

Swedish Constructing Excellence: A Tool for Quality Management within Construction Projects

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Abstract

The Swedish construction sector has been criticized in media for being corrupted, unproductive and conservative. Several incidents, e.g. cartels, work on the side without paying tax and moisture problems, have had a great deal of attention. Of that reason has the government initiated a number of investigations in order to identify the major problems in the construction industry. Further, they have initiated a development of a tool aimed for (a) to identify risks, (b) to avoid poor quality costs, and (c) to direct towards increased quality and effectiveness in building and civil engineering projects, from a client perspective. The UK Constructing Excellence has often been held up as a model during the debate. However, the Swedish general culture differs from the British, as well as the Swedish system differs from the British. The purpose of this paper is to describe the program for developing the system, including the purposes with the system, identified starting points and demands and the approach/method for the development.

1. Introduction

1.1 Background

The Swedish construction sector has been criticized in media for being corrupted, unproductive and conservative. Several incidents, e.g. cartels in the asphalt business, work on the side without paying tax in minor specialist firms, moisture problems in new built houses and in national museums, have had a great deal of attention. Of that reason has the government during the last years initiated three investigations in order to identify the major problems in the construction industry. 'Byggkvalitets-utredningen' (1997) focused on general quality-related problems. 'Byggkostnadsdelegationen' (2000) focused on the high costs. 'Byggkommissionen' (2002) focused on competition, quality, costs and competence. In 2003, the Swedish Construction Federation presented an own investigation done by external experts (Andersson *et al.*, 2003), which highlighted general problems. Despite some criticism, these

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reports have been generally accepted and contributed to a kind of common crises awareness, especially among top managers. The UK national improvement program based on the Egan report (1998) has often been held up as a model during the debate.

The government invited a number of top managers for larger companies and trade organizations and also a number of experts to a meeting in November 2003 in Stockholm. Surprisingly the delegates were in agreement on establishing a common program for improving the sector. They especially emphasized the need of developing a system for measuring the performance.

Partly based on that meeting, the government laid down the need of such an improvement program and suggested that the government would take the initiative (The National Board of Housing, Building and Planning, 2004). At a Government meeting on the 7th of October 2004 it was decided to establish a coordinating role for a development program within the building, real estate and civil engineering sectors. The commission was among other tasks to “support and coordinate the development of criteria for measuring the progress in each part of the sector” (Directive, 2004). Informally it was said to develop the sector “from scoring own goals to become world class”.

Several initiatives have been taken to develop systems for measuring performance in the industry. The strongest initiatives has been taken by the Swedish Council for Construction Excellence (BQR), who performed a minor pre study during the winter 2004, and by the Swedish Institute for Quality (SIQ) and Chalmers University of Technology, who won a governmental grant during the spring 2004. These two groups have then joined in order to increase the efforts to develop a system, which fit the Swedish construction system and culture.

The purpose of this paper is to describe the program for developing the system, including the purposes with the system, identified starting points and demands and the approach/ method for the development.

1.2 Purposes

The main purpose of the research project is

to create a management system which from a client perspective can be used to (a) identify risks, (b) avoid poor quality costs, and (c) direct towards increased quality and effectiveness in building and civil engineering projects.

Secondary purposes are

to suggest how a tool can be designed also to (a) indicate strength and weaknesses in the building and construction industries as well as other housing related industries in Sweden, (b) indicate the changes of performance over time and (c) be an instrument for benchmarking.

2. Frame of Reference

2.1 The Construction Industry

The construction industry is traditionally fragmented both regarding the company structure and the industrial processes as such. Many different actors are involved, many of them only in one activity during the whole process from idea to use of a building or another construction. Also on the organizational level the industry is fragmented with many, and sometimes, strong industry organizations. They are all active in advocating the interest of their own part of the industry.

