-FM)	2012-13
7.	Supervising BSc upgrade Nick Lettink (MST-FM)	2012-13
8.	Supervising MSc Thesis Kirsten van der Vaart (MST-FM)	2012-13
9.	Supervising BSc upgrade Jeanet Houterman (MST-FM)	2013
10.	Supervising BSc upgrade Kirsten van der Vaart (MST-FM)	2013
11.	Supervising MSc Thesis Paul van der Heijden (MST-FM)	2013
12.	Supervising BSc upgrade Kim Basten (MST-FM)	2013
13.	Supervising MSc Thesis Inge Fraij (MST-FM)	2011-13
14.	Supervising MSc Thesis Nick Lettink (MST-FM)	2013-14
15.	Supervising MSc Thesis Susan Reedijk (MST-FM)	2013-14
16.	Supervising MSc Thesis Kim Basten (MST-FM)	2013-14
17.	Supervising BSc upgrade Paul van der Heijden (MST-FM)	2014
18.	Supervising BSc Thesis Daniël Meijers (BGM)	2014
19.	Supervising MSc Internship Denise Jacobs (MST-FM)	2014
20.	Supervising MSc Internship Edith Cijsouw (MST-FM)	2014-15
21.	Supervising MSc Thesis Irene van Rijsewijk (MST/ECS)	2014-15
22.	Supervising MSc Thesis Janet van den Boomen (MST-FM)	2014-15
23.	Supervising MSc Thesis Martijn Vos (MST-FM)	2014-15
24.	Supervising MSc Thesis Remy Bach (MST-FM)	2014-15
25.	Supervising MSc Internship Bart Grobben (MST)	2014-15

Besides these students who already finished their BSc/MSc Thesis, PhD candidate is currently supervising an additional number of 12 students (both MST and other chair groups) who are in the process of finalising their BSc/MSc Thesis and/or Intersnhip in the course of this calendar year.

*** Additional teaching activities concern the following courses:

- MST-21306 Advanced Management and Marketing	2013-2014
- MST-32806 Management and Economics of Health Care	2013-2015
- MST-25306 Management and Policy in the Health Sector	2013-2015
- MST-23406 New Venture Creation	2013-2015
- MST-25806 Principles of Entrepreneurship	2014-2015
- MST-31306 Advanced Business Strategy/Case Study Mgnt.	2014-2015

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