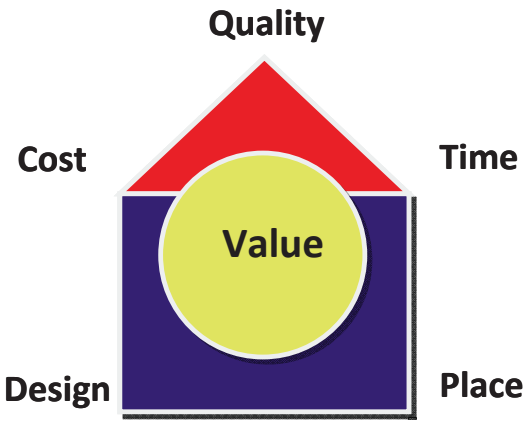
DOCTORAL THESIS

Value Creation in Development and Construction of Public Buildings

The Case of Houses of Culture



Kristina Laurell Stenlund

LULEÅ UNIVERSITY OF TECHNOLOGY

LULEÅ UNIVERSITY OF TECHNOLOGY

VALUE CREATION IN DEVELOPMENT AND CONSTRUCTION OF PUBLIC BUILDINGS

THE CASE OF HOUSES OF CULTURE

Kristina Laurell Stenlund

Division of Architecture and Infrastructure
Department of Civil, Mining and Environmental Engineering
Luleå University of Technology
971 87 LULEÅ
www.ltu.se/shb

VALUE CREATION IN DEVELOPMENT AND CONSTRUCTION OF PUBLIC BUILDINGS – THE CASE OF HOUSES OF CULTURE

Published and distributed by

Luleå University of Technology

971 87 Luleå, Sweden

ISSN: 1402-1544

ISBN: 978-91-7439-129-9

Universitetstryckeriet, Luleå, 2010

Preface

Public buildings such as houses of culture, with a content of cultural activities, create places for people to meet, develop knowledge and understanding. This is a story of building houses of culture and the effects for the built environment in terms of social and economic effects for public clients, construction professionals, citizens and society.

Open spaces such as a square or a market place enhance the expression of the city and its buildings. A fountain in the middle attracts people towards the open space creating a meeting spot with an air of experiences. A public library is, like the fountain's source of fresh water, a source of knowledge. If it is invisible most humans do not find it. Still, if citizens see and find the library, or other sources of a deeper understanding of their lives, it is not certain that they find their way of using it. Culture is always around us, i.e. our way of living and our civilization, based on our traditions, backgrounds and ethnicity and how we express them in our daily life. Art performances, such as theatre plays, music, dance and art exhibitions plus other activities express and visualise our culture. Humans have always expressed their culture to each other. Creativity creates ideas and ideas create creativity. Understanding these forces is embedded in our understanding of life, in other words mysterious with emotions but at the same realistic and logical over time. Managing the need of buildings to store books and perform arts depends thus on peoples', municipalities' and societies' interest, desires and resources. When the building is there, for us to use, our experiences are stored in the building.

There are many people who have been crucial for the completion of this thesis. Even though not all are mentioned by name or their contribution described, all are equally appreciated and gratefully acknowledged.

Without the people involved in the building of Houses of Culture in Sweden and the studied cases of Kulturens hus in Luleå, Vingens kulturhus in Torslanda, Mimers hus in Kungälv, Uppsala Konsert och Kongress and Vara Konserthus, there would not have been any story to write about. Engagement, creativity and never ending patience characterise the involved actors, both citizens and professionals, when driving their own and the municipalities' desires and requirements for constructing these public buildings. Thank you for your contribution to the good life in our society!

Research is dependent on people telling their story to researchers. To participating professionals and citizens from Swedish municipalities, construction and consultancy companies and The Swedish Construction Federation, thank you for your contribution of experiences and knowledge. Without your contribution to this research project the story would never have been written, thank you all!

