

# THE VALUE FLOW OF A WORKPLACE IN CONSTRUCTION PROCESS – A CASE STUDY

Tuuli Luoma<sup>1</sup> and Seppo Junnila<sup>2</sup>

## ABSTRACT

Lean construction papers have shown a great deal of interest in project management and delivery. However, the end-customer or tenant perspective has not yet been emphasised similarly in the lean construction literature. This paper focuses on end-customer value creation in construction projects. The specific focus is on workplace creation through the construction project. The purpose of the paper is to assess how the end-customer value is managed in a workplace construction project. The end-customer value and the value flow of a workplace creation project are analysed through value stream mapping in a descriptive case study. A generic map of value creation with the utilised investment management process is constructed according to the documents of the case, semi-structured interviews, and questionnaires.

The value stream analysis showed that a workplace project can potentially produce significant additional value for the end-customer, but inadequate value management during the investment process can waste the potential. The studied investment management process was found not to support value management; instead it focused heavily on optimising the delivery and managing the investment costs of sub-processes. In order to enhance the end-customer value creation in workplace construction process the role of value stream management needs to be highlighted along with delivery.

## KEY WORDS

value production, value management, workplace creation, case study

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<sup>1</sup> Researcher, Real Estate Business, Aalto University School of Engineering, PO Box 11200 FI-00076 Aalto, Finland, Phone +358 50 594 6727, tuuli.luoma@aalto.fi

<sup>2</sup> Professor, Real Estate Business, Aalto University School of Engineering, PO Box 11200 FI-00076 Aalto, Finland, Phone +358 50 511 5816, seppo.junnila@aalto.fi

## **INTRODUCTION**

Lean construction papers have shown a great deal of interest in project management and delivery. According to Alves and Tsao (2007) the top three focus areas (c. 20% of the papers) during 2000-2006 in lean construction have been (1) project management, (2) design management, and (3) costs, performance measurement, and implementation. The value and customer themes have a surprisingly low share of 3.8% of all the papers (Alves and Tsao 2007), although it is one of the primary features of lean (e.g., Liker 2004; Hines et al. 2008; Morgan and Liker 2006)

This study uses lean approach to assess the end-customer value creation of a typical workplace construction project in Finland. Since the role of workplaces has been highlighted in the rapidly changing business environment, both the academia and the business have shown a great interest to understand the potential of workplaces. The undergoing digital revolution has even brought more attention on the subject. Schriefer (2005) even stated that organisations, which ignore the changes in work environment, work patterns, and workforce, will likely confront problems in the future.

The paper is divided into four sections. First the theoretical background of the customer value, value creation, and the value of a workplace is discussed. After this the used method, data collection, and background information of the case are presented. In the third section the results are illustrated and visualised through a generic value stream map, the sources of the discontinuations in value management are listed, and potential ways to improve the value creation are discussed. Finally, the conclusions are drawn and future research suggested.

## **THEORY**

### **CUSTOMER VALUE AND ITS CREATION**

Value is a complex and broad concept. According to Salvatierra-Garrido et al. (2009), the definition and understanding of value changes according to the project features and authors' perspective and, thus, a widely used definition of value is not established. Value is often associated to issues such as product or service features, exchange, costs, quality, and design (Salvatierra-Garrido et al. 2009, Erikshammar et al. 2010) and increasingly value is also linked to the sustainability in terms of economical, social, and environmental contexts (Bee and Kim 2007, Huovila and Koskela 1998).

The subjective nature of value has been accepted in lean and non-lean literature. The customer value is seen to be defined by the customer, not by the service provider. Value has been recognised to be a dynamic concept and, thus, the customer value changes over time. (e.g. Khalifa 2004, Emmitt et al. 2005, Salvatierra-Garrido et al. 2009). Khalifa (2004) even states that customer value is the source of all other values. According to lean, customer value should be identified in order to recognise what should be produced and what should be eliminated (e.g., Liker 2004; Hines et al. 2008; Morgan and Liker 2006). However, despite of the connections between value and waste, simply eliminating the waste from the process does not mean that the customer value is captured (Koskela 2000, Salvatierra-Garrido et al. 2009)

In lean, products and services are designed to bring the maximum value for the end-customer (Ballard et al. 2001). Koskela (2000) originally presented three production concepts, called TFV theory, that have different approaches to value:

concepts of transformation, flow, and value generation. In the concept of transformation the focus is not on the customer value; it is on the transformation of input into output through independent sub-processes, which are optimised separately. In this concept the underlying assumption is that the customer value is related to the value of the input: by having high-quality and expensive materials the value of the output increases. In the second concept the focus is on flows as the name indicates: how to create a flow by eliminating the non-value-adding activities of the production. In this concept the idea is to create as little unnecessary customer value as possible. In third concept the focus is on value management and the goal is to ensure that customer-defined value is created. (Koskela 2000).

