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NON VALUE-ADDING COSTS IN BUILDING PROJECTS: THE MISSING THOUGHTS

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ABSTRACT
There is common agreement within the building and construction industry that the costs are too high, but disagreement on which cost elements and what reasons lie behind this situation. The Swedish Construction Federation states that the burden of taxation on new houses in Sweden is 65%. Other groups of actors mean that the production is inefficient or that material prises are too high. An alternative way to tackle the problem is to identify activities that do not add value to the customer. This paper aims to broaden the thinking considering non value-adding activities and associated costs. Some examples of such activities found in Swedish construction projects are presented.

KEYWORDS
Non Value-adding Costs, Poor Quality Costs, Building Project, Costs

1. INTRODUCTION

In most parts of the world, there are debates about how to reduce the costs for producing buildings. So is also the case in Sweden. Over the last few years the Swedish government has initiated two major investigations in order to identify the major problems in the construction industry. 'Byggkostnadsdelegationen' (SOU 2000:44) focused on the high costs. 'Byggkvalitetsutredningen' focused on general quality-related problems. Both investigations have been heavily criticized by the industry as well as by academics. One critique is that none of these investigations has taken the opportunity to investigate either the amount of non value-adding costs or the causes of these unnecessary costs. A new initiative is 'Byggkostnadsforum', placed at The National Board of Housing, Building and Planning, supported by the government and with focus on reducing costs for producing new buildings. However, this group has not clearly stated the need of identifying the non value-adding activities and its associated costs.

While all actors within the building and construction industry agree that the costs are too high, there is disagreement on which cost elements and what reasons lie behind this situation. The Swedish Construction Federation (2001) states that the burden of taxation on new houses in Sweden is 65%. Other groups of actors point at government's control, time aspects, complex project organisations, inefficient production, low competence, high material prices etc. It is imperative to identify and categorize the non value-adding activities and to sort the major causes and consequences into categories.

Individual successful projects have been presented by the media in which the costs for producing one square meter is close to half the normal cost in the major cities in Sweden. However, some actors question these success stories.

Irrespective of what is true or not, there are still activities, both in the system used in industry and in each specific project, which can be considered as not adding value for the customer.

It should be clear that one of the most prioritised objectives in all construction-related business is to reduce the costs of quality problems and other non value-adding activities. Numerous investigations have been performed to identify costs for poor quality, but only a few have collected data in a systematic and reliable way. Studies of other types of losses have so far been limited to specific aspects of non value-adding activities. This explains why we lack knowledge on (a) the total picture of non value-adding costs, (b) the hidden costs for quality problems, and (c) the causes of these costs (Josephson, 2000). Some researchers (e.g. Holland, 2000; Hall and Tomkins, 2001) claim that they use a total perspective, while it could be argued that they still use a narrow definition on quality.

This paper initiates a study that aims to identify all poor quality costs and costs for other non value-adding activities and also to introduce new thoughts about what is non value-adding or not. The study includes categorizing the building projects costs based on poor quality costs and other non value-adding costs, (b) quantifying those costs, (c) discussing their origin and causes and (d) discussing the possibilities of eliminating or reducing the cost for each activity. One reason is to add clear facts to the on-going debate. Another reason is to find ideas for future studies. The recommendations are directed not only to the government and the construction industry but also to individual companies. Theoretically, the study extends the concepts of poor quality costs to include basic thoughts from value chain analysis.

The paper describes how the view of poor quality has broadened from an internal short-term perspective to including all project costs in a long-term perspective. It gives some examples of typical activities adding no value to the customer and discusses them. Definition problems and measurement problems are mentioned as well as motives for a single company to act on not only the direct costs but all unnecessary costs influencing the project cost.

