

VALUE PROPOSITION IN DIFFERENT TYPES OF BUILDINGS

CHARACTERISTICS AND MEANS

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ABSTRACT:

Purpose: The purpose of the research is to gain knowledge regarding what creates value in different types of buildings and how these identified value-creating elements can be linked to the development (design) and planning in order to increase the value creation of the project.

Design/method/approach: The paper is a result of three separate studies on value creation in hospitals, university campuses, and office buildings by using mix qualitative methods involving the study of cases through literature studies, document studies, questionnaires, and semi-structured interviews.

Findings: Results indicate the differences in value propositions of different types of building and how it is directly related to the owner's and user's value proposition. The results also indicate that value creation in the operation stage is basically built upon life-cycle thinking and characteristics such as satisfying a function, creating a positive emotion, achievement of the owner's intentions and moving it forward by innovation.

Originality/value: The research relates findings from the literature and three extensive studies to explore the similarities and differences in what creates value in different types of building to provide a new understanding of what contributes to creating value in projects. This new understanding can contribute to better decision-making processes in the planning and design phase of the projects.

1. Introduction

Although the idea of defining value and conceptualizing it started in the field of philosophy (Fleetwood, 1997), the focus on how value can be created in modern time was initiated in economics and manufacturing of products (Kelly, Male, & Graham, 2015). Decades of research within different contexts such as Marketing, manufacturing, and economics pointed at the relationship between cost and benefit and customer's, or the end user's, perception of the product as the focal point for value and value creation (Babin, Darden, & Griffin, 1994; Bowman & Ambrosini, 2000; Dittmar, 1992; Ford & Crowther, 1926; Holbrook, 1999; Womack & Jones, 1996; Zeithaml, 1988). Thomson, Austin, Devine-Wright, and Mills (2003) pointed out that projects should have value delivery as a fundamental objective. Arge and Hjelmbrække (2012) argued that projects must have their reason based on organization's business strategy and goals, admitting that the trigger for any project is a predicted or existing customer need. This emphasizes the importance of aligning corporate strategies with customer needs to maximize the value creation (Haddadi, Johansen, & Andersen, 2016), seen from the owners perspective. Numerous models have been developed in the field of value management to identify, understand and define value for the stakeholders, and create ideas to achieve the defined value (Austin & Thomson, 2005; Green, 1994; Kelly et al., 2015; Male, Kelly, Gronqvist, & Graham, 2007; Thyssen, Emmitt, Bonke, & Kirk-Christoffersen, 2010). However, there is a focus on optimizing the cost of obtaining defined value rather than focus on achieving value elements as strategic objectives. Hjelmbrække, Klakegg, and Lohne (2017) pointed to strategic objectives as the ability to produce the intended effect. In the European research project, Value Driven Procurement in Building & Real Estate (VALPRO), a lack of understanding of the project owner's- and users' strategic objectives and lack of methodology for translating them into functional buildings under traditional project management is stressed (Arge & Hjelmbrække, 2012).

The purpose of the research is to gain knowledge regarding what creates value in different types of buildings during the operation phase and how these identified value-creating elements can be linked to the development (design and planning) in order to increase the value creation of the projects. This led us to the following research questions:

- **What are the similarities and differences in value propositions in different building types?**

- **What are the aspects that should be considered in the early development of the project to maximize value creation in the operation phase of the life cycle after the project's completion.**

This research paper is presenting results from a long-term study of value creation in building projects from three different contexts - Office buildings, university campuses, and hospitals. These buildings have in common that they are large, expensive, and complicated buildings. In addition, the end users are not those who directly pay for the product (building) or the investment. The purpose of the building, seen from a user perspective, is to provide a condition so that the core businesses and activities happening there can achieve their goals. Also, the user's value creation process is not linked to owner's income (rent) in the operation stage. The following article is divided into four main sections. A short introduction to the theoretical background regarding value and value creation in general and value creation, within the context of hospitals, university campuses and office buildings, in particular. Next, the methodology of this research is presented. Then the findings are presented for each type of building, and in the end, the results are discussed, and the conclusions are presented.

2. Theoretical background- value creation in building projects

The research is exploring what creates value for owners and users in the operation phase and whether there are similarities or differences between how users and owners of complex public buildings (hospital and universities) and complex private buildings (Office buildings) define and understand value.