In the use of the three concepts, the balance, integration and synergy between the concepts should be taken into account and the weight of the concepts in different situations is not necessarily the same. The management of the concepts is suggested to consist of three parts: contracts, processes, and value are managed independently but in co-ordination (Bertelsel and Koskela 2002). Another challenge is the fundamental ontological differences between the transformation concept, and flow and value concepts, but coherence between the concepts might be achieved by reinterpreting the transformation concept to match the process-based understanding of the production as Koskela et al. (2007) presented.

#### **VALUE OF WORKPLACE**

The role of the real estates, premises, and spaces has been transformed from a necessary cost to a support function of the organisations. For example, Krumm et al. (1998), Krumm and Vries (2003), Appel-Meulenbroek and Feijts (2007), and Lindholm (2008) have identified the added value of real estate for organisation's core business: it can decrease costs and increase the value of assets, employee satisfaction, and flexibility, to name a few. An efficient workplace supports also knowledge sharing that will enhance productivity, quality and innovations (Schriefer 2005). In addition to the physical space, value can also be created through virtual and social space (Nenonen 2005). Especially Joroff (2002) has highlighted the role of virtual spaces: digital technologies change the traditional way of thinking of how, when and where the work is done. This means that the way the value is created by the employees needs to be supported by new workplace solutions and opportunities, and, thus in this paper the focus is on service related to workplace change and management. The value of the workplace has been identified to be created on three levels, and similarly in this selected case service (see next section) there are three levels to generate the value.

First, throughout the history, efficiency and productivity have been the driving forces for workplace change and value creation (Bell and Joroff 2001). Similarly in Koskela's (2000) transformation concept the driver has been the efficiency of the production and, thus, cost minimisations. Second, organisations have become aware of the alignment of space and work: the physical aspects of workplaces have been matched with the work (Joroff et al. 2003). This idea has a similar core idea as in the flow production: to build up a workplace that supports employees' core activities by reducing the elements that cause non-value-adding activities such as interruptions and lack of interaction. Joroff et al. (2003) continue that the cost minimisation and alignment of space and work are not enough; so called agile workplaces have been recognised to be the next level in workplace evolution. In the agile workplace the

continuous improvement of the work and the place, in which the work is done, is possible. As Joroff et al. (2003) stated it *workplace becomes an integral part of work itself*. By using the terms of Koskela's (2000) value generation concept this means that in agile workspace the aim is to eliminate value losses continuously.

## **METHOD - CASE STUDY**

Due to the exploratory nature of the study, a single detailed case with a service provider and end-customer was selected for the study. The focus is on the service provider's processes: how the value is managed through the investment management processes to generate value for the end-customer. First, the customer value was identified, and then a generic model of value creation for the case has been formed with value stream technique. After this the discontinuations in the value creation have been analysed through investment management process and improvement potential discussed.

## **BACKGROUND OF THE CASE**

In this case the service provider is one of the largest property asset managers in Finland and it acts like an active owner. The service provider is a public organisation and, thus, it is under the public procurement when buying goods and services. The end-customer, who is the tenant, is a large research organisation that occupies office and research premises in several cities in Finland and, thus, has a strong corporate real estate unit. The service provider purchases some of the services for the end-customer but the end-customer also purchases some services by itself.

The selected case service, called strategic workplace management (SWM), is structured according to the levels of Joroff et al. (2003): efficiency, alignment, and agile workspace. The aim of the service is not only to provide workplace solutions but also to support the organisation's core strategies and activities. SWM service is used in all kind of processes that are related to investments. Small repairs, such as modifying one large meeting room into two, are not included in the SWM services but handled by the end-customer according to the agreed procedure. In the value creation process external consultants conduct the workplace study, but the service provider's task is to manage the strategic workplace changes and, thus, to manage the value of the workplace through the investment management process. The studied value stream begins in its current form when the service provider receives a request of needs from the end-customer and ends when the change has been made and is being maintained.