2. NON VALUE-ADDING COSTS

2.1 Poor Quality Costs

Among the earliest writings pertaining to the general concept of ”quality costs” can be found in Juran’s first Quality Control Handbook, published in 1951 (Campanella, 1990). For many years quality costs were divided into prevention, appraisal, internal failure and external failure costs, first identified by Feigenbaum (1956). External failure costs was considered as more serious than internal failure costs, because it may result in more disappointed customers. Later the term poor quality costs (PQC) was used to make clear that it is poor quality that causes non value-adding costs.

During the 1980’s the concept of poor quality costs began to change its focus to more consider the customers needs. Harrington (1987) differentiates between direct PQC and indirect PQC. He uses the term direct PQC for the traditional categories. Prevention costs and appraisal costs are those that management has direct control over to ensure that only customer-acceptable products and services are delivered to the customer. All the company-incurred costs that result from errors include internal and external error costs. These costs are directly related to management decisions made in the prevention and appraisal cost categories. When using the term indirect poor-quality costs Harrington consider the customers different and individual requirements. He use the example of a cheap hotel meeting the basic requirements, such as a clean room, a flat bed, and hot and cold running water. Still many people choose to stay in more luxury hotels. “When you merely meet requirements your customers have no reason to return, but as long as you fulfill their expectations, you’ll have them for a long time”, explains Harrington. He defines indirect PQC as “those costs not directly measurable in the company ledger, but part of the product life cycle PQC”. They consist of three major categories. Customer-incurred PQC, customer-dissatisfaction PQC and loss-of-reputation PQC. Customer-incurred PQC appears when an output fails to meet the customer’s expectations. Examples are loss of productivity while equipment is down, travel costs and time spent to return defective merchandise. Customer-dissatisfaction PQC is lost income because customers are not satisfied with the company’s product and therefore choose a competitor’s product next time. Cost incurred due to loss of reputation differs from customer-dissatisfaction costs in that they reflect the customer’s attitude to a company rather than toward an individual product. All customer-incurred PQC are non value-adding costs, while the last two categories are strictly used in a company perspective, as they in themselves not cover any non value-adding costs.

2.2 Broadened Customer Perspective

During the 1990's the concept of poor quality costs has continuously been broadened since the concept of quality has itself acquired a broader customer perspective (Sörqvist, 1998). The customer can be everyone who is affected in any way by the products and business, e.g. shareholder, financier, state and local government, supplier, user, buyer, company management, employee etc. It means that customer-incurred costs, environmental requirements, safety and social responsibility should be considered. Sörqvist use this wider perspective by dividing the poor quality costs in traditional PQC, hidden PQC, customer costs and socio-economic costs.

So far we have more or less used a strict company perspective. We have considered the customers expectations, but still in order to improve the individual company's business. If we broaden the view, we can find activities in the industry and in the society that should not be there and which directly or indirectly increase the costs for the customers. The systems used in the industry and in the country may include activities that can be considered as not adding any value for the customer. For improving competitiveness, it is necessary to develop the concept a further step and include costs for all non value-adding activities.

This broadened view of poor quality costs makes it more difficult to measure the total losses, but also far more exciting and important to obtain knowledge of the new and unknown areas of poor quality costs continuously arising.

2.3 What Do We Know?

It's evident that we must learn more about poor quality costs. This statement is based on experiences from many studies of poor quality costs and there are two primary arguments supporting it.

First, we have a low level of knowledge of poor quality costs. We have knowledge of the visible costs, but lack knowledge of all hidden costs, lost income, customer's costs and socio-economic costs. We probably lack necessary knowledge to be able to see and understand the hidden costs (Josephson, 2000). We also lack knowledge of poor quality costs arising in early phases of projects. Further, we lack methods for measuring the hidden costs. Studies of poor quality costs report figures from 0-12 % of the total cost in building or civil engineering projects (e.g. Burati et al, 1992; Josephson and Hammarlund, 1999; Nylén, 1999; Love et al, 1999; Barber et al, 2000), depending on the scope of the study and the definitions used of poor quality and costs. Studies during the early phases and the design phase are rare. Studies during the production phase generally show 3-6 % of total cost of production (Burati et al, 1992; Josephson and Hammarlund, 1999; Nylén, 1999). Studies during the use phase generally give 2-5 % of the cost of using (e.g. Tolstoy, 1984; SBR, 1988; Pintér, 1989). However, in all these studies only a minor part of the defects and their consequences are detected. There are hidden costs not found. Lost income, customer's costs and socio-economic costs are not included either. In practical terms, we can only establish some of the visible and hidden costs.

