

# VALUE ADDING RESOURCE CONSUMPTION AS PERCEIVED BY A CLIENT: A CASE STUDY

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## ABSTRACT

Ineffective, unproductive and expensive are adjectives that increasingly have become associated with the Swedish construction industry. Measures taken to remedy the situation have been widespread and the industry has lacked a common understanding of the origin to the perceived deficiencies. Rarely have the contribution to the design of a building from consumed resources been assessed in retrospect.

The scope of the conducted case study covered the brief and design phases of a Swedish construction project. The resources used were mapped through a documentary data collection and interviews with the client, a contractor and the city planning office. There were three categories (directly value adding, indirectly value adding and not value adding) to which time consumed by resources was allocated during interview.

A summarised assessment over time of the consumed resources constituted a part of the result. The hypothesis that qualities that potentially could be considered valuable by the client were continuously added throughout the brief and design phases was tested and proven false. The study revealed that the client regarded only short periods of time as having been directly value adding. In turn separated by long periods of time where the client only saw small amounts of value adding time. In total the scope of the study covered 17,040 worked hours. 17 % of these were regarded as having been directly added value by the client. Out of which 78 % took place during 27 % of the time.

## KEY WORDS

Value, Value creation, Brief, Design, Client perspective, Resources.

## INTRODUCTION

A negative development of the reputation of the Swedish construction industry has been attested in literature and governmental reports. Finansdepartementet (2002) stated that construction is an industry displaying low productivity development, high costs, low quality and low profitability. Simu (2007, p. 1) described the industry as suffering “from poor performance and a lack of control in various stages of the process”. While efforts have been made to investigate the origin of the industries perceived deficiencies, e.g. Josephson and Saukkoriipi (2007), little of the research has focused on identifying the contribution made by each project participant.

A decision to initiate a construction project is reasonably “rooted in a wider set of beliefs of how the firm competes”, i.e. the business strategy, and expected to increase its profitability (Bowman and Ambrosini 2000, p. 3, Thomson, Austin, Devine-Wright and Mills 2003). Furthermore, the business strategy “defines what the project must deliver to be successful” (Thomson et al. 2003, p. 340). However, as specialisation within the Swedish construction industry has increased steadily since

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the early 20<sup>th</sup> century, clients may have found it increasingly difficult to assure that a project progresses in line with the business strategy as intended (Nordstrand 2000). That clients, according to Finansdepartementet (2002), have lost strength within technical and legal issues only strengthens the argument. If competence, and hence the ability to cope with uncertainty, have found new carriers the power balance within project organisations may have shifted (Clegg, Kornberger and Pitsis 2005). This may have lessened the influence exercised by clients during the projects. Firstly upon completion of a construction project is a client able to assess the value received in relation to the value needed, an assessment that is influenced by the values held by individuals (Bowman and Ambrosini 2000, Thomson et al. 2003).

While there are numerous representations in literature of construction project progression there is a lack of research on the client's perception of the same progression. Commonly, construction projects are described as relay-races depicted by adjoining arrows, in which each arrow represents a separate phase (e.g. Nordstrand 2000, Nordstrand and Révai 2002, Sporrang 2006). A construction project can also be seen as a dynamic and continuous reduction of uncertainty over time (e.g. Winch 2002). Together these two types of illustrations can be interpreted as portraying continuity in project progression and in uncertainty reduction. The focus of this study has been on elucidating the clients understanding of project progression. Thomson et al. (2003, p. 334) have argued that "the construction industry needs to engage stakeholders in a dialogue of value delivery to understand what they need from their products". This study could serve as a basis when discussing the alignment between the services offered by the construction industry and the needs of the client. The studied hypothesis was that qualities that potentially could be considered valuable by the client were continuously added throughout the brief and design phases.