## **DATA COLLECTION**

The data was collected through semi-structured interviews, memos, agreements, and other documents. Altogether 32 interviews or meetings were conducted in the case. First, a total of 13 interviews were made to identify the customer value of the end-customer. Then, 3 general interviews were done to understand more deeply the selected service, customership, and organisation structures. The generic model was formed based on 12 interviews with those people who were involved in the value creation process: 9 interviews at the service provider's side and 3 interviews at the end-customer's side. The saturation point was achieved by interviewing people with similar tasks. The results of the last 5 interviews or meetings serve as secondary data for this study, since they focused mainly on practical arrangements of the case such as planning a workshop or defining the case's timetable. The workshop, which was also

visited by the end-customer, was arranged with the case's service provider in order to validate the findings from the interviews and to create ideas for enhancing the value generation.

### **DATA ANALYSIS**

Value creation interviews were analysed through coding. After the data was collected and reviewed, coding was implemented through 5 perspectives according to the research aim: search of process elements (such as wastes, process flows, turning points), roles and social structure, strategies and tactics, ways of thinking to understand the interviewees assumptions behind the statements, and elements of surroundings to understand the larger context (after Miles and Huberman 1994). 10 major themes were composed of the coding, and relationships and trends were found.

### **RESULTS**

Next the results of this study will be presented. First, a generic map of value creation of SWM service through investment management process is described and visualised. Then the discontinuations in the value creation are mirrored towards the concepts of production: transformation, flow, and value generation. Finally, the key ideas against discontinuations are presented.

### **DESCRIPTION OF THE CURRENT VALUE STREAM**

The investment management process, in which the value of SWM service is created and managed currently for the end-customer, can be divided into several sub-processes, which all consist of sub-sub-processes. A simplified version without detailed sub-sub-processes of the investment management process is illustrated in Figure 1.

The beginning of the investment management process, in which hidden or clear requests from the end-customer's values are received, is structured through an interface with the end-customer: on the strategic level, the service provider constantly processes the requests and other information and aims for proactive response. Requests from the end-customer might not always be clear due to the changing needs, poorly defined goals, or poor communication. Strategic workplace requests that require action are first discussed inside the service provider's organisation and the potential of the possible solutions and their realisation are estimated in the long term before approaching the end-customer.

If the service provider and the end-customer find a common long term solution, the strategic goals for the project can be defined. After this the actual workplace study can be done. An external consultant, who is selected through a bidding process, conducts the study on the agreed level with the end-customer, but the service provider manages the process. Along with the workplace study, other studies, biddings, etc. are arranged by the service provider.

After all material and information is available, the program and a feasibility study for the project are prepared by the service provider. The draftsman of the documents should take into account also the results of the workplace study. Then one person prepares an investment proposal and another one makes the decision. The decision-making process of the end-customer is not illustrated here because the focus in this study is on the service provider's process. When the proposal has been accepted, the project has an agreed schedule, costs, and quality levels. These goals are aimed to be

achieved during the rest of the process.

The service provider selects the designers etc. through another bidding process and steers the design phase. After the design phase is completed, the service provider can select the contractor(s) through a third bidding process. After the renovation or construction phase, the premises are inspected by the service provider and then handed over to the end-customer. When the end-customer is in the premises the maintenance period has started.

During the maintenance period the service provider purchases a post evaluation study (POE) to assess if the workplace meets the set goals. In addition, during the maintenance period another annual customer satisfaction survey is conducted by the service provider. The end-customer has its own move management system. End-customer and service provider handle together work orders in maintenance issues depending on the divided responsibilities in the lease agreement. Small workplace renovations are usually conducted by the end-customer as individual projects.