The intention is to exploit this knowledge in the early phases of the construction projects to enhance and optimize the design process of buildings and ultimately contribute to higher value creation in the operation phase. As a result, the point of departure for the theoretical background is to identify how to define value and how value can be created. The definition of value and value creation in literature is ambiguous although the documented discussions have been ongoing, at least, since Aristotle. Aristotle, as the first documented philosopher, branched value into "use value" and "exchange value" (Fleetwood, 1997). Since then, scientists, economists, and researchers have attempted to define and describe value in different contexts. Drevland and Lohne (2015) stressed the dependence of value on the theoretical context, as well as on subjective perception while referring to Womack and Jones (1996) as, arguably, the most common definition for value. Womack and Jones (1996) argued that the real value of a good or service could only be defined by the ultimate customer. Kelly et al. (2015) had a more mathematical approach to the concept of value defining it as the relationship between needs, functions, costs, and used resources. Value and value management is particularly discussed in management and marketing literature, especially since 1980s (Babin et al., 1994; Dodds, Monroe, & Grewal, 1991; Holbrook, 1994, 1999; Kaufman, 1998; Kelly et al., 2015; Parasuraman, 1997; Woodruff, 1997; Zeithaml, 1988). Although different theories and research streams have been applied in different contexts to conceptualize value, the focus on the customers and users can be considered as the common ground. This might lead us to the focus on the individuals who use the buildings,

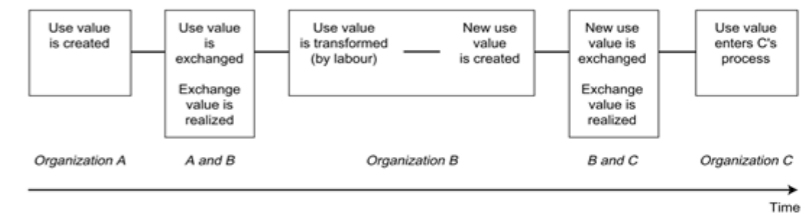


Figure 1 Value creation process (Bowman and Ambrosini, 2000)

but the fact that different stakeholders have their own value proposition and perspective on value should not be ignored (Haddadi, Temeljotov, Foss, & Klakegg, 2015).

Bowman and Ambrosini (2000) use Aristotle's conceptualization of value to define the process of value creation. They point out that use value is created by labor and organization. At some point, the use value is exchanged as in a sale, and exchange value is thereby realized. The use value of the product can again be transferred by labor to new use value, and the new use value can again be exchanged to create a new exchange value. **Figure 1** illustrates this process.

Hjelmbrække and Klakegg (2013) supported Bowman and Ambrosini (2000) by stating that value creation is a result of human activity (labor), and stress that human activity is the only source of new value. To evaluate value in a building context, Dewulf and Wright (2009) argued that value should be defined by in which degree a building is flexible and supportive of the core business activities in the operational phase. According to Eikeland (2001) value creation, in the operational phase, arises through the future users of the building. Consequently, the users' perspective of value is essential to understand achieving value creation in a project. Blanc-Brude, Goldsmith, and Valila (2006) and Smit and Dewulf (2002) presented comparable definitions, stating that inexpensive solutions to provide a quick and low-cost construction will decrease the lifetime value of a building.

Bell (1994) claimed that the processes in the pre-design phase of construction projects can appear to be hurried, resulting in customers' expectations being unrecognized. Thomson et al. (2003) supported this claim by arguing that construction industry's current understanding of value routinely fails to contemplate the relationships between buildings and users. Hjelmbrække and Klakegg (2013) emphasized that traditionally a building project is based on project organizations that leave the users in a half-excluded/part-included position.

Samset (2010) defined the predesign phase as all activities from when the idea of a building is conceived until an investment decision is made and introduces tactical and strategic performance in construction projects. Tactical performance concerns delivering the agreed project outputs on time and within cost while Strategic performance includes longer-term perspectives, such as relevance, effect, and sustainability. Arge and Hjelmbrekke (2012) pointed out that working towards enhancing strategic performance, including usability, would enhance value for the project owner and user.

Sustainability and usability, as long-term strategical objectives of buildings, depend not only on the design of the building but also on how the building is operated. Facility Management is supposed to create an environment to support the primary objective of the activity in the building by an integrated approach to operate, maintain, improve and adapt the building and infrastructure (Atkin & Brooks, 2014). Atkin and Brooks (2014) also stated that understanding organizational needs is the key to efficient FM in terms of providing value for money. According to Anker Jensen (2010), the focus of Facilities Management (FM) has been on cost reductions for a long time. This has changed in recent years towards the need for FM to create added value. The focus needs to change from evaluating buildings after completion time, cost, and quality, to assessment of life-span qualities such as low operational costs, adaptability, long-lasting materials and on how the building supports the core business over time (Bjørberg & Verweij, 2009; Nedin, 2013).