A good story often involves a drama. The drama of this story consists of invisible values based on end-user needs and desires as well as on public clients' requirements together with visible value evaluated by stakeholders. The research environment in terms of universities, professors, doctors, research colleagues and research funding institutes, has been essential for understanding the drama. Researchers from Luleå University of Technology, KTH, Lund University, Chalmers, Linköping University as well as from the ARCOM and COBRA associations have contributed their specific knowledge and expertise within construction engineering and management, architecture and political science. Due to researchers from different disciplines, analyses with different theoretic perspectives have been accomplished.

I would like to thank my three supervisors, in order as they came into the project. I am very grateful to assistant professor Nina Ryd for sharing her outstanding experiences, giving me brilliant advice, guiding me through difficult empirical and theoretical obstacles as well as encouraging me when I needed it most. Thank you Nina, it has been great having you as a supervisor; your humour has lightened up my working days, as have also our joint visits to different houses of culture. I am very grateful to associate professor Elin Wihlborg for guiding me into her excellent knowledge of theoretical structure, focus and sparkling analytical ability as well as encouraging me when I needed it most. Thank you Elin, it has been great having you as a supervisor; your way of opening up the 'black boxes' of research has been personal and full of happy surprises making my postgraduate period much more pleasant. I am very grateful to professor Thomas Olofsson for his outstanding suggestions and for

sharing his bright knowledge. Thank you Thomas, for relying on me, it has been great having you as a supervisor; your energy and positive attitude makes problem develop into solutions!

Without assistant professor Diana Chronéer this thesis never had been completed. Thank you, Diana, for taking the role as project leader, for hours of fruitful discussions, for being my colleague and friend. I am very grateful to associate professor Birgitta Olsson for tremendous support and advice, pilot me through my postgraduate period. For chairing my final seminar I would like to express my gratitude to Dr Ylva Sardén for useful comments together with supporting advice contributing to the completion of the thesis.

I would like to thank the members in the reference group for their valuable contribution to the realisation of and their participation in the research project: Åke Broström, Cultural manager and Karl Petersen, Municipal commissioner from Luleå Municpality, Per Forsberg, Property manager from Folkets hus och parker, Per Ola Patomella, CEO from Nåiden Bygg, Jan Petschler, CEO at the Swedish Construction Federation Region North and Stefan Sandesten, ex CEO at the Swedish Construction Clients Forum. I would also like to thank Henrik L Bang, CEO at the Danish Association of Construction Clients for valuable comments on ongoing analysis.

I gratefully acknowledge the financial support of Development Fund of the Swedish Construction Industry (SBUF) and The Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (Formas/BIC).

Thank you all my dear colleagues and co-writers at the research group Construction Engineering and Management: Anders Vennström, Ekaterina Osipova, Jan Byfors, Jutta Schade, Kajsa Simu, Lu Weizhuo, Ove Lagerqvist, Patrik Jensen, Per Erik Eriksson, Robert Lundkvist, Romuald Rwamamara, Tamas Racz, Tim Johansson and Thomas Olofsson for creating an intellectual, open, trustful and happy research environment where almost all missions are possible. To Lars Björnfot, many tanks for assisting me with the data work.

I would like to thank Gunnar Persson for correcting the language. Any remaining errors that might still be present are my responsibility and are due to last minute changes.

To my dear friends and my dear family: My gratitude and love to all of you for being a part of my life.

Kristina Laurell Stenlund, Luleå in August, 2010

ABSTRACT

A public building should create an added value to clients, construction professionals and users resulting in an efficient construction project as well as an economically and socially sustainable building over its whole lifetime. In the meantime it is difficult to describe the social benefits of public buildings in general, but even more difficult to describe public buildings with a cultural content, e.g. concert halls and theatres, which supposed to create emotional and knowledge-based experiences. Likewise economic benefits of an investment in a public building are difficult to describe in terms of sustainable development in the region.