## **LITERATURE REVIEW**

In line with Winch (2002, p. 5) investments in construction can be regarded as value adding since "they create something where there was nothing, create new assets to be exploited for private benefit and public good". However, value "is not a measurable product attribute" but an assessment of product qualities (Thomson et al. 2003, p. 337). The amount of value assigned to a product can be said to depend on the extent to which it meets the needs of a customer (Bowman and Ambrosini 2000). Even so, "objective interpretations of value are commonplace" as monetary amounts, i.e. prices, are assigned to products (Thomson et al. 2003, p. 337). Price is seen as objective as it is based on "the relationship between benefit and expense", while had the assessment been based on values held by an individual it would have been considered an subjective interpretation of value (Thomson et al. 2003, p. 339). However, the price of a product is not solely set on the basis of a products capability to meet the needs of a customer. It is also determined by the relative power balance between buyer and seller, in turn affected by the to a varying degree imperfectly competitive factor market (Barney 1986, Bowman and Ambrosini 2000). Purchasing decisions are no longer considered rational, as the economic man has come to be regarded as an simplification, decisions are commonly seen as based on expectations (Bowman and Ambrosini 2000, Eklund 2004). During design "value is envisioned" by the client, based on expectations the client assigns a value to the future asset, however, it is not until construction works are completed and the building is handed over that these expectations are replaced by an assessment of the actual building (Thomson et al. 2003, p. 340). Nevertheless, when a sale takes place, the value realised in the form of an monetary amount is called exchange value (Bowman and

Ambrosini 2000). In a real estate context it has been defined as the “amount the property is realistically likely to sell at in the open market” by Miller and Geltner (2005, p. 252) and as the “open market price of a building” by Thomson et al. (2003, p. 338).

Neither exchange value nor costs for production represents the value acquired by a client when commissioning a building (Aniander, Blomgren, Engwall, Gessler, Gramenius, Karlson, Lagergren, Storm and Westin 1998, Bowman and Ambrosini 2000). Instead, the value created in a construction project can be considered two-dimensional, the first dimension being exchange value and the second dimension being perceived use value (Bowman and Ambrosini 2000, Miller and Geltner 2005). The latter represents a subjective valuation of the amount of utility or the functions in a building by a client (Aniander et al. 1998). In a real-estate context, it was defined as the most productive use of a property identified by a prospective buyer by Miller and Geltner (2005) and as the “value of a building to the organization performing activities within it” by Thomson et al. (2003, p. 338). In a general context it was defined as “the specific qualities perceived by customers in relation to their needs” by Bowman and Ambrosini (2000, p. 2). While similar to the definition of quality by Thomson et al. (2003, p. 337), “the quality of a product is an assessment of how well its qualities (that is its features or attributes) meets the customer’s needs”, the latter lacks the subjective valuation underpinning the definition by Bowman and Ambrosini (2000). It becomes evident though that the perceived use value of a product is based upon the qualities of a product in relation to the needs and perception of a client or customer.

The project stakeholders “determine the functional, physical and symbolic product characteristics that are necessary to achieve customer satisfaction” (Thomson et al. 2003, p. 334). According to Aniander et al. (1998) product development should begin with these product characteristics, and if so, any improvement to that process would make the development more cost-effective. In construction product development is commonly resembled to a relay-race (Sporrong 2006). Carried out by a temporary organisation, their first task is to identify the needs of the client during the brief and to thereafter specify a product, i.e. a building, that meets those needs during design (Nordstrand 2000, Winch 2002). The brief is intended to lower the level of inherent uncertainty in the project, partly through various investigations but also through frequent interaction in-between the participating actors, including the municipality (Nordstrand 2000, Winch 2002, Sporrong 2006). The temporary organisation commonly consists of the client, a project manager, an architect, consultants, specialists and occasionally future tenant representatives (Nordstrand 2000). The process results in a building programme that should include all known conditions and requirements affecting the building while reflecting what the client values and serving as an input to the client’s decision of whether or not to proceed (Nordstrand 2000, Nordstrand and Révai 2002, Thomson et al. 2003). If the client decides to proceed, design commences, commonly divided into three phases: concept design, scheme design and detailed design, successively lowering the level of uncertainty and increasing the level of detail (Nordstrand 2000, Nordstrand and Révai 2002). The objective of the design phase is to design a building that meets all the requirements presented in the building programme while adapting to the known conditions and avoiding collisions in the design (Nordstrand 2000, Winch 2002). Throughout the process the consultants deliver proposals to the client as to acquire additional feedback and approach a solution to the problem (Winch 2002).