Adaptability will possibly generate a building ready for changing requirements in a sustainable way (Larsen & Støre-Valen, 2008; Nedin, 2013; Støre-Valen, Kathrine Larsen, & Bjørberg, 2014). Adaptability can maximize the efficiency of the core business in a building over the whole life cycle (Glanville & Nedin, 2009). Bjørberg and Verweij (2009) argued that adaptable buildings possess three essential abilities: flexibility, generality, and elasticity (F, G, E). Arge (2005) referred to the Norwegian Building Research Institute and defined these key elements as following:

- Flexibility is the building's ability to meet changes in user's and owner's functional needs by changing its properties
- Generality is the building's ability to meet changes in user's and owner's functional needs without changing its properties

- Elasticity is the building's ability to be extended or partitioned according to changes in user or owner needs

The research is exploring what creates value for owners and users in the operation phase and whether there are similarities or differences between how users and owners of complex public buildings (hospital and universities) and complex private buildings (Office buildings) define and understand value.

2.1. Value creation in hospital buildings

Initial costs have been the primary decision maker when designing hospital buildings in Europe for decades (Bjørberg & Verweij, 2009). Støre-Valen et al. (2014) claimed that life cycle cost (LCC) and initial cost should be considered as one total sum, as the operational costs usually already exceed the initial costs two to three years after completion. By designing the building after a comprehensive life-cycle analysis, the building costs typically increase with 6-12 %, but the costs over the lifespan of the building will be reduced (Rechel, Wright, & Edwards, 2009)

Facility Management (FM) can be the link between the hospital building and the healthcare services, contributing to value creation (Larsen, 2011). Støre-Valen et al. (2014) concluded that FM in hospital buildings needs to address a strategic function that aligns FM deliveries with strategic deliveries of the core healthcare service as well as the daily operation of the hospital. The theory pointed out that there are two fundamental functions that need to be addressed.

2.2. Value creation in university buildings

University facilities are learning environments, where the focus is on the students and staff, and their interaction with the built environment (Kärnä, Julin, & Nenonen, 2013). Hence, the university buildings are expected to support and facilitate the universities' core activities of teaching and research to contribute value.

This general picture is complicated by the fact that there are student groups, e.g., medical students, which need different facilities from, for instance, a group such as civil engineering students. A campus, defined as the landscape and different buildings used for university-related functions, contains several facilities with different purposes and therefore different user groups (Kärnä et al., 2013). Many scholars, such as (Hanssen & Solvoll, 2015; Wiers-Jenssen, Stensaker, & Grøgaard, 2002) have conducted studies focusing on how the university surroundings contribute to student and staff satisfaction. With regard to building facilities, these studies have found that the factors that can influence user satisfaction within university facilities are the quality of its social areas, auditoriums, and libraries, and aesthetic aspects of the physical infrastructure. A functional and aesthetic design can contribute to a pleasing first impression, motivate and support students both socially and academically and increase the time that the students spend at the campus (Spiten, 2016).

The organization and activities of universities change rapidly. Hence, university facilities must be dynamic and adaptable to these changes. Furthermore, people should be encouraged to use the spaces in the university in a myriad of ways, due to the development of technology and the learning landscape (Rytkönen, Nenonen, & Kärnä, 2012).

2.3. Value creation in office buildings

A physical environment that corresponds to the employees' needs and work processes can positively affect their performance, health, and well-being (Feige, Wallbaum, Janser, & Windlinger, 2013; B.P. Haynes, 2008). On the other hand, a poorly performing office environment can negatively affect the employees' health and productivity (Clements-Croome, 2015).

It is clear from studying lists of qualities that are of value to users that most employees highly value the possibility of doing focused work (individually and in groups) without many distractions. Informal, unplanned meetings are also important (Brill, Weidemann, & the BOSTI Associates, 2001; Leesman Lmi, 2015). According to van der Voordt and van Meel (2000), one of the central challenges in office innovation is finding a balance between privacy and interaction. While distractions are often referred to as the factor that has the highest negative influence on self-assessed productivity, interaction is often perceived as having the most significant positive impact (B. P. Haynes, 2007). Environmental conditions, such as temperature, air quality, noise levels, lighting, and access to daylight, are also of great value to users. Other factors that seem to be important are having information and communication technologies equipment and enough individual space for storage (Brill et al., 2001; Leesman Lmi, 2015).

3. Research design and methodology

Three separate studies were carried out to identify the elements of value creation for each type of building. The studies were a part of a larger research project and aimed to gather different types of data.