The overall purpose of this thesis is to increase understanding of value creation in development and construction of public buildings. The focus is on evaluations needed to ensure that public construction projects are planned, designed and produced to fit the particular needs they are meant to meet.

Ideas and end-user needs are transformed into the client's requirements in a written brief, also termed the building programme. These early phases of the building process are discussed and analysed in the thesis from the following perspectives: 1) development of ideas, 2) relation between clients and construction professionals when developing functional and technical specifications and 3) management of multicultural activities in the building.

The research is based on a case study of the effects when building houses of culture, i.e. buildings for multiple cultural activities. The case study consists of one comprehensive single case where the building process and the effects of building a house of culture were studied. Interviews with different stakeholders, observations and a survey of visitors were conducted. Empirical data analysis resulted in a value-based briefing model for analysis of stakeholder and end-user value as well as effects on the built environment. The model was applied in a study of four other houses of culture using interviews with clients and end-users as well as secondary data describing end-users' evaluation of the building.

The main result is a deeper understanding of how public clients identify, develop and transform end-user needs into a strategic written brief, creating added value in the built environment over time. When developing ideas the public clients would benefit from developing a strategic brief where end-user needs are related to the building's activities and overall goals. Developing functional and technical specifications, clients and construction professionals should benefit from including value-based briefing as a method for identification and evaluation of effective and sustainable functional and technical specifications. The value-based model is built on construction project parameters: time, cost and quality and developed with a time-geographical theoretical perspective where the building's quality includes design parameters describing end-user value in terms of activities, form & shape and place & space. The time-geographical perspective gives an understanding of how end-user needs and stakeholder values develop over time.

Sammanfattning

En offentlig byggnad bör skapa ett mervärde för byggherren, dess entreprenörer, dess medborgare för att byggprojektet ska bli lönsamt och samhällsekonomiskt hållbart. Det är emellertid svårt att beskriva värdet av en offentlig byggnad i allmänhet och byggnader som syftar till att skapa känslomässig eller kunskapsutvecklande upplevelser för dess brukare, i synnerhet. Likaså är de ekonomiska effekterna av en investering i ett kulturellt byggprojekt svåra att värdera i termer om hållbar utveckling i regionen.

Denna avhandling handlar om att studera byggprocessen från idé till förvaltning av offentliga byggnader för kulturell verksamhet genom en fallstudie av kulturhus och en fördjupad studie av Kulturens hus i Luleå. Här diskuteras tre faser i programarbetet avseende byggherrens (kommunens) önskemål och krav och aktörernas upplevda nytta i 1) idéarbetet, 2) relationen mellan byggherre/beställare och byggprojektets professionella aktörer i samband med utveckling av funktionella och tekniska programbeskrivningar samt 3) organisationen av förvaltningen av byggnaden avseende att skapa brukarvärden.

Fallstudien har resulterat i en värdeteoretisk analysmetod som bygger på analyser där aktörer (byggherre/beställare, konsulter, entreprenörer och brukare) har beskrivit sina nyttor med ett kulturhus och hur de upplever att de satta kraven och önskemålen på byggnaden motsvarar det färdiga resultatet. Resultaten i denna avhandling syftar till att utveckla programarbetet i byggprocessens tidiga skede avseende att identifiera, värdera och följa upp effektiva och hållbara funktionella och tekniska byggnadskrav avseende brukarvärden.

List of papers

This thesis is based on the following papers

Paper I: Chronéer, D. and Laurell Stenlund, K. (2006) Determinants of an effective product development process: Towards a conceptual framework for process industry. *International Journal of Innovation Management*, 10(3), 237-269.

Paper II: Laurell Stenlund, K. (2010) Using grounded theory method and rich picture diagrams when analysing value creation in houses of culture in Sweden, *Accepted for publication in Built and Human Environment Review.*

Paper III: Laurell Stenlund, K., Ryd, N. and Vennström, A. (2009) Client's decisions in strategic briefs and their impact on user values, *Proceedings 25th Annual ARCOM Conference. Nottingham: Association of Researchers in Construction Management*, 361-370.

