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ENHANCING VALUE FOR END USERS—A CASE STUDY OF END-USER INVOLVEMENT

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ABSTRACT

This paper explores the understanding of value in university buildings and tries to identify how value for end users can be obtained through end-user involvement in the pre-design stage of university buildings projects through a case study. The results from Statsbygg's (SB) customer satisfaction surveys from 2010 to 2014 have revealed decreasing customer satisfaction in the sector. Consequently, several lease agreements have not been renewed due to dissatisfaction with the building mass offered and lack of consultation with end users.

The results of the case study show that value-enhancing elements of university buildings in Norway create optimal conditions for teaching, learning, and research. To achieve adaptability in the building, which is needed to meet rapid changes in academia, end-user involvement in the pre-design phase, with a focus on excellent communication, an understanding of end-user value, and innovation, is valuable and necessary. This study indicates that further studies implementing strategies such as including the use of Building information modeling (BIM) tools and appointing a user coordinator with technical competence are recommended to give a better understanding of the advantages of optimal end-user involvement.

KEYWORDS

University buildings, value-enhancing elements, collaboration, end users, Lean Construction

INTRODUCTION

Statsbygg (SB) is the Norwegian government's facilities manager and fills the role of owner in public construction projects. With a total area of 800,000 m^2, universities form the largest part of SB's portfolio. In recent years, the results from SB's customer satisfaction surveys from 2010 to 2014 have revealed a decreasing customer satisfaction in the sector. Consequently, several lease agreements have not been renewed due to dissatisfaction with the building mass offered and a lack of consultation with end users.

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Additionally, a white paper addresses the fact that the university sector in Norway is undergoing significant transformation due to the introduction of new education practices and technological advances (Regjeringen, 2015). Modern, adaptable, and appropriate buildings with the focus on value creation for end users may enable the build environment to meet the standards required for achieving positive change (Regjeringen, 2015).

SB has previously implemented Lean Construction (LC) methods to increase productivity and eliminate waste in the construction phase. Ensuring value throughout the lifetime of buildings has not, however, received the same level of consideration. Value creation is the end goal of all construction projects (Emmitt et al., 2005), and the concept of value should cover the whole life cycle of the built facility (Rooke et al., 2010). Hence, a continuous effort to understand value creation for end users is essential.

This paper presents the results of research on value-enhancing elements of university buildings and tries to identify, on basis of a case study, how value for end users can be obtained through end-user involvement. It addresses the following two research questions:

1. What elements enhance value for end users of university buildings?
2. Which strategies for end-user involvement are required in the pre-design stage to enhance end-user value?

THEORY

In order to uncover what value-enhancing elements for end users in university buildings are, it is imperative to define the nature of value and value creation for end users.

UNDERSTANDING VALUE AND VALUE CREATION

Value is dependent on the theoretical context, as well as on subjective perceptions and evaluative judgments (Drevland and Lohne, 2015). Most often, value is expressed in mathematical terms as the relationship between cost and benefit (Kelly, 2007, Bell, 1994). Within the context of Lean Construction, however, arguably the most common definition is noted by Drevland and Lohne (2015) to be that of Womack and Jones (1996), who consider the real value of a good or service only to be defined by the final customer. Correspondingly, Liker (2012) defines value as what the customer wants, and customer satisfaction is identified as an important criterion for the success of a project (Kaplan and Norton, 1996). In this paper, end users are the primary focus for the analysis of value.

The industry's current understanding of value is such that it routinely fails to consider the relationships between buildings and users (Thomson et al., 2003). In the construction industry, the processes in the pre-design phase can appear to be hurried, resulting in customers' expectations being unrecognized (Bell, 1994). As a consequence of such phenomena, Hjelmbrekke and Klakegg (2013) emphasize that traditionally a building project is based on project organizations that leave the users in a half-excluded/part-included position.

Value creation in the operational phase occurs through the project's future users. Thus, the users' perspective of value is essential understand in order to to achieve value creation in a project (Eikeland, 1999). The public sector is the Norwegian construction industry's largest customer and accounts for 40% of the demand in the construction industry (Espelien and Reve, 2007). Consequently, what the public sector does for securing user value is of

high importance to the entire construction sector – and in turn for the entire value creation of the nation.