Figure 2 illustrates the overall research design for this article

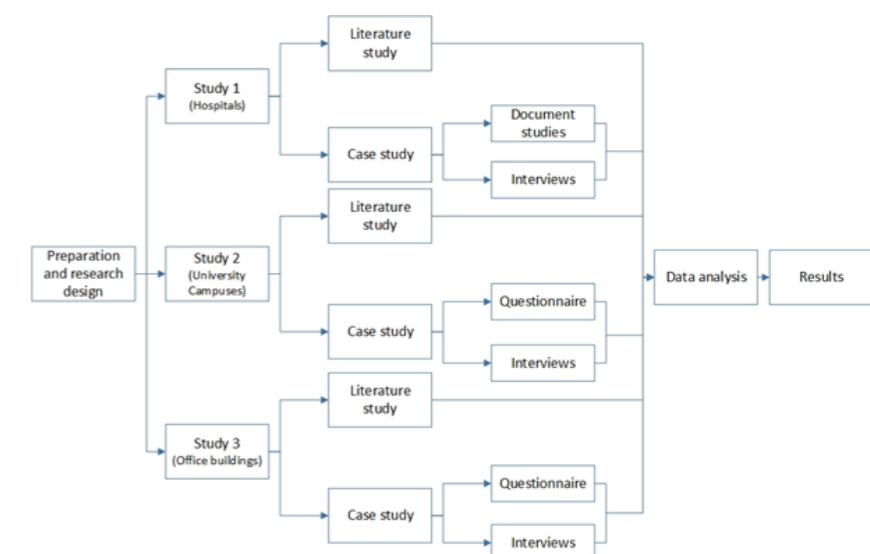


Figure 2 Research design

Each study contained its own literature study and a case study. The case study in Study 1 included documents studies of the case project and semi-structured interviews. The case studies in Study 2 and 3 consisted of questionnaires and semi-structured interviews.

Study 1 was conducted between January and June 2015 and collected its data through a literature review as well as case study of four Norwegian hospitals and an administrative governmental organization (SBHF) established in 2014 for planning and building hospitals

Study 2 was conducted between January and June 2016 and collected its data through a literature review, two questionnaires, and a case study with semi-structured interviews.

Study 3 was conducted between January and June 2016 and collected its data through a literature study and a case study of office buildings through a questionnaire and semi-structured in-depth interviews.

3.1. Study 1 (hospital projects)

The focus of study 1 was to identify what creates value for users within hospital buildings and which strategies should be present to create value. The literature review aimed to create a theoretical framework within the topic. Internet queries through library databases and search engines constitute the primary source of information in this literature study. The hospitals for the case study were selected on the basis of their completion dates, spanning from 2000 to 2015 with pre-design phase starting 12-15 years earlier. The case study in study 1 contained a document study, four interviews, and a workshop. The document study aimed to identify the background of each project and strategies for value creation. At three of the hospitals and SBHF, open-ended semi-structured interviews were conducted. For the last hospital, four employees from the Facility Management (FM) department were invited to participate in a workshop. The objective of the workshop, and four in-depth interviews, was to map the understanding of the concept of value and what creates value, as well as gathering experiences regarding strategies for value creation. The respondents had backgrounds from design and project management, FM-services and pre-design phase of projects.

3.2. Study 2 (University campuses)

The focus of study 2 was to identify what creates value for users within University campuses. The literature review that was conducted as part of this study had two purposes: First, to identify the existing research and knowledge within the topic of value and value creation in general and within value creation in university campuses in particular and second, to create a theoretical framework for the research.

Seven Norwegian universities participated in the questionnaire, resulting in 879 respondents (337 students, 541 staff). The universities distributed the questionnaire through different channels. This prevented us from knowing the exact number of people who received the questionnaire, which in our opinion does not influence the results nor the conclusions of our research since the number of respondents is so high. The part of the questionnaire, which is benefited in this article, aimed at collecting data about value enhancing elements from two different user groups of university buildings; students, employees (staff). The focus of this questionnaire has been on campus facilities rather than individual buildings.

The case study in study 2 was an in-depth investigation, of the two universities that had the highest number of respondents in the questionnaire, through semi-structured interviews. Both universities had been through major construction projects during the past 15 years. The objective of the case study was further assessment and evaluation of the results of the questionnaire. Fifteen experts who had participated in the construction projects of the two university campuses were identified and interviewed.

3.3. Study 3 (Office buildings)

This study focused on how value is understood in office buildings. Data were collected through a literature study, a questionnaire and semi-structured in-depth interviews of users of office buildings. The questionnaire had 378 respondents and a response rate of 53%, and 13 key actors in moving or office refurbishment projects from three of businesses were interviewed.