Paper IV: Laurell Stenlund, K. and Wihlborg, E. (2010) A time-geographical perspective on stakeholders articulating end-user needs when building houses of culture, *Re-submitted to Building Research and Information.*

Paper V: Laurell Stenlund, K., Ryd, N. and Olofsson, T. (2010) Creating stakeholder value in strategic briefing when building houses of culture, *Submitted to Construction Management and Economics.*

Paper VI: Laurell Stenlund and Eriksson (2010) Design factors' influence on value creation when building Houses of Culture, Proceedings *26th Annual ARCOM Conference. Leeds: Association of Researchers in Construction Management, 2010.*

Table of Contents

List of figures and tables

1 INTRODUCTION

New buildings and housing can be seen as symbols for future hope and may take people one step closer to realizing their dreams regardless of whether it is a new place to live, a summerhouse, a shop, a library or a concert hall. Building houses of culture are in the built environments seen as something new and speculative as they can be valuable through people living and working in the area. When developing and constructing public buildings it is of interest for public clients and construction professionals to understand how and what kind of value these buildings create to stakeholders including end-users. The chapter introduces the background, purpose, research questions and content of this thesis.

1.1 Background

This thesis is about value creation in building houses of culture in Sweden. The thesis describes the complexity for public clients and construction professionals when they develop and construct a building with cultural content with aspects of clients' requirements and end-user needs.

When towns were established, as far back as to the Middle Ages, businessmen building for profit developed the construction industry. During the global industrialisation, increasing market demand for commercial buildings, such as factories, warehouses, offices and shops enabled designers and builders to meet these needs with innovative solutions (Hughes and Hillebrandt, 2003). Technology development enhanced changes in society and forced the industrialization of production (Mokyr, 1990). As wealth is created, a need for

more prestigious and substantial buildings arises (Hughes and Hillebrandt, 2003). Basic conditions, such as technology and demand for a product are thus important to consider when analysing value creation in building houses of culture.

Developing and constructing a new building involves both the questions of *what to build* related to the demand side and *how to build*, related to the supply side. To be more precise, the production of buildings is managed by actors belonging to private and public companies and organisations with different structures and culture. Construction projects is in this thesis described as a chain of input- and output of deliveries from and between private and public industries, such as building, manufacturing, consulting, including design, construction and installation, as well as public administration, education, transport, communication etc. The construction sector has an important impact on the Swedish national economy as well as on the labour market (Bröchner and Kadefors, 2010). Stakeholders are individuals or organisations that are actively involved in the construction project and those interests may be positively or negatively affected as a result of the project (Winch, 2002, Olander, 2007; Olander and Landin, 2008). The balancing of different stakeholder values is central for the construction process (Barrett, 2007).

1.2 The role of the construction client

The construction client is “the person carrying out our having carried out building, construction, demolition or other site works, on his own account” according to the Swedish regulatory code for construction, Swedish Planning and Building Act, PBL (1995). During last decades the construction clients’ responsibilities and roles have been a matter for discussion, arguments and research in different countries (Brandon and Lu, 2008; Vennström, 2008). According to the Swedish Construction Clients Forum (2006) "The construction client is also responsible for interpreting and translating the user's needs, expectations and desires into requirements and prerequisites for the construction project based on society's need for a sustainable built environment." This expanded definition of the construction client’s role also includes the client as an agent for change in the construction industry. The construction client is thus not just the person who pays for the construction, but is also to be seen as the bridge between the stakeholders according to Courtney (2008).

In the meantime there are still many obstacles regarding organisational questions and attitudes to overcome, before the construction client takes the

role as a change agent in the construction industry (Vennström, 2008). For example the Swedish Construction Clients Forum (2010) as well as the Danish Association of Construction Clients (2010) has during the last few years continuously arranged seminars, workshops and educational programs to assist professional clients to develop their leadership role as well as to help them structure their relationships with other professional advisers and construction professionals.