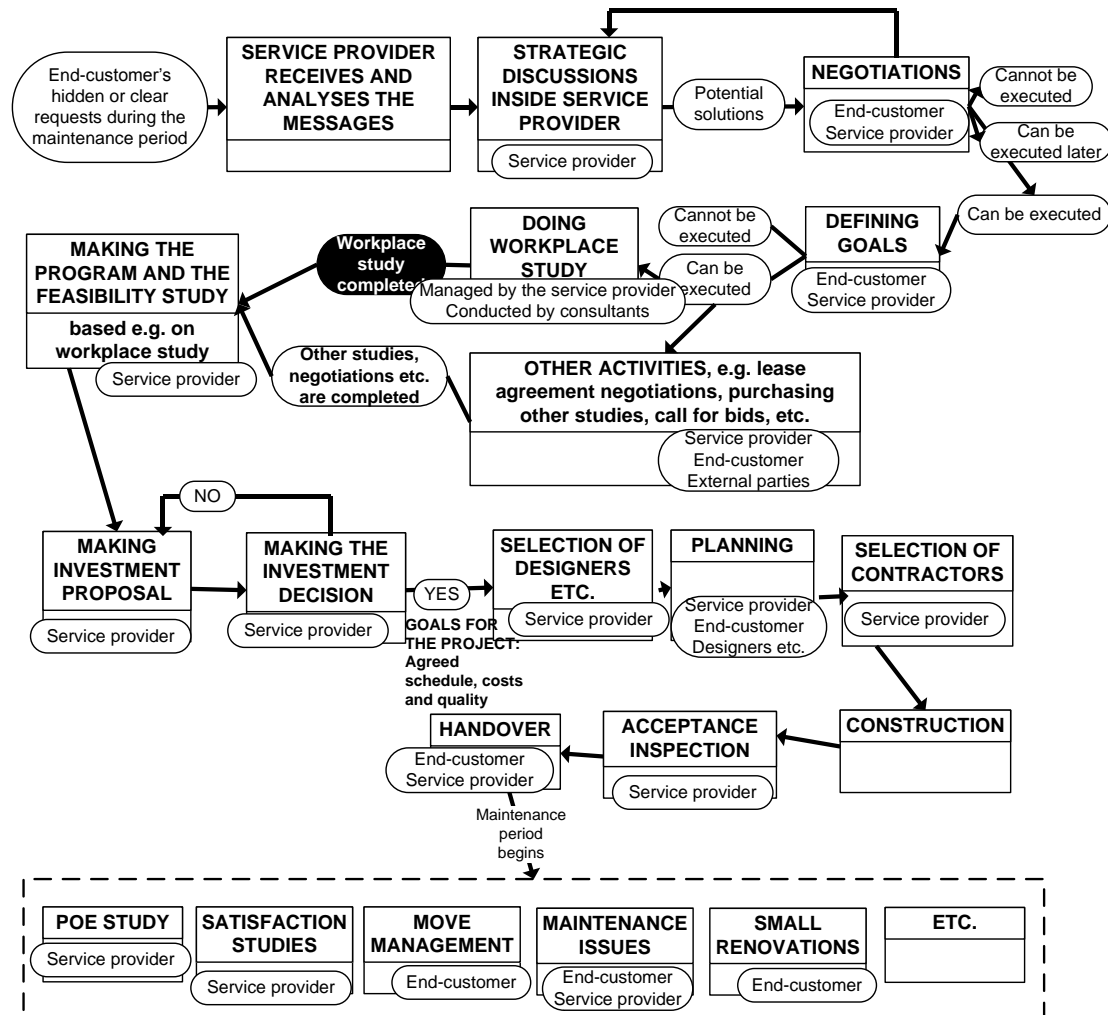


Figure 1: A generic model of the value production.

## THEORETICAL ANALYSIS OF INVESTMENT MANAGEMENT PROCESS

In the case value management is especially taken care of in the beginning of the investment management process on the strategic level: the service provider has invested on its interface to the end-customer especially on the strategic level. Through this interface the communication has been made easy and information is delivered.

Even though the value losses in the case are eliminated at the beginning of the process, there is no mechanism that ensures that same kind of approach is applied in the rest of the sub-processes. Therefore, the value management may be cut down to remind flow production or even transformation production. This is typical in construction and real estate processes. A large number of people, end-customer's changing needs, public procurement, etc. all mislead the value creation. Next, the main reasons that create discontinuations in the investment management process in the case are discussed (Table 1).

Table 1: Discontinuations in the value creation in the case

Value creation...	What this means in the case?	Outcome
...is organised around people with tasks	<ul style="list-style-type: none"> <li>- People optimise their own sub-processes</li> <li>- The responsible person changes while the process goes on</li> <li>- Separating strategic and operational levels e.g. separating decision making and doing</li> </ul>	<ul style="list-style-type: none"> <li>- The whole value creation is not optimised</li> <li>- Tacit knowledge is not transferred</li> <li>- The amount of sub-sub-processes increases and the process gets longer</li> </ul>
...approach is changed during the process	<ul style="list-style-type: none"> <li>- First the approach is to create value for the end customer by workplace. At the end the aim is to achieve the goals of the investment decision (costs, schedule and quality).</li> </ul>	<ul style="list-style-type: none"> <li>- Planned issues are delivered</li> <li>- Planned issues ≠ end customer's value</li> </ul>
...is built through outsourcing	<ul style="list-style-type: none"> <li>- Outsourced sub-processes are managed by separate people</li> <li>- The importance of purchasing know-how increases</li> </ul>	<ul style="list-style-type: none"> <li>- Instead of integrating the sub-processes, only results are integrated</li> </ul>
...is handed over for the end-customer	<ul style="list-style-type: none"> <li>- Service provider can evaluate the use of workplace</li> <li>- The workplace can be misused</li> </ul>	<ul style="list-style-type: none"> <li>- The value of a workspace can decrease</li> </ul>