We have fairly good knowledge of the causes of the visible poor quality costs. Many causes have to do with unstable project organizations. This creates more uncertainty and communication problems. We also know that good leadership during production can reduce the visible consequences of poor quality. But we are not aware of the root-causes of other non-value added costs (Love et al, 2001).

We lack knowledge of how to improve. There are many anecdotal stories of both successes and failures, but no clear evidence of successful improvement activities (Hackman and Wageman, 1995). Attitudes are changing slowly. We should learn more about value and how it affects poor quality costs in building projects.

Second, the concept of poor quality costs is changing to be even more broadened since the concept of quality is broadened. We have knowledge about different types of non value-adding activities; some examples are given in the next section. But we don't have the total map presenting all such activities. This means that we don't have a total understanding of the unnecessary costs for construction projects. There is a real challenge in making as many hidden poor quality costs as possible visible. With more knowledge about the hidden costs and their causes and by outlining the total map of non value-adding activities, we should be able to achieve large cost reductions.

2.4 Other Approaches to Non Value-Adding Costs

To distinguish between poor quality costs and accepted operating costs it's common to focus on non value-adding costs along with value adding costs. A common method to identify value-adding activities and non value-adding activities is to do process maps (Dicander et al, 1998; Rentzhog, 1998). Similar thoughts can be found in the concept of lean construction, which aims "to maximises value delivered to the customer while minimizing waste" (LCI, 2002).

In a construction project there are numerous firms involved, not only designers and contractors, but also material suppliers etc. This means that numerous business relations must be established and maintained. Transaction costs are directly or indirectly associated with efforts to assess the fair value of a specific asset and to search for a trading counterpart. In a construction project, the transaction costs are high. This approach is discussed in Williamson (1979) and Winch (1989).

The concept of sunk costs is mostly used when discussing a firm's entry to a new market. Sunk costs are those costs, which cannot be recovered by the firm.

3. EXAMPLES FROM SWEDEN

Looking closely into the Swedish construction process, there are many activities that can be considered non value-adding. Of course, the opinions about what is not adding value vary to a great extent between the actors. Some examples are given here.

3.1 The Cost for Correcting Defects

Systematic case studies on construction sites show that the cost of correcting defects varies from two and up to ten percent of the total cost as already mentioned. Possible future costs are then not included. Choosing the total project cost as a reference can be discussed, since a large part of the production cost is costs for material and equipment not produced on site. The price for material and equipment probably includes costs for correcting defects in the factories.

3.2 How Time is Used

In most production-related activities surprisingly low share of the working time are used for direct work. For plumbers only 35-40% of the working hours are direct work. 9-14% of the working hours are losses, such as waiting and unused time (Hammarlund and Rydén, 1989). The rest of the time is used for planning and preparing the direct work. Construction workers are often blamed for being late to the site and taking too long coffee breaks. On the other hand it is typical to solve problems during the coffee breaks and also to move the time for breaks depending on which activities are going on.

3.3 The Piece Wage System

The system with piece wages for construction workers is traditionally used in Sweden. In most projects, representatives for the employees' trade union do extensive measures on site, followed by long discussions between employers and employees to decide what the piece wages should be based on in the specific project. According to the trade magazine 'Byggindustrin' the costs for measuring the workmanships works corresponds to 1.5% of their salaries. The system is heavily discussed within the industry.