While “a firm’s resources at a given time could be defined as those (tangible and intangible) assets which are tied semipermanently to the firm” it is only the members of the temporary project organisation that are able to create value for the client (Wernerfelt 1984, Bowman and Ambrosini 2000, p. 172). Yet, “construction is essentially a service industry”, meaning that neither consultants nor contractors sell results or products but a capability to produce those (Bowman and Ambrosini 2000, Winch 2002, p. 181). This capability though is uncertain as “performance varies from staff member to staff member” (Bowman and Ambrosini 2000, Winch 2002, p. 182). Peteraf (1993, p. 180) described these “productive factors in use as having intrinsically differential levels of ‘efficiency’” which can be manifested in their varying ability “to meet customers’ needs” (Bowman and Ambrosini 2000, p. 2).

Based on the aforementioned arguments (the influence of the power balance between buyer and seller on price, the imperfectly competitive factor market, the influence of expectations on early assessments of value and the varying performance of labour) exchange value and costs for production are seen as unfit determinants of value. The reasoning is supported by Bowman and Ambrosini (2000, p. 4) who stated that “exchange value is not transferred into the organization’s production or distribution process, only use value is”. To clarify, a client receives use value equal to the amount perceived. The use value available for a client to perceive will be found in the qualities of a building, and these qualities exist as a result of the use of human labour to whom value creation is attributable.

## **METHOD**

The object of this case study was the brief and design phases of a five-storey office building to be constructed in Gothenburg. As it was conducted detailed design was being finalised. The study was designed so that it would test the hypothesis and extract the client’s assessment of the resources consumed throughout the studied phases.

Interviews guided by an aide-mémoire were held with the client, the contractor and the city planning office to gain an increased understanding of their roles in the project. As the city planning office included many sub organisations, each of the following were interviewed once: the surveyor, the plan architect and the building permit administrator, all assigned to the project. As “the generation of an intensive, detailed examination of a case” was sought for each interviewee was instructed to describe the sequences of the project from their organisations point of view (Bryman and Bell 2007, p. 62).

To construct a timeline of past events in line with Bryman and Bell (2007) documents produced, acquired and received by the interviewed organisations were studied. These documents included invoices received by the client, minutes from meetings held by the project steering committee, a diary for the registration of property, records of the hours allotted to the project by the plan architect and the contractor and a copy of the granted building permit. With these documents and interviews it was possible to map the use of resources throughout the studied phases of the project. Daily averages, based on the period of data, of the hours consumed by each resource were calculated and plotted in graphs ranging from January 1 2008 to October 31 2009. Descriptions of the kind of services acquired by the client were added based on the interviews and literature.

As nearly all of the resources consumed throughout the studied phases were mapped and descriptions of each were added it was possible for a representative of the client to assess the extent of each resource’s contribution to the project. Based on the

stated arguments cost was disregarded and time served as a basis for this assessment. This enabled the representative to focus strictly on the contribution made by each resource without taking its associated cost into account. The evaluation took place during interviews in which the representative was instructed to also further elucidate the kind of contribution each resource had made. It was designed so that the representative allocated time consumed by the resources to three different colour-coded categories. The assessment was based on the premise that, in line with arguments by Thomson et al. (2003) and Bowman and Ambrosini (2000), all value created throughout the studied phases could be found in the qualities, that was the designed features and attributes, of the building. Therefore, there was no definite amount of value assigned to neither the building as a whole nor any specific attribute or feature of it. By doing so the study was also able to circumvent the argument by Thomson et al. (2003) that clients are incapable of evaluating a building prior to its completion. The three categories to which time consumed by the resources was allocated were: light grey, dark grey and black.

Time that was consumed by a resource producing a feature or attribute that at the time of the study could be found in the design of the building was represented by the colour light grey. The category though, also included preceding work that had led up to the final design. Time consumed by resources belonging to this category was termed directly value adding. This since, in line with Bowman and Ambrosini (2000), use value has been created if the consumed resources result in a feature or attribute of the design, however, the final assessment does not take place until the client receives the finished facility. Up to that point it remains uncertain whether or not the client perceives it as use value or not.

Time that was consumed by a resource to make the project feasible, however, without producing a feature or attribute that at the time of the study could be found in the design of the building was represented by the colour dark grey. Allocated to this category was time consumed to either enable a subsequent step, to comply with requirements by authorities, to enable the use of current methods (Saukkoriipi 2005), to bring the design of the building forward without being a part of it or time that could not have been removed without having affected the perceived value acquired by the client. Time consumed by resources belonging to this category was termed indirectly value adding.