In order to improve the industry the system needs to stimulate and support the individual companies in their improvements. To be able to do that have the following prerequisites for the development of the management system been formulated. The system shall

- be flexible and therefore possible to use in companies of different sizes
- customer oriented in the meaning that the measurements always shall reflect the ultimate customer's (=Construction Client) stated or implied needs
- be a "living" system for organizational development and continuous improvement, easy to operate
- create learning in the local operations in all part of the value chain
- be simple and valid to apply

To fulfill the purposes we also have described that the system shall cover the whole process from idea to destruction of a building or other construction. However it will for practical reasons be necessary to limit the period use in the first phases of the development, probably to include the warranty period, i.e. the first two years of the use phase. Figure 1 illustrates this principle.

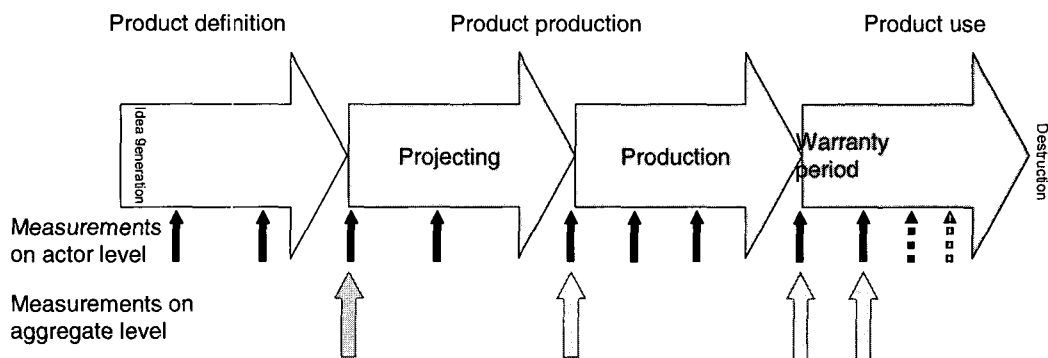


Figure 1. The process of building and construction from idea to destruction

The measurements must be done at several occasions during the process. Primarily shall measurement be done in the actor organizations to create immediately learning in the local operations for all part of the value chain. It must also be possible to integrate the way of measuring with the systems used by the local actors. Those two characteristics are necessary to create the “living” system for organizational development and continuous improvement, easy to operate.

However a purpose for the system is also to create learning over the whole process of building and construction as well as give possibilities to following the changes of performance over time on aggregate level. It shall also give possibilities for benchmarking. It is therefore necessary to orga-nize the systems to create measurements to also on an aggregate level at certain occasions during the process.

2.2 Total Quality Management

The orientation of the quality process over the years has changed so that methods of picking out and scrapping faulty products are no longer the primary focus. It has instead become a matter of avoiding making mistakes and making an effort to “get it right from the beginning”. The focus on quality has generally during the years gone from control-oriented organizations to TQM-oriented organizations (See for example Bergman and Klefsjö, 2003, for a general description.).

In the TQM-oriented companies, external and internal anonymity has been replaced by a holistic view of operations. Co-operation between customers, suppliers and society has become a natural feature of daily life. This applies both to direct business relationships and indirect external factors in the form of the environment, use of resources, ethics and social responsibility. Concepts such as strategic alliances, networks etc. are becoming increasingly common. In the TQM-oriented companies, the customer is an equal partner, who is focused on as part of the view that the customer is “*those for whom your organization exists*”. Even if different companies, public bodies and organizations have different words for “*those for whom your organization exists*” (subscriber, guest, client, passenger, patient, student etc.) the content of the concept and the way of acting are becoming increasingly clear.

Within the organization, involvement, individual development and learning organizations are common concepts, as is a clear management philosophy that includes responsibility in teams and working groups in combination with a “flat” organization. For the management, extensive specialist competence is not a merit in itself but something that opens up other career paths. It is becoming more and more important to assume a holistic view of one’s role as a manager, the role of the staff, the organization and the external world and likewise the ability to take, implement and follow up decisions.

If the “flat” organization, with a decentralized decision-making process, is to work, clear operating visions and goals are required, backed up by systems for following up these vi-

sions and goals. In addition, delegation of responsibility must be accompanied by delegation of authority and resources. This also demands an understanding that decentralized responsibility is not simply a right but also an obligation in order to guide development towards agreed goals.