A changed client role may for now also lead to implications for other construction professionals, e.g. architects who have traditionally acted on behalf of the client. The relation between the construction client and other construction professionals is influenced by the specific country's laws, policies and restrictions (Bloxham Zettersten, 2007). The Danish Association of Construction Clients has for example expressed that there is a risk that clients may take on responsibilities that have previously fallen to the supply side (Courtney, 2008, p.38). The client's business together with the business environment will influence the construction project as well as on the relations between the actors. The private client has to argue with competitors and markets, whereas the public client has to argue with stakeholders and private providers. Public and private clients have suppliers that are part of a value chain and thus dependent on the client but also in competition for getting the order as well as higher prices (Boyd and Chinyio, 2006, p. 289).

1.3 Development and construction of public buildings

One important issue for the public client when developing a new public building is to open up communication between different stakeholder groups generating many alternatives, different understandings, new perspectives etc of end-user needs and desires (Commission for Architecture and the Built Environment and Arts & Business, 2008). A concert may for example be performed out in the open air, on the street or in a building, i.e. in a concert hall. The need for a concert hall can thus arise from the need for an acoustic room for the musicians and a shelter for the audience.

In general one could say that public construction project with focus on cultural activities, is always a unique project for the public client. Famous theatre buildings, opera houses, concert halls have in general long life cycles. Today many cities have or are planning to build new opera houses and theatres. The technology development of light, sound and new art performances is putting pressure on new halls. Short *et al*. (2007) argue that the design and construction of arts buildings have been considered to be both very different

from other building types and uniquely complex due to exacting technical demands and the accommodation of the various and sometimes conflicting needs of the many stakeholders. These design factors may be difficult to manage for public clients with no experience of developing these kinds of buildings.

1.4 The house of culture – public buildings with cultural content

During the 20th century until the end of 1970 the public houses, 'Folkets hus' were important meeting places in small villages all over the country, owned and managed by public associations. Nowadays many of these public houses have changed their activities together with their name to become so called houses of culture.

The first time the concept 'houses of culture' was mentioned in Sweden was when architect Peter Celsing gave Kulturhuset, 'The House of Culture in Stockholm', its name in the 1970s. Kulturhuset was built as a cultural complement to the new down central shopping district, since the politicians argued that shopping should be complemented with people's education by giving citizens an opportunity for an easy visit in the public library or in a museum (Laurell Stenlund, 2008).

A house of culture consists of varying venues combining different cultural activities, e.g. a concert hall with a library and an art gallery in the same building (Laurell Stenlund, 2008; 2010). During the last decades many Swedish municipalities have invested money in new houses of culture (SKL, 2008). A municipality has an obligation to its citizens to manage and carry out political decisions. Swedish municipalities have a responsibility to manage health care, education, social care but also financing cultural activities. However, the reasons of why the municipalities have built houses of culture could be different.

Culture, in the sense of performing, creating and experiencing science, music, literature and art, is a fast growing industry. The consumption of culture and experiences increases in society. In 1999 the Swedish Knowledge Foundation introduced the concept of "experience industry" in Sweden (KK-stiftelsen, 2005/2006) to identify, promote and boost Sweden's competitiveness in the fast growing creativity industry. According to Florida (2002) creativity has become a growing force of economic growth.

The investments in culture are however often a matter for discussion, political as well as public. The discussions involve questions of the importance of culture in relation to the political commission and how to use the tax revenue.

1.5 The briefing process

In the early phases of the construction project the client has to make a decision of whether to build or not. Investigations of the conditions, benefits and consequences of an idea, i.e. feasibility studies, are crucial to the client. Construction clients have also to consider organisational objectives as well as needs when making decisions about a construction project (Atkin and Flanagan, 1995). In this early stage, feasibility studies arguing for needs and the importance of conducting the specific project together with profitable investment budgets, facilitate the client's decision of starting a construction project. However, one cumbersome matter with complex construction projects is that before the construction project is settled, different stakeholder values need to be considered and managed (Barrett, 2007).