3.4 The Bidding System

The bidding system does not itself add value for the customer. With this view most bidding activities, with several parallel calculations, in the project supply-chain are poor quality costs and should be removed. In addition, costs for the customer to administer the biddings are unnecessary. The bidding system is considered a way to find as low price as possible. However, in a long-term perspective it can be argued that the costs for calculation are included in the actual bid. Currently, the competition is tough in the Swedish construction industry. There is general experience that most contractors have a success rate of approximately 10%.

3.5 The Administrative Consultants

In most major building projects, the client hires several specialized consultants to administer the project. In partner relations, building on trust between the client and the contractor, many of these consultants become unnecessary. Hotel Gothia Tower in Gothenburg, built 1999-2001, is considered a successful project. The client, Svenska Mässan, and the contractor, Skanska Sweden, co-operated as partners. In this case the client had one consultant, while it would be 4-5 consultants with a traditional contract form. Some work typically for the consultants was taken over by Skanska Sweden, but most were eliminated.

3.6 Safety and Health Aspects

The Swedish construction industry is regarded as one of the safest in the world (Flanagan et al, 2001). Still, there are major problems to deal with. Even if construction in Sweden – in an international perspective - is safe regarding the physical health, bad working conditions, accidents and also fatalities cause relatively high costs influencing the projects. The debate currently focuses on the mental health. Some investigations indicate that up to 1/3 or even more of the people working are feeling ill because of stressful working conditions and too much overtime.

3.7 The Taxes

An unpublished investigation, conducted by the Swedish Construction Federation (2001), shows that 65% of the total cost for new produced houses is taxes! Then the taxes on each stage through the whole project are accumulated. The taxes cover many crucial activities including the social system, medical system, crime, defense etc. These examples include major costs, which in a political economic perspective can be considered as 'unnecessary', because if all people would follow the law etc some of these costs would disappear. Necessary questions are: How do individual companies' businesses affect the taxes? What are the taxes on building-related activities based on in reality?

4. DISCUSSION

4.1 Definition Problems and Measurement Problems

There are many methodological and measurement-related aspects to consider when identifying and quantifying costs of non value-adding activities. Such aspects considering poor quality costs are discussed in Gluch and Josephson (1999). Some examples considering other non-value activities are given here.

A common question is "Who pays for a mistake?" In many situations it can be argued that the supplier pays, not the customer. This is partly true in short-term perspectives. In long-term perspectives, it can be argued that all costs for defects and other non value-adding activities are accumulated and included in the prices. This means that all such costs are transferred to the customers.

Most non value-adding activities help to increase the knowledge in an organization. For example, a firm preparing a bid gains new knowledge irrespective of whether they win or lose the job. Even though organizational learning in construction projects often is argued to be defective (Josephson, 1994; Love and Li, 2000; Huemer and Östergren, 2000) the individuals involved will learn. The value of this knowledge is hard to estimate.

The bidding system can be considered as an example of another measurement problem. It is argued above that it includes activities adding no value. On the other hand, the competition means that the prices may be lower. In that sense, the customer gets more value for the price he pays.

Costs for safety and health problems are problematic to calculate. For example, what are the real costs for work-related mental problems and what are the real costs for deaths?

It's obvious that the costs for non value-adding activities may be counted twice. It's often complicated to identify a single root-cause for an incident. Looking from the other side, two or more incidents may lead to the same consequence. This means that it is not correct to analyze individual activities and just accumulate them. A typical

example is that the cost for a specific unnecessary activity includes taxes and the taxes are dependent on how well the social system etc are functioning.

It is sometimes discussed whether changes in projects should be considered as unnecessary or not. Burati et al (1992) include changes in their study of deviations, while other researchers consider most changes as caused by new or unknown needs, which implies that changes should not be viewed as losses.