Working with TQM thus involves an ongoing process of organizational and competence development. It is vital that responsibility for this exists in the line organization while at the same time the overall task is to induce everyone in the organization to become involved and participate in the work.

However the traditions as well as formal aspects very often limit this holistic approach to be handled inside defined legal entities. Very seldom are the same aspects possible to extend to all participants in a “network”. In construction industry this is obvious when looking on the process as described in Figure 1. Each (fragmented) part of the whole process will try to run its quality control system, as well as, in some cases, TQM oriented management system, inside its own organization. The links between these systems are seldom effective.

An important part of our project is to create those links. It doesn't mean that our “tools” shall replace existent systems, but it must be able to link them together and also that the use of the interlinked systems also creates improvements for the whole process. We will in our work refer to the experience made in TQM applications in projects as well as those based on the QIS project run by the Swedish Institute for Quality (SIQ, 2005). In the QIS project will Quality methods applied in Innovation Systems be tested.

2.3 The Ultimate Customer

It is important that the value creation focus the stated or implied needs for ultimate customer in the process. In our case we have decided that we will organize the system from the stated or implied needs of the Construction Client.

The Planning and building act (PBL, 1987:10) defines the client as “the one who conduct for himself or have construction, demolition or ground projects conducted”. The Swedish organization ByggherreForum widens this definition by adding “the client is also the one who interprets and translates the own activity's needs, expectations and wishes to demands and prerequisites for building and civil engineering projects according to the society's condition on sustainable construction”. Inspired by these definitions Uusman and von Schéele (2002) have classified clients into three categories with reference to their main purpose with construction. *Using client* (Brukarbyggherre) builds to lodge its own organization and can thereby be defined according to ByggherreForum. *The maintaining client* (Förvaltarbyggherre) builds to own and let and is also responsible for the maintenance of the building. *The selling client* (Försäljarbrukherre) builds in order to sell and strive for maximized profit.

Of course these different aspects of the client will give some complications to our efforts. The main reason is that the “stated or implied needs” of the client probably differs over

these different categories. We will therefore address one of our sub research processes to define the driving forces described by the clients. Those forces will have a substantial impact on which key performance indicators (KPI:s) that will be important for the construction of a management system.

3. The Research Project

3.1 The Method – An Overview

A research program has been started up which will run from late 2004 to mid 2006. It is financed by Formas (the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning), Boverket (The National Board of Housing, Building and Planning) and the Swedish construction industry through BQR (Swedish Council for Constructing Excellence). The project is divided in some major parts described in Figure 2.