First of all, the investment management process in the case is organised around people with tasks and, thus, the person who is in charge in the value management changes approx. 3-4 times in the process. This creates e.g. lack of information to eliminate the value losses. The more the tasks are separated, the more sub-sub-processes are generated. In addition, people with separate tasks lead to optimising the sub-processes or sub-sub-processes as in the transformation concept. Optimising one part does not necessarily lead to a better outcome. For example by optimising the work of the workplace consultant and the actual planning as separate processes does not necessarily enhance the whole value production. Second, the value generation approach at the beginning of the process is changed in the case because the goals, which are set in the investment decision, encourage implementing the transformation and flow process approaches; the focus is on costs, schedule, and quality. According to the case interviews, if all the goals cannot be achieved, the quality is vulnerable for adjustments. Third, most of the sub-sub-processes are purchased through bidding process. The integration of the purchased services as one service might be challenging

in the current value production due to the separate responsibilities among the sub-sub-processes. This can lead into a situation, in which only the results are integrated and some value might be lost. Fourth, during the maintenance period the value management is handed over to the end-customer because the service provider has little power if any to impact on how to use the premises. It is possible that in some cases the value of the workplace will deteriorate by a significant level because the space is not used according to the original plans. For example a small change, which is not linked to the workplace study, can have a negative impact on the whole working environment, and the employee satisfaction and their experienced productivity. These four issues that cause discontinuations in the case usually do not emerge alone and the problems will pile up and cause more waste.

### **RESULTS OF THE VALUE WORKSHOP**

The discontinuations in the value creation were further discussed in a two day value workshop with the service provider and tenant. The first steps to improve the value creation were developed and introduced for the investment management process. First, the workshop results suggested that the studied SWM service should be used continuously as a strategic planning tool throughout the investment management process in the interface for the customer and inside the service provider. This would enhance the value creation by reducing unnecessary steps. In the current value creation the strategic role of the SWM service is not fully utilised. Second, to optimise the whole investment management process and not just the sub-sub-processes, value manager' task is needed to make the process flow: to maintain the information, integrating the sub-sub-processes, showing the link between defined customer value to the goals of the investment decisions, etc. Similarly external consultants and designers should be aligned with the value flowing process from the beginning to the end. Finally, the visible presence of the service provider in the maintenance could be one way to secure the value creation also in the maintenance phase.

### **CONCLUSIONS**

The starting point in lean is to provide customer-defined value. More customer value can be achieved by viewing production as fulfilling end-customers' needs and expectations. From end-customer or tenant perspective the focus in value generation can be seen in a broader context than project management and delivery. For end-customer the workplace solutions can create value by ultimately influencing their core activities and performance.

In this paper, it was assessed how the end-customer value is managed in a workplace construction project. The generic map of value creation of SWM service through investment management process was visualised based on the interviews and other material and analysed towards the concepts of production: transformation, flow, and value generation. Four reasons that create discontinuations in the investment management process were found: the way the value creation is organised, the changed value creation approach during the process, building the process through outsourcing, and handing over the value creation for the end-customer without control.

If the value management in the investment management process faces a lot of discontinuations, value losses are evident. In some cases the value of a workplace can even deteriorate due to the unmanaged process. Of course there are external factors



such as organisational changes that might be difficult to manage from the service provider's side. However, in general, the strategic workplace management has a huge potential to generate value for the end-customer because it aims to eliminate value losses in the context of the workplace. The attention that has been paid for the strategic workplace management, such as developing the role of the value manager, creates a firm base to develop the value production further.

In the future research, methods for evaluating the level of value losses of workplace would bring deeper understanding on the issue. In addition, the suitability of the key innovations in lean and lean construction to value management of workplace could also be studied on a more detailed level.

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