The questionnaire aimed to identify how the end users perceive value-creating elements and what is essential for them to have a productive day. The questions were determined based on findings from the literature study considering what could be of interest to users in an office context. The questionnaire had five parts in total whereas data from two parts were relevant and are used for this article. These are:

- Part 1: What kind of office structure they have (Small 4-9 or large over ten open plan or cell offices) and how they work (mostly individual or in groups) and whether they spend most of their time inside or outside of the office
- Part 2: Ranking 22 qualities on a 4-point scale. The questions concerned structural, environmental and social qualities of the office building.

While the questionnaire had its focus on user requirements and the attractive qualities that enhance value in office buildings, the interviews focused on the processes in recent construction, refurbishment or moving project in those office spaces that can contribute to value creation.

The quantitative data, which was a result of the questionnaire, was analyzed by calculating the mean and standard deviation. These values would indicate how the

respondents evaluate the qualities and how divided the perception is. As it is evident in the description of the studies, all studies sought to improve the validation of their findings through triangulation suggested by Yin (2014). Study 1 tested the findings through the literature review and the documentation study of the cases by conducting interviews. Study 2 and 3 combined quantitative and qualitative approach, by testing the quantitative questionnaire through qualitative interviews. The results and findings are presented in the next chapter.

4. Findings from the three studies

The following chapter presents the findings from the three studies that have been conducted. First, the results of the investigation of what creates value for the end users is presented for each type of building. Then the findings regarding the strategic aspects of value creation are presented.

4.1. Hospital buildings

Identifying what creates value for users of hospital buildings is a difficult task. One of the main reason, besides the quick development of the technology, is the fact that there is a tremendous variety of functions in a hospital and identification of the user requirements and needs should happen based on each function. Furthermore, healthcare personnel and patients are both considered as the end users of the hospitals with different needs. Hence, the interviewees were asked to explain their understanding of what can create value in hospital buildings. Respondents pointed out factors that can contribute to the fulfillment of the users' requirements such as appealing light and air quality (indoor climate), positive and appealing holistic impression (interior quality, hygiene, cleanness), attractive buildings (Exterior and interior architectural qualities). Factors that can contribute to the improvement of healthcare services such as quality of workplace environment, development of competencies, collaboration and knowledge sharing and sense of belonging were as well mentioned as value creating elements. Other parameters such as proper logistics, desirable functionality, efficient operation services and environmental consciousness were mentioned by the interviewees as fundamental elements of achieving value in hospital buildings.

The understanding regarding the definition of a value-creating hospital building was reasonably harmonized. Almost all the interviewees stated that value in a hospital context is created when optimal conditions for efficient delivery of healthcare services is achieved.

A basic mathematical approach to defining value in the literature pointed to the relationship between function and cost. Although the nature of the function of a hospital building implies that this definition is hard to apply in this context, a broad awareness on considering LCC as a strategic means to achieve more valuable building is advised by the respondents. As an example, during the planning and design of one of the studied hospitals, the investments were reduced. As a result, the project was postponed, and a more comprehensive analysis of the new hospital was conducted. Despite the initial adverse reactions, the extensive effort resulted in a better building than initially intended.

Correspondingly, the findings advise an extensive analysis to evaluate and define objectives describing how to add value to healthcare services although this might be a challenging and demanding task. The criteria and specifications are unique for every project. Through the case studies, we managed to define three useful questions to obtain and identify the required criteria and specifications:

- 1- How do the healthcare services intend to develop capacity, reputation, and competences in the future?
- 2- How can the hospital buildings help the healthcare services to achieve these objectives?
- 3- What are the most critical requirements for the hospital buildings to fulfill future needs?

Strategic objectives of a hospital involve the long-term effects of the project. In all the cases of our study, the projects had pre-design documents labeling LCC. However, three out of the four cases admit that LCC was not given adequate attention during the processes.

Facility Management (FM) services including maintenance and development of the buildings are the dominant part of the costs in the operation phase. Although the document study pointed at LCC as a priority in all the cases, the response from the interviews is in contrast with this finding. Achieving annual operation cost profits is stated as an objective for the project in the pre-design documents of all four hospital cases. However, the respondents expressed concern regarding budget cuts and inadequate resources allocated to FM services.

Another frequently used term observed in the document study, in particular in the most recent hospital projects, is adaptability. As in FM, adaptability is a term that seems to be in focus during the pre-design phase of the hospital projects. However, like FM, the practical handling of this vital aspect appears to be questionable. A closer investigation of how adaptability is described and perceived in the most recent case reveals an emphasize on Elasticity (Future expansion opportunities). This finding can also be related to other hospital projects as population growth and need for larger hospitals and increased areas are of significant concern. A recent case hospital reached their full capacity quickly after completion as the population prognoses took place faster than estimated. Another challenge regarding the design of elasticity is the communication of these design opportunities to those who can realize them in future, such as facility managers. Also, accomplishing the potentials of adaptability is a complex task in operating hospitals. Although the possibilities of restructuring the use or expanding the areas are there, moving functions and making areas available for construction work is challenging.