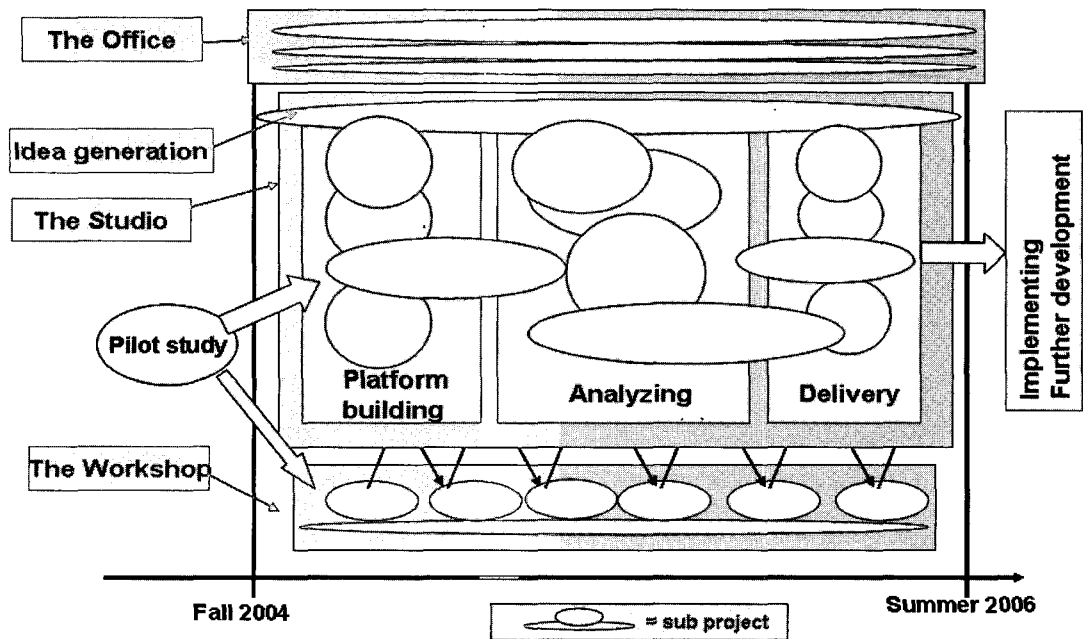


Figure 2. The research process

In the figure is described that it will be overall working supporting project for **idea generation** and administrative support in “the Office”. The research will be conducted on two “levels”, “the Studio” where most of the creative work will be done and the “the Workshop” where we will test ideas generated and also develop them further.

Time wise will “**the Studio**” be divided in three phases as follows.

1. **Platform building**, in which we will define the core values that a system must be based on. We will also do basic definitions on key elements to be used in future research. This phase was started late 2004 and will be reported in June and August 2005. Some sub-projects will also have a second phase during the fall of 2005. So far we have defined the following sub-projects to be conducted:
 - a. The Construction Client, its driving forces and management systems
 - b. The Construction Client, its driving forces and management systems with special efforts on early phases (project definition and projecting in Figure 1)
 - c. Driving forces, a literature review of management systems
 - d. International experiences
 - e. Existing management systems, an overview (inside and outside the industry)
2. **Analyzing**, in which we start our effort to build the system based on the experience from the first phase and the pilot study. The detailed planning will start in the summer of 2005. In this phase also some further of the research will be done regarding core values and key elements.
3. **Delivery**, in which the final construction will be done and the recommendations for the **implementation** and for **further research** will be worked out.

In **the Workshop**, we will test ideas generated and also develop them further. The first two tests started early 2005. In these we test the results from the pilot study as well as test the UK experiences on Swedish projects.

3.2 Preliminary Results

During the spring of 2005 some of our sub-projects have started to deliver preliminary results. Most of the sub projects are supposed to have the final reports delivered in June or August.

3.2.1 Driving Forces and Success Criteria

In the sub-projects regarding driving forces (*a* to *c* above) it has been confirmed already on an early stage of the project that the high degree of fragmentation mentioned in the discussion above is obvious. Not even the reason for and use of the management system, which is the rational behind this research project, is clearly understood by them financing the project.

We have asked representatives from the sponsoring companies formulate their visions of the future use. They were asked to write down how they have use the (at that time four years old system) year 2010 and how they want to improve the system and its use to 2011. After a short glance of the around 20 written visions, we can summarize that it is around

20 different ideas about the characteristics of the system. All the respondents are however very committed to the ideas behind the project (WHY and WHAT to do) but they have very different views about HOW to do it. The differences are of that kind that it is obvious that the various backgrounds have given totally different views of what the important driving forces are.

For example we can notice that the expected use of the system should be, based on the written visions, for so different aims as:

- “Measure changes within the industry”
- “Produce facts, which can help to improve the standard of contracts”
- “More efficient construction process”
- “Create indexes for the actors performances”
- “Eliminate defects”
- “Make sure that right building is built and delivered”
- “Identify crucial driving forces”
- “Make sure that all project members are committed and do their best”

Another focus in our early sub-projects is the driving forces or “success factors” described by various actors. After a literature review we can conclude that project success is widely discussed in the construction-related literature. A problem is that the researchers use different criteria, for example who decide if the project is successful or not, when is it decided how successful the project is, what time perspective is used etc. Based on the literature review a number of criteria were listed. Then, 12 experienced individuals representing different types of clients were asked to choose the criteria they thought were important for their businesses. They agreed on that end-user satisfaction is most important, but had different views about the other criteria, see Table 1.