VALUE-ENHANCING ELEMENTS OF UNIVERSITY BUILDINGS

The Norwegian government states in a white paper that functional buildings can contribute to increasing the quality of higher education and improving study and work conditions study and work conditions (Regjeringen, 2015). University facilities can be depicted as learning environments, where the focus is the users that is, the students and staff, and their interaction with the built environment (Thomas, 2012, cited by Kärnä et al., 2013). The university buildings must thus support and facilitate the universities' core activities of teaching and research to contribute value. This general picture is complicated by the fact that there arestudent groups, e.g. medical students, that need different facilities from, for instance, a group such as civil engineering students. A campus, defined as land and buildings used for university-related functions, contains several facilities with different purposes and therefore different user groups (Kärnä et al., 2013).

Several student and staff satisfaction surveys have previsously been conducted to map what contributes to student and staff satisfaction. Concerning buildings' facilities, these studies have found that the important factors that influence student satisfaction with university facilities are the quality of its social areas, auditoriums, and libraries, and aesthetic aspects of the physical infrastructure (Sandberg Hanssen and Solvoll, 2015, Wiers-Jenssen et al., 2002). Kärnä et al. (2013) maintain that factors related to the facilities and the entire campus infrastructure influence the satisfaction of staff and students alike.

The organization and activities of universities change rapidly (Bygningsstyrelsen, 2013). 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 et al., 2012). Including business collaborations on campus and encouraging the businesses to find a natural place on campus and facilitating the creation of new solutions jointly with business is becomeing increasingly important (Bygningsstyrelsen, 2013).

We found little literature exploring facilities managers (FMs) as users of educational facilities or what value-enhancing elements for FMs are.

STRATEGIES FOR END-USER INVOLVEMENT

Planning public buildings in Norway is grounded in legislation and agreements stating that users should be involved in the process. This is motivated by the idea that users have an expertise that is significant for the planning of the building's functionality (Lefdal, 2015). SB's project mandate states that users must, through representatives, participate in the briefing. However, how this should be executed to create value for the end user is not clearly stated.

In general, the traditional view in the construction industry is that end-user interaction in the process is a nuisance (Arge, 2008). However, if client values are not fully understood in a construction project, it is likely to result in either low fulfillment of customer expectations or multiple design alterations during the project. Such changes typically lead to additional costs and frustration among the project participants (Thyssen et al., 2010).

Combined with a clear set of values, the briefing exercise and initial design operations can be managed in such a way as to reduce downstream uncertainty and associated waste (Emmitt et al., 2005).

Jensen (2011) found that the most important outcome of user involvement was that the end user felt a sense of ownership of the final result and that this led to buildings that suited the needs of the end users better. Therefore, it is essential that stakeholders are involved in the briefing and design processes (Thomson et al., 2003). End-user participation is of particular importance when a building project is part of a process of change within an organization (Jensen, 2006).

Major public projects in Norway are dependent on the quality assurance scheme of the government (Christensen, 2011) and government funding. Hence, there can be an extended period between the pre-design phase and the construction phase, which challenges the continuity of the participants engaged in end-user involvement (Hansen and Jensø, 2009). Also, both value and end users change over time (Drevland and Svalestuen, 2013, Emmitt et al., 2005), and value must cover the entire life cycle of the building (Rooke et al., 2010). Users that participate in the pre-design phase will therefore only be representative of future value creation in limited ways. Emmitt et al. (2005) highlight that a group of end users' objective view of best value will differ from individuals' perception of value. It is proposed that part of the problem with end-user involvement may be that end users find it difficult to define what creates value combined with the fact that value is difficult to measure (Spencer and Winch, 2009).

Lindahl and Ryd (2006) suggest that construction project teams should improve their skills in communicating and interacting with the end users. The users on their hand need to be skilled in choosing the appropriate experts or consultants for the task of translating end-user values into design criteria (Lindahl and Ryd, 2006). Hansen and Jensø (2006) found that one of the most important strategies used to improve both the planning processes and the final design has been establishing the building as a virtual model, allowing the users and the construction project team to both develop solutions and improve communication.

Emmitt et al. (2005) present a model of a simple design management tool that employs a value-based approach and incorporates Lean Construction thinking. A central element in this model is creative workshops that encourage open communication and knowledge sharing while trying to respect and manage the chaotic nature of the design process. Cooperation, communication, experience, and learning as a group contribute to the clarification and confirmation of project values. Additionally, Thyssen et al. (2010) acknowledge ways in which LC methodology facilitates client value creation in the pre-design phase, including translating client values into understandable design criteria and taking enough time to explore end users' needs and make the changes up front. Such exploration provides room for creativity and stimulates innovations.

RESEARCH METHODOLOGY

This paper presents the results of research based on a literature review, a widely distributed questionnaire, and an examination of one case, thus applying triangulation methodology used in qualitative research according to the presctiptions of Yin (2013).