In some studies unexpected costs due to insufficient preliminary studies are defined as unnecessary. Nylén (1999) defines unexpected costs due to insufficient geotechnical investigations, however necessary they may be, as poor quality costs. Other studies accept these unexpected costs as necessary, but of course question the limited investigations.

The designers' works are often discussed. Architects make several alternative sketches to test and find good solutions fulfilling known and unknown needs. It can be argued that this type of 'trial-and-error' includes activities adding no value. However, most practitioners and researchers define this way of working as necessary.

4.2 Categorization of Non Value-Adding Costs

The non value-adding costs, including poor quality costs, should be categorized to differentiate the debate. Two preliminary categorizations are suggested to give guidelines on who should act and how to act. These categorization systems can be combined.

First, the level of organization shows how general the costs are. Consequently, it indicates who is responsible for reducing or eliminating the costs of the activities. The non value-adding activities could be on individual or group level, e.g. how time is used, which means that it is a leadership problem. They could be on the project level, e.g. defects caused by communication problems, which means that several actors may be involved. If they are on the company level, it could be a strategic problem. If the problem has to do with the general system used, e.g. the bidding system and the piece wage system, it may be on the industry level or the national level.

Second, the type of costs should be categorized to guide how to act. Sörqvist's (1998) categorization is one example. However, he has a company approach. Traditional PQC are the obvious losses, which can be measured using poor quality cost systems. Many of these losses are sporadic problems, which disrupt operations. Hidden PQC consists of the losses remaining which directly affect the business, but which are not revealed by the financial accounting system (Sörqvist). These are often caused by chronic problems. Lost income considers the income lost by releasing products and services onto the market, which do not satisfy all the requirements of the external customer. It includes customer-dissatisfaction PQC and loss-of-reputation PQC. Customers' cost includes costs, which affect the external customer. These could be losses due to delays or breakdowns in production. Socio-economic costs mean the losses affecting the community at large due to the poor quality of companies' processes and products.

5. CONCLUSIONS

There are obvious motives and clear needs to map the totality of non value-adding activities and associated costs in building projects. First, the high cost for producing buildings is not accepted by the users. Second, we lack knowledge of poor quality costs and other non value-adding costs. Third, the trend of broadened perspectives on quality makes new studies necessary. Fourth, facts are necessary both to stimulate the debate on building costs and to make the debate clearer and more action-oriented.

In practice, there is no doubt about that most companies are aware of all known losses, which are directly related to the business. One problem is that many costs, e.g. the hidden PQC, are not known by a single company, and for that reason are not considered in internal improvement programs. Another problem is that many of the losses, which are indirectly related to the business, are accepted as part of the existing system and for that reason are not considered. In reality, all categories of non value-adding costs, more or less influence individual companies' businesses, especially large companies' businesses. This is particularly relevant for larger firms, because their activities influence the existing industrial rules and systems to a greater extent.

The introductory discussion in this paper reveals some missing thoughts in practice, but also in the general scientific work. Much improvement focuses on the companies' own work. For a contractor in a building project, other companies often produce some 80% or more of the total cost. In a long-term perspective, costs for non value-adding activities and poor quality are built in the price for the products. Most construction companies discuss how they choose suppliers for the projects, instead of discussing how they can help their suppliers to reduce the non value-adding costs. Here, much could be learned from other industries. The first missing thought is that most practitioners and researchers using a short-time perspective when focusing on who pays for a specific incident. Following on the first missing thought, the second missing thought is that most companies do not really realize that costs for non value-adding activities are included in the prices for material, sub-contractors etc. The third missing thought is that most companies do not realize that the taxes to a certain extent also include costs for non value-adding activities. The fourth missing thought is that most companies do not realize their possibility – and responsibility! - to act on and influence all the cost categories.

The study presented here is currently starting up and will end in 2004. The data collection will be a combination of available methods, including analyses of available investigations. The analyses are based on specific building projects to make the results clear and easier to accept by the companies and the industry. This means that close cooperation with companies and several trade organizations is necessary.

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