Table 1. Criteria for successful projects, ranked by client representatives

Success criteria	Number of responses
1 End-user satisfaction	8
2 Functionality	6
2 Conformity with expectations	6
4 Quality issues at end of defect rectification period	5
5 Profitability	4
5 Conformity with technical specifications	4

Based on the literature review we also listed some 100 different driving forces and let the 12 individuals choose the most important for their businesses. The clients agreed on that their ability to make decisions and workmanship commitment are important, but had different

views about the other driving forces, Table 2. In all, some 40 driving forces were chosen by two or more respondents.

Table 2. Driving forces ranked by client representatives

Driving force	Number of responses
Client's ability to make decisions	11
Workmanship's commitment	10
Project manager's competence	8
Project manager's commitment	8
Workmanships adequate competence	7

The client's views about criteria for successful projects and driving forces for achieving successful projects vary to a great extent. We believe that this is a consequence of that the group of clients are so heterogeneous. It complicates the development of the tool, but it also makes it more challenging.

The 12 client representatives were also asked to rank eight characteristics of a general tool for measuring performance. The answers were scored based on the individual rank of the answers from each respondent (8 to 1). However, some respondents only mentioned a few characteristics. Here, the clients had similar opinions. They mean that trustworthiness and simplicity are crucial characteristics for the tool, see Table 3. Some clients argued that if the system is not simple enough to use no one bother to try to learn how to use it.

Table 3. Clients' ranking of characteristics of a measurement system

Characteristic	Score
1 Trustworthiness	78
2 Simplicity	68
3 Quick response	47
4 Action-oriented response	36
5 Resource effective	16
6 Few (vital) KPI:s	11
7 Feedback reports to several management levels	3
8 Data collected from several management levels	3

3.2.2 Analysis of Existing Measuring Systems

Management systems or systems for measuring KPI:s are of course very well established in all types of organizations (for *intra*organizational use). In our case we will study the possibility also to create similar systems working on an *inter*organisational level. In our plat-

form building phase we have decided to have a benchmarking approach. We have therefore started to analyze both *intra*organisational systems used in complex organizations and *inter*organizational systems. The later type is not so frequently available, but could be seen in projects like product development and industrial investments (where buildings could be a part of the investment). Of course we also have a special sub-project studying existing systems used by various companies as well as examples described in the literature.

A preliminary analysis of existing tools for measuring performance within construction-related companies indicates that such tools are available. However, they are limited in several ways. They very often focus on managers and customers views on actor level, not including aspects based on the “best” for all project members. The tools are also often limited to the company’s own processes, i.e. does not include suppliers processes. The data collections are seldom anonymous, since the companies employees ask the questions in the part of the systems based on qualitative data. The validity of measurements can sometimes be questionable. Most measurements are done after the project has finished. Therefore, the experiences cannot be used to improve the current project. Another reason for that is that the results mostly are reported directly to upper management levels. The results will not be obvious or fast available on the specific level where immediate learning and improvement can be done.

From a theoretical point of view it can be noticed that in the existing body of knowledge on performance measurement much effort is put on suggesting new models and concepts for measurement and on finding faults in prevailing models. However, “faults” are often not faults, but differences in opinion caused various theoretical viewpoints or adjustments to organizational contexts that are ignored in the comparative analysis. Different models fulfill different needs and they are therefore not equally relevant and effective in all organizations. By viewing models for performance measurement from a more basic theoretical perspective we can see that each model in itself represent an inherent theoretical conception of organizations. In our study the “Spatial model of organizational effectiveness” (Quinn and Rohrbaugh, 1983) is used as a frame of reference for illuminating the different implications for measurement found in three models for performance measurement and the TQM philosophy.

Our conclusion is that it is crucial to make a conscious choice based on analysis, not only when identifying performance indicators but also when choosing or designing a model or structure for measurement. For example, the design of The Balanced Scorecard emphasizes strategic focus and structure and it may therefore not be the most suitable tool for a new fast-growing organization in need for flexibility, innovative thinking and resources. From our study, we can also understand that models should not be copied from one organization to another (or from management literature). A model for performance measurement must be aligned with the conditions and needs of the organization it is aimed to support in order to

be effective. However our intention is to use existing knowledge and use the principal of transformation instead of copying.