The questionnaire was distributed to seven universities in Norway. It aimed at gaining views on value-enhancing elements of university buildings from three different end-user groups: students, employees, and FMs. All eight universities were selected on the basis of recently completed construction projects. We developed the questionnaire in collaboration with Statsbygg and Multiconsult. A total of 910 respondents completed the questionnaire (337 students, 541 staff, and 32 FMs). The data from the questionnaire was examined to find the relationships between end-user value and various educational facilities. The questionnaire distributed consisted of questions that asked the respondent to rank the importance of elements and facilities in the buildings.

Additionally, a case study involving one project was investigated thoroughly to find optimal strategies for end-user involvement. The university in the case study was selected because of its high response level to the questionnaire that was distributed. Construction of the new campus at this university was finished in the spring of 2014, and the pre-design phase had started nine years earlier. We were able to analyze how end-user involvement was conducted in this particular project. The study consists of ten in-depth, open-ended, semi-structured interviews with key actors, notably project managers, architects end users and FM representatives.

FINDINGS

VALUE-ENHANCING ELEMENTS FOR END USERS

The interviewees were asked to state what, in their opinion, value consisted of in the context of university buildings. Their responses indicated that value for end users is a building that creates optimal conditions for teaching, learning, and research. Additionally, the interviewees were asked whom they considered the end users of a university building to be; the responses stated that end users were thought to include students, staff, FMs, and the community. FMs, however, felt that they had not been involved to the same degree as other users in the earliest stages of the project.

The ranking of eight room functions was modeled and is presented in Table 1 and Table 2. The results were examined separately to reveal potential variances between the views of students and staff. Group/meetingrooms and studyhall/private offices are ranked as number one by students and staff respectively, and so on. The results show that the standard deviation is high, indicating individual preferences and different interpretations of what value is. In addition to the functions set out in Tables 1 and 2, several elements are highlighted as important factors for students and staff. These are as follows: a campus should be located near a city, there should be access to public transportation and bicycle parking, the opportunity for physical activity on campus, and the opportunity for interaction with businesses on campus.

Table 1: Room functions ranked from most to least important—students

Element	Mean	SD
Group/meeting rooms	2.10	1.29
Study hall/private offices	2.51	1.85
Auditorium	3.39	2.27
Library	3.44	2.05
Informal break facilities	4.10	2.23
Cafeteria	4.48	2.08
Laboratory	4.75	3.10
Workshop	5.39	3.07

Table 2: Room functions ranked from most to least important—staff

Element	Mean	SD
Study hall/ private offices	1.44	1.25
Group/meeting rooms	2.27	1.46
Auditorium	2.74	2.28
Library	3.10	2.40
Informal break facilities	3.34	2.39
Laboratory	3.40	3.31
Workshop	3.75	3.51
Cafeteria	3.78	2.73

We also examined the essential elements for FMs. The results show that access to technical rooms, easy control of technical installations, a central operation control system that controls all functions, and an effective fire and emergency evacuation plan are the most important factors for FMs.

On an organizational level, we asked the administrative staff how the building design contributes to or prevents the university achieving its primary goals on a corporate level. The design of the current university buildings in Norway does not necessarily support the achievement of each university's strategic organizational goals. We also found that the building design lacked adaptability in relation to the changes in teaching methods and new technology and resulted in an inefficient utilization of space.

STRATEGIES FOR END-USER INVOLVEMENT

The case study of one project was investigated thoroughly to find optimal strategies for end-user involvement. The university studied began processes for co-locating and fusion in 1994, moving from having institutions at six different locations to only one. The new university building is 54,660 m^2 and accommodates approximately 5000 students and 500 employees.

It was confirmed by all interviewees that user involvement was executed in line with SB's mandate. The mandate states that end users should participate in preparation of briefs. The end user should, as part of this process, describe their future organization and the specific needs that it will have.

The university appointed user-group representatives from the university board and all academic departments. A user coordinator (UC) is the project manager's (PM) contact. It is the university's responsibility to select a UC. All communication from the user to the PM goes through the UC. A UC employed in the university's construction engineering department was chosen. Several respondents noted that it was crucial for the implementation of user involvement that the UC had previous experience of construction processes and design possibilities.