4.2. University campuses

The literature, the questionnaire, and the interviewees' consent on the claim that value in a university campus context is a campus and buildings that creates optimal conditions for teaching, learning, and research. A remarkable finding in the results of the questionnaire is a general trend in the standard deviation of the answers. The standard deviation is higher for the low-ranking functions, indicating more consensus in individual perceptions on the most essential (high-ranking) functions and qualities.

Both value and customers' perception change over time. Despite this, the findings from the questionnaire correspond with studies from the literature showing that special rooms such as workshops, laboratories, auditoriums, and libraries, as well as social elements such as a cafeteria and informal break facilities, are basic needs and of vital importance for the users.

It was discovered in the case study interviews that more time spent on innovative design in the pre-design phase might contribute to creating an ability to adapt to the changes that could take place at the university in the future.

The first part of the questionnaire asked the students and the staff to rank some selected campus qualities that were chosen based on the literature and discussions among authors. The second part asked the students and the staff to rank the importance of different types of rooms and support functions. (Table 4)

The highest-ranking quality "areas suitable for work" corresponds with the literature claiming that supporting the core activities of teaching, studying and research contributes to value on university campuses. Availability of public transportation, sense of direction and orientation between the buildings and facilities for bicycles are also of high importance for both students and staff. In general students and staff seem to agree on what campus qualities contribute to value for them. However, students seem to rank facilities for physical activity and sport higher than employees do.

The ranking of room functions, as well, revealed relatively high consensus among students and staff. Both "Group/meeting rooms" and Study hall/private offices are ranked highly by students and staff. This finding, as well, supports the claim that both students and staff find the highest value in what supports their core activity. (Table 5)

Qualities	University Staff		University Students	
	Mean	Standard Deviation	Mean	Standard deviation
Areas suitable for work	3,69	0,49	3,47	0,60
Availability of public transportation	3,52	0,69	3,43	0,85
Sense of direction and orientation	3,31	0,62	3,40	0,64
Facilities for bicycles	3,13	0,92	2,84	1,08
Contribution to pride in the work/study place	2,97	0,83	2,80	0,89
Architectural qualities and aesthetic	2,90	0,81	2,67	0,85
Parking facilities for cars	2,66	1,07	2,44	1,17
Facilities for physical activity and sport	2,23	1,92	2,82	1,80

Table 4 Selected qualities of the university campuses (1=low importance, 4=high importance)

Room functions	University Staff		University Students	
	Mean	Standard Deviation	Mean	Standard deviation
Study hall/Private offices	1,44	1,25	2,51	1,29
Group and meeting rooms	2,27	1,46	2,10	1,29
Auditorium	2,74	2,28	3,39	2,27
Library	3,10	2,40	3,44	2,05

Table 5 Four most valued room functions (1= highest value, 4= lowest value)

During the interviews, the respondents were asked about their definition of value for university campuses. The response expresses that value for the end user is a campus that creates optimal conditions for teaching, learning, and research. When asked about whom they considered as end users, the students, staff, facility and property managers and the community were mentioned. The results from the interviews imply that the users agree on what elements would create value. However, the length of the project acted as an obstacle in communicating value for end users. The university campus construction projects usually are complicated and long-lasting. Consequently, the end users can change, and technology can advance resulting in loss of information and changes in value creating elements for users. The interviews reveal that facility managers have an ambiguous role in the projects while they are substantial resources. Facility managers are not considered a distinguished user group although they, in fact, are an influential user group. Additionally, they are excellent resources with substantial knowledge about the operation, technical solutions, and building design. Therefore, they should be involved both as end users and as a resource for the design team during the pre-design phase of a project.

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4.3. University campuses

The overall results from the case study questionnaire reveal that the most critical factors that can enhance value for the employees are fundamental qualities such as good indoor climate conditions and areas being suitable for individual work, formal meetings, informal meetings, and sharing knowledge. For the employees in this case study, the availability of public transport was rated as the most critical factor. This was supported and reemphasized by the fact that "Parking facilities for cars" has the lowest ranking. This finding is highly situational and location-dependent. Norway has a strong culture for using public transportation, and the cities that the case buildings are located in have tremendous and wide-spreading public transportation systems. (Table 6)