Time that was consumed by a resource without affecting the project was represented by the colour black. The result of the consumed resources belonging to this category either came to be scrapped or re-worked and time consumed by resources belonging to this category was termed not value adding (Bowman and Ambrosini 2000, Roper 2003).

## **EMPIRICAL FINDINGS**

Although the project had existed within the client organisation prior to the period covered by the scope of the study, it was not until January 2008 that an architect and a project manager was hired, followed in February by a structural engineer and in March by a heating, ventilation and plumbing consultant and an electrical engineer. During an interview the client described how the architect had been given the mission to design a building “that was about 4000 m<sup>2</sup>, would connect two adjacent buildings and have a striking design”. That several conceptual suggestions were produced prior to the brief ending at March 31 greatly affected the clients assessment of the work conducted as only 20 % was considered directly value adding, the remaining 80 % was considered not value adding. The 20 % represented the client’s assessment of the

time spent by the architect producing the conceptual suggestion that came to be adopted. On February 8 the client applied for a change in the municipal detailed development plan as the site on which the building was to be constructed was a public square.

During the two subsequent months a soil mechanics engineer, an acoustician, a telecommunications consultant and an environmental consultant was added to the project group that were occupied with a first, simplified, version of schematic design finalised on May 31 2008. Initially the soil mechanics engineer relied on previously available information, but as this proved to be unreliable once drilling began, a large quantity of work came to be scrapped. This was reflected in the clients assessment of the time spent as 50 % was considered to have been indirectly value adding and 50 % was considered to not have been value adding. A large part of the work functioned as the basis for design of the foundation. However, as no suggestions were made from the soil mechanics engineer the client did not regard the efforts as value adding.

Approaching summer the extent of the project teams' engagement was reduced until the end of July where it picked up again as efforts to develop a deepened schematic design were increased (see Figure 1). This deepened schematic design also formed the basis for tender documents received by contractors on September 26. The procurement was subject to the Swedish Public Procurement Act and an open-competitive tendering process was chosen by the client. There were six contractors that supplied tenders, as these began working the project teams' involvement in the project decreased substantially. Tender documents were due to the client on November 27. In total only 2,5 % of the time spent by the contractor during this tendering period was considered to have been directly value adding, this in turn represented 75 % of the time the structural engineer hired by the contractor spent on developing an alternative tender that later came to be adopted by the client. 25 % of the time was estimated to have been indirectly value adding and 72,5 % was considered not value adding.

Tender documents were then examined, processed and balanced by the client aided by the project manager throughout January and February 2009. However, once the client had awarded a contractor the contract the project was efficiently put to halt until late April as a competing contractor appealed the awarding process. This greatly affected the clients' assessment of the work conducted by the hired project manager. During March and April 90 % of the time spent was considered as not having added value. The remaining 10 % was considered to have been indirectly value adding.

On January 16 the client had applied for a cadastral procedure to secure future construction. However, as the building being designed was to connect two adjacent buildings through footbridges it required for the cadastral procedure to include three-dimensional spaces which prolonged the procedure.

The project team gained momentum once again as July came to an end and the third deepened schematic design was produced in collaboration with the awarded contractor (see Figure 1). That version of the schematic design was the last element of design covered by the scope of the study.