It is expressed by the users that Statsbygg should have informed them that any changes in decisions they make in the course of the project after completion of the brief might have unfortunate consequences for progress and costs. The project paused from 2006 to 2009. In 2009, funding was granted. The university found that by then teaching and learning methods had evolved. So, when the engineering and design phase commenced, the brief from 2003 were found to be representative of the end users' current needs. Representatives from the university explicitly stated that they felt that it had not been communicated clearly by Statsbygg that the brief could not be changed. All parties involved expressed the view that the users were in agreement about what elements would create value. However, the length of the project acted as an obstacle in communicating value for end users since the end users had changed and technology had advanced. The users felt they were not challenged enough to be innovative with design solutions, stating that the university was built for the needs as they were in 2003, not for its future needs.

The PM and the UC determined the extent of user involvement and agreed on expectations throughout the pre-design phase, arranging workshops and meetings with the user organization and SB. However, the interviews did not reveal any specific strategies that would be implemented to preserve user value. Respondents from the project organization and the university stated that they found the communication and collaboration to be reasonable. The discontinuity of PMs and members of the user group due to the long time frame of the project led to complications in communication and the traceability of previous decisions. The university found it difficult to understand the magnitude and complexity of the project and what was required of the organization to make the right decisions.

It was highlighted by the key actors that creating a common understanding of the terminology and design solutions is imperative to understand the end users' needs and improve communication. The former facilities manager of the university expressed a need for a BIM tool that would be easy to use to demonstrate effortlessly the design alternatives discussed with the end users. One of the PMs said that trips taken to other universities in Norway helped the user groups and the SB project organization create a common ground for further discussions.

DISCUSSION

VALUE-ENHANCING ELEMENTS FOR END USERS

The literature and interviewees concur in that value is a building that creates optimal conditions for teaching, learning, and research. The results of the questionnaire show that the standard deviation is high, suggesting that there is a high level of variance in the perception of what the most value-enhancing elements are. The case study reveals that the users agreed on what elements would create value. However, the length of the project acted as an obstacle in communicating value for end users since the end users changed and technology advanced. Hence, users that participate in the pre-design phase will only be representative of future value creation in limited ways. The importance of innovation is critical. The literature supports the view that value is dependent on subjective perceptions and that both value and customers change over time. Even so, 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 very important.

The inappropriate design of current universities' buildings in Norway counteracts adaptability. The importance of adaptability in buildings is emphasized in the literature, as the spaces in a university should be used in different ways to adapt to the development of technology and the learning landscape. It was discovered in the case study that more time spent on innovative design in the pre-design phase might contribute by creating an ability to adapt to the changes that could take place at the university in the future.

The literature shows that FMs were only to a limited degree included in the pre-design process. We found no studies exploring FMs' value perspective. The case study reveals that FMs were not automatically considered as a distinguished user group, resulting in the disregarding of solutions for facility management. However, more research is necessary to draw full conclusions in this respect.

STRATEGIES FOR END USERS' INVOLVEMENT

Both the theoretical framework and the case study indicate that communicating using the same terminology, translating client values into understandable design criteria, and creating a common understanding are important for successful end-user involvement. Establishing the building as a virtual model as a basis for discussion and taking enough time to explore end users' needs and make the changes up front can contribute to fewer changes being made after design and construction starts, avoiding negative consequences for progress and the cost. Engaging the users in creative workshops with a clear agenda of preserving user value, as presented as a design management tool in the literature, can contribute to clarifying and confirming values further. The case study indicates that a UC with previous experience of the construction industry was crucial to achieving communication and interaction between the actors and end users, raising the question of whether there is a need for a technical coordinator or an academic process leader to succeed with end-user involvement, as the literature suggests.

It is important to note that it is hard to generalize the findings, due to the fact that the study is based on end-user involvement in one project only and the distributed questionnaire received an uneven number of responses spread among the chosen universities.

CONCLUSION AND FUTURE RESEARCH

The results show that value-enhancing elements of university buildings in Norway enable the creation of optimal conditions for teaching, learning, and research, including special rooms like workshops and laboratories. End-user involvement in the pre-design phase, with the focus on good communication, understanding end-user value, and innovation seem to be necessary to achieve the adaptability in the building that is needed to meet rapid changes in academia and different views of value among the end users.

The research identified the importance of having strategies, including the use of BIM tools, design management tools for user involvement, and appointing a user coordinator with technical competence, to aid communication between parties in the process, hence

possibly enhancing value throughout the lifetime of the building. Even though the most significant obstacle found was the length of the public project, the case study illustrates that increased focus on end-user needs could improve the project's success. However, it appears that the competence of the user coordinator was of major importance.

Further research and implementation of the strategies used to achieve end-user involvement may give a broader understanding of the advantages of optimal end-user involvement. It is also important that the lack of facilities manager involvement is studied further in order to enhance value for both the end user and the owner.

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