The questionnaire results also indicate that several qualities are perceived to be better by the employees who sit in a partly activity-based open-plan space compared to the employees who have individual cell offices. One of these is the suitability of the open-plan space for informal meetings. However, users who have cell office are more pleased with its suitability for individual work. Their concerns with the indoor environment seem to be mostly related to air quality and temperature, while people working in the open-plan space have more complaints about noise. This substantiates the challenge of finding a balance between privacy and interaction mentioned in the literature. In the case of the office buildings, similarly to university campuses, the results indicate a higher standard deviation for the low-ranking functions, revealing converging individual

Quality	Mean	Standard deviation
Availability of public transportation	3,56	0,69
Indoor climate and comfort	3,37	0,63
Areas suitable for individual work	3,33	0,69
Sharing knowledge and collaboration	3,27	0,66
Interior qualities and well-being	3,11	0,75
Areas suitable for formal meetings	3,02	0,70
Safety and security	2,99	0,74
Areas suitable for informal meetings	2,83	0,82
Individual control of indoor climate	2,82	0,86
Workplace design that enables flexible working	2,80	0,87
Modern, forward-looking solutions	2,77	0,84
Contribution to pride in the workplace	2,75	0,78
Environmental friendly energy efficient building	2,66	0,82
Arrangements for effective waste management	2,61	0,82
Access to locker room and shower	2,55	0,99
User-friendliness, sense of direction	2,54	0,76
Parking facilities for bicycles	2,51	1,14
Flexibility (changing floor plan)	2,47	0,87
Accessibility and universal design	2,46	0,86
Exterior, architectural quality	2,41	0,80
Facilities for physical activity	2,25	1,04
Parking facilities for cars	2,01	1,05

Table 6 Results from the questionnaire in study 3

perceptions of the most essential functions.

Case study interviews pointed to some essential elements that could contribute to value creation in a project. Four key elements were identified during the interviews as factors for enhancement of value creation in projects:

- A structured user involvement process
- Collection of information and identifying needs
- Identifying who should be involved when
- Structuring the collected information

The importance of satisfying user needs and thereby the importance of identifying and understanding these needs during the early phases of the project was emphasized by most of the interview objects. Besides, the significance of involvement of the management level of the company/business in the predesign phase was specified. By involving the management before the users, certain fundamental decisions can be taken before the users are involved. In addition, the management would be able to communicate the strategies and objectives of the project to the users.

5. Discussions and conclusion

The fundamental similarity and common ground is in creating optimal condition for core business activities. However, the key for creating optimal condition for core business activities is in differentiating the value propositions of the users and the owners. There is an overlap between these two, and although owner's value proposition can affect the business activities of the users, they are mostly related to, and taken care of, by the owner. The user value proposition is the specific requirements that users request to be able to perform their tasks productively.

Similarities and Differences in User's value proposition in different types of buildings

Over 1000 users were asked about the qualities they consider as value creating in their buildings in this research. Requirements such as indoor climate and comfort (noise, air quality and temperature), access to public transportation, interior and exterior quality and impression, rooms and areas that facilitate both individual and collaborative activities are among the examples of user requirements that are common for any building.

However, every type of building has its distinctive value proposition as well. While elements such as facilities for physical activity and sport is considered as a relatively highly ranked factor for students on university campuses, they are not acknowledged as important factors for an office building or hospital users. Logistics and environmental consciousness are pointed out as fundamental parameters to achieve value in hospital buildings, while neither campus nor office users have ranked these as important factors. Elements such as parking facilities for cars and bicycles, architectural quality and aesthetic, and access to shower and locker rooms are

qualities with the highest standard deviation, indicating that these qualities are highly appreciated by some people while others do not consider them as essential factors for value creation. Although everyone can appreciate the access to public transportation, parking facilities for cars are appreciated by those who drive and facilities for parking bicycles and the locker rooms are appreciated by those who ride bicycles.

As a literature study revealed, the value of a product is defined by the ultimate user and depends on the individual perception of the product (Womack). Although this can imply that determining what creates value for users is a difficult task, one of our most significant findings, regarding identifying value creating elements for users, is that the standard deviation is higher for the low-ranking functions, indicating converging individual preferences on what the most important functions and requirements are.

This finding indicates that user requirements in projects can be determined by conducting questionnaires while standard deviation can be a measure for identifying the most legitimate requirements. The elements with a low standard deviation are essential to be fulfilled for everyone while the higher standard deviation indicates the diversity in needs meaning that these should be fulfilled but not designed to be utilized by everyone.

Although some of the significant user requirements were ranked and analyzed, identifying user requirements in each project is of significance. In the study of the hospitals, identifying users' critical requirements were associated with the future development of the capacity, reputation and competences and how the buildings can help healthcare services to achieve these objectives. Reflecting the process over to the core business is a smart strategy that would disregard the requirements, to a certain level, from individual perceptions. This strategy is not as expedient for office buildings since the core business strategies would depend on the occupying organization and strategies will change when a new organization leases the spaces. In the context of office buildings, the findings showed that a user involvement process for identifying needs, collecting information and structuring it in each case is necessary. In addition, it was remarked that the involvement of the core business management in the early phases of this process would be positive as some fundamental decisions can be taken before the users are involved.