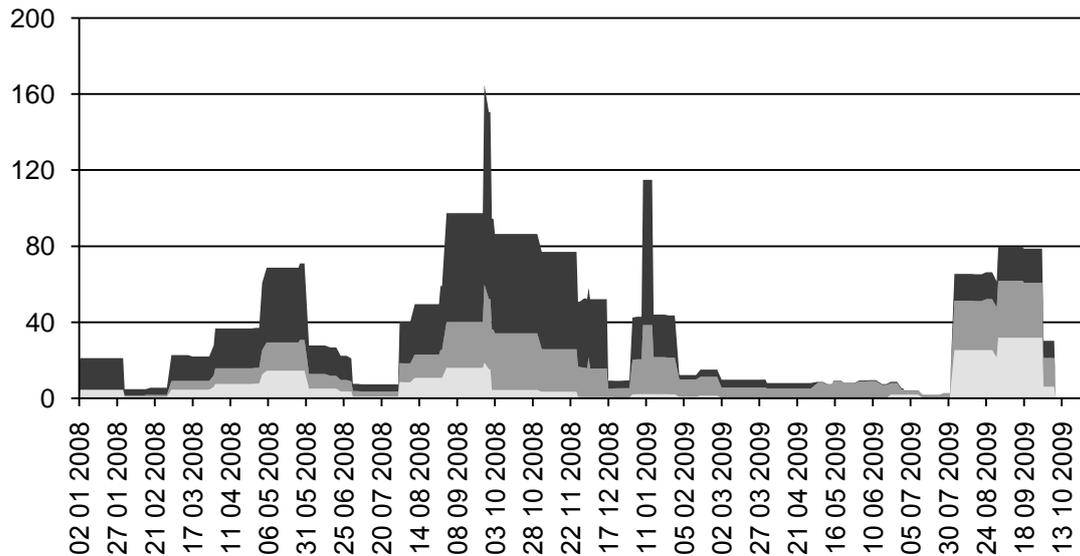


Figure 1: The client's assessment of the contribution to the design of the building from the resources consumed throughout the project.

The detailed development plan enabling the future construction works gained legal force on July 22 2009. Although necessary by law the client regarded no part of the detailed development planning process as value adding, instead parts of it was seen as not having been value adding. During the consultation process several changes were brought about but these efforts did not add any value according to the client whom regarded the consumed resources as not having added value for 40 % of the time up until November 28 2008 and for 10 % during the remainder. The cadastral procedure was approved and registered by the city planning office on September 17 2009.

In total the scope of the study included the client's assessment of approximately 17,040 hours consumed by consultants, the awarded contractor, the city planning office and others. Compiling the assessments reveals that almost 17 % of the consumed resources were regarded as having directly added value, roughly 32 % was seen as indirectly having added value and the remaining 51 % was considered as not having been value adding (see Figure 1).

## DISCUSSION AND CONCLUSIONS

Not all resources consumed on behalf of the project have been included in the study which constitutes a limitation. Those excluded are the clients' internal resources, the building permit administrators, the lawyers engaged in the appeal, the five contractors that were not awarded the contract and the sub-contractors and material suppliers that supplied all the construction contractors with tender documents. Assuming that the other contractors spent an amount of time equal to that of the awarded contractor on their tenders and that the client would not have considered it value adding another 23,600 hours could have been added.

The stated hypothesis proved to be false during the study. As can be seen in Figure 1, value was not conceived as having been continuously added throughout the project. The time considered value adding by the client was concentrated to three periods of time: between April 1 and May 31 2008 16 % of the time spent was regarded value adding, between August 1 and September 26 2008 19 % of the time

spent was considered as value adding and between August 3 and September 30 2009 43 % of the time spent was seen as value adding. In total 78 % of the time consumed by resources regarded as having been directly value adding was spent during 27 % of the time covered by scope of the study. These periods all coincide with the periods during which the project team were working with the schematic design.

The relay-race model of construction projects carries with it several decision points at which a client decides whether or not to proceed (Nordstrand 2000, Nordstrand and Révai 2002, Sporrang 2006). These decisions are made by clients based on the information currently available to them. However, while the brief is intended to elucidate all known conditions affecting the project, the brief and the design is a process of uncertainty reduction. It became evident when the client assessed the soil mechanics engineering work that some decisions were made with great uncertainty still present. Otherwise half of the work conducted would not have been regarded as not having added any value.

A process of conjecture was identified in the project prior to work commencing on the first, simplified, version of schematic design in April 2008. Nordstrand (2000) described this process of producing conceptual designs already in the brief as a process of assuring the feasibility of certain elements of the building programme. Winch (2002) described how conceptual designs are approved or disapproved firstly within the architectural firm and secondly by the project group including the client. Since the symbolic design of the building was a key issue for the client this process could be regarded as in line with the description of the cost-effective product development by Aniander et al. (1998). It also exemplifies the clients influence upon the level of uncertainty in the project being a source of information. Originating from the client during these phases information is then spread and processed throughout the project organisation also placing demands on coordination.

To determine the performance of project teams during the brief and design phases of construction projects further research is needed. If additional, similar studies enabled comparisons, it could be possible to identify key factors affecting the level of work resulting in features and attributes, and possibly use value. It could also benefit the industry in its efforts to respond to the critique it is experiencing.

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