On the international arena, there are a number of similar national initiatives. The UK initiative is the most well-known. We had a first contact with Constructing Excellence in London during our pilot study in 2004 and visited them the second time springtime 2005. At the same time we interviewed users of the system and discussed the system with a number of researchers. Our experiences will be reported in a special paper. We plan to test some of the methods used in the UK system in a few Swedish construction projects. Another interesting initiative is taken by the Danish government. Their first version of the measurement system became criticized by the practitioners for its many detailed questions. Their second version, which is going to be implemented, includes fewer variables and less data collection.

4. Research Results to be Expected

We have learned that we will face several challenges in the further research. Except the most obvious one, i.e. to design a system including definitions of measurements and questions about how to measure and analyze, we will also face a lot of infrastructure challenges. For example, the system must fit into many different types of building and civil engineering projects, which is run by different types of construction clients with different driving forces.

Also the mode of data collection will be challenging as the system should be able to use in various types of projects with various contract forms and often in various geographical locations and during situations with different technical infrastructure available for data collection (computerize connection to accounting systems, web, telephone, regular post only etc.).

The road to success must be a system which can be adopted on general basis with a certain, not too many, number of KPI:s defined. To this set of basic information element should be linked modules of extra elements, which can be chosen either for conducting special depth-analysis or special designed for purposes defined for special sub-industries or types of projects.

We will also put extra effort into the process of implementation, where we introduce the system step by step via a number of tests. A part of the implementation plan will also consider the marketing of the system and the operation of the system.

References

1. Andersson, W., Aspling, A., and Johansson, G.(2003), *Utmaningar för nytänkare, Bygg-*
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- kommissionens rapport om företagsförnyelse och medarbetarutveckling i byggnäringen*, Bygghälsokommissionen, Stockholm.
2. Bergman, B. and Klefsjö, B.(2003), *Quality from Customer Needs to Customer Satisfaction*, Studentlitteratur, Lund.
 3. Bygghälsokommissionen(2002), *Skärpning gubbar! Om konkurrensen, kvaliteten, kostnaderna och kompetensen inom byggsektorn*, Statens offentliga utredningar 2002:115, Stockholm. Fritze.
 4. Bygghälsokostnadsdelegationen(2000), *Från byggsekt till byggsektor*, Statens offentliga utredningar 2000:44, Stockholm: Fritze.
 5. Bygghälsokvalitetsutredningen(1997), *Bygghälsokvalitet för framtiden*, Statens offentliga utredningar 1997:177, Stockholm: Fritze.
 6. Egan, J.(1998), *Re-Thinking Construction: Report of the Construction Industry Task Force*, DETR, London.
 7. Lindström, J et. al, *Förslag till BQRs modell för kundorienterad utveckling av bygg- och anläggningsprojekt*, Förstudie BQR 2004 (Paper preenting the pilot study).
 8. Quinn, Robert E, and Rohrbaugh, John(1983), "A spatial model of effectiveness criteria: Towards a competing values approach to organizational effectiveness," *Management Science*, Vol. 29, No. 3, pp. 363-377.
 9. SIQ(2005), *Quality in Innovation Systems*, working paper.
 10. The National Board of Housing, Building and Planning(2004), *Utvecklingsprogram för bygg-, fastighets- och anläggningssektorn*, Slutrapport för Regeringsuppdrag Fi2003/6439, Regeringskansliet, Finansdepartementet, Stockholm.
 11. The Swedish government(2004), *Uppbyggnad och samordning av ett utvecklingsprogram för bygg-, fastighets- och anläggningssektorn*, Direktiv 2004:138.
 12. Uusman, I. and von Schéele, A.(2002), *Byggherredebatten – Respektera marknadens rollfördelning*, *Planera Bygga Bo*, No. 5.
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