VALUE PROPOSITION IN DIFFERENT TYPES OF BUILDINGS

Similarities and Differences in Owner's value proposition in different types of buildings

Life cycle thinking and considering LCC was acknowledged as an important contribution to value creation particularly within the context of hospital buildings. Although choosing efficient, long-lasting and heavy-duty solutions might increase the initial investment cost of a hospital project, it might contribute to better long-term value creation and lower LCC during the lifetime of the hospital. This element was, however, not emphasized by the respondents within the context of an office building. This can be explained by the nature of core businesses in office buildings. Businesses typically have a leasing contract with the owners, and the expenses for maintenance and operation of the buildings are included in the leasing contract. The leasing contracts usually are shorter than the buildings lifetime, and the owner can adjust the incomes based on the costs during the buildings lifetime.

FM is one of the elements of concern in life cycle thinking as it is one of the leading parts of the operation cost. The studies, especially in the context of the hospital buildings and university campuses showed that this factor is highly acknowledged in projects but is not adequately prioritized during the planning.

Another highlighted value-creating element on the strategic level is adaptability. Both hospitals and university campuses pointed out this factor as an essential contribution to value creation. The core activities in hospitals and universities are changing rapidly. This results in changing functions and increases the demand for flexibility, generality, and elasticity of the buildings. Results from the office buildings were different in this case as well. Adaptable office buildings will reduce the operation and development costs for the owner of the buildings. Therefore, considering adaptability in office buildings is strongly recommended although the users are not accentuating it as a value-creating element.

Aspects to Consider in the Planning and Design Phase

The research revealed some major aspects with regard to value creation. The literature review and the questionnaire revealed that user requirements are either related to functional needs or emotional value, meaning that the elements are either perceived as value creating because they have functional value, or they erupt a positive emotion in the user. Other factors related to the owner can also be related to either functional value or strategic performance regarding satisfying a long-term objective and effect. Owners strategies are related to the owner's intention with the project. This implies the importance of satisfying the intention of the owner through the project. The study also revealed the importance of thinking towards future identified or unidentified needs. These needs cannot be fulfilled by previous experiences and require new thinking and innovation. Hence, innovation is also one of the fundamental aspects to be addressed in the context of value creation.

Table 7 presents the aspects that should be considered in the early development of the project to maximize value creation in the operation phase of the life from both owner and user perspective.

Although the inputs and prerequisites for value creation in the early phases of the project are identified through this study, there is still a need for a systematic approach to optimizing the tactical performance of the projects. Value creating elements in the management of the projects should be identified in further research, and a structure that contributes to higher tactical performance should be suggested. LCC, FM, and adaptability are all considered as critical strategic objectives and can have significant contributions to value creation, but the tactical aspects of exploiting it is still a challenging as they are not adequately planned and implemented. This is related to project governance and management of the project towards achieving its tactical objectives and should be investigated by further research.

	<i>Hospital buildings</i>	<i>University campuses</i>	<i>Office buildings</i>
Owner	<p>Design focusing on Life Cycle Cost (LCC) – long-lasting building with low FM cost</p> <p>Important design parameters are Logistics and environmental consciousness</p> <p>Design for adaptability</p> <p>High demand for innovation, fast-changing user needs increases the demand for flexibility, generality, and elasticity of the buildings</p>	<p>Design focusing on Life Cycle Cost – long-lasting building with low FM cost</p> <p>Important design parameters are Indoor climate and comfort, areas suitable for individual work and for charring knowledge and collaboration</p> <p>Design for adaptability</p> <p>High demand for innovation, fast-changing user needs increases the demand for flexibility, generality, and elasticity of the buildings</p>	<p>Design focusing on high rent</p> <p>More focus on short-term user needs</p> <p>The inner structure of the building usually changes cyclically</p>
User	<p>Users' critical requirements were associated with the future development of the capacity, reputation, and competences</p> <p>Thinking towards future identified and unidentified needs</p>	<p>Users' critical requirements were associated with the future development of the capacity, reputation, and competences</p> <p>Thinking towards future identified and unidentified needs</p>	<p>New occupying businesses usually have other needs and requirements than the previous one.</p> <p>User involvement process for identifying needs, collecting information and structuring. Shorter time perspective than university campuses and hospitals.</p>

Table 7 Aspects to consider in the early development of the projects to maximize value creation

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