When the decision is taken, the client's requirements are communicated to and among the actors of the project. Project goals are settled together with the clients' directives on how the project should be accomplished (Winch, 2002). In this stage a strategic briefing process should be performed according to Green and Simister (1999).

The briefing process can be defined as "a dialogue between the client and the construction professionals, normally carried out by the architect, where the client's aspirations, desires and needs are captured and presented in a written form called the 'brief' (Boyd and Chinyio, 2006, p. 11).

Briefing enables the communication of the client's requirements consisting of end-user needs and desires to the construction professionals. The briefing process could be seen as a process in which balanced and ongoing synergies can be created between the client's strategic demands, end-users' operational demands and construction sectors' production demands (Spencer and Winch, 2002).

The briefing process is critical for the delivery of a successful construction project and for a successful building performance (Shen *et al.*, 2004). Yu *et al.* (2006, 2007) argue that the success of the construction project and the building performance depends on how well the project is managed, the kind of

actors involved in the briefing process, the structure of the project and the processes performed during construction.

The performance of the briefing process including actors' engagement and how information and knowledge are communicated has an impact on the briefing process (Fristedt and Ryd, 2004, 2006). Green and Simister (1999) as well as Ryd and Fristedt (2007) argue that strategic briefing is the most problematic stage in the early phases of the process. Strategic briefings are defined here as the processes where the client's visions and overall goals are implemented in the construction project, i.e. when all the players are responsible for adopting the operation's overall goals, developing them and realising them in the best possible way in the individual project (Ryd, 2004, Ryd and Fristedt, 2007). Strategic briefing has thus an important role when managing client's vision and goals and defining the worth of the construction project in the early phases.

The briefing process can also be seen as an integrated process starting in the early phase of the building process (Boyd and Chinyio, 2006). According to Blyth and Worthington (2001), Barrett and Stanley (1999) and Ryd (2003) an integrated briefing process should address the requirements of the client by capturing, interpreting, confirming, and communicating relevant data and issues to the design and construction team during the building process. Criteria for briefing, designing, and building new environments should be based on the evaluation of existing ones. However, these assessments are seldom made, according to Preiser and Vischer (2005).

Value Management, a planned, multidisciplinary group decision-making process, supports the improvement of the value of a project, process, or product in a manner consistent with the business goals of the stakeholders and customers (Connaughton and Green, 1996; Kelly *et al.*, 2003). This approach often leads to cost savings, but more importantly it provides the best outcome for a project by considering a variety of evaluation criteria.

From previous research the need for further research in the early phases of the building process concerns:

- Communication of stakeholder values and end-users' evaluation of the building
- Clients' visions and the operations overall goals

- Effects in terms of value to clients, construction professionals and end-users.

These issues are particularly relevant for public buildings where many stakeholders are involved in the building process.

1.6 Purpose and aim

The overall purpose of the thesis is to explore stakeholder value and explain value creation in development and construction of public buildings. The focus is on end-users needs and how public construction projects are planned, designed and produced to fit the particular needs they are meant to meet.

The aim of this research is to develop a value-based model applied to a case study on public buildings. The model supports briefing in the early phase of the building process.

1.7 Research questions

The research questions are developed from a theoretical economic input, throughput and output perspective, arguing that public buildings create different kinds of stakeholder value. The research addresses five research questions

RQ1) What end-user value has the house of culture created?

RQ2) What stakeholder value was created when building a house of culture specifically for the public client and the construction professionals?

The first and second research questions are about *what* kind of value a house of culture creates? These two questions are studied by stakeholders' evaluation of the House of Culture in Luleå and their perceived value a) from the building in use and b) from the construction project. The first and second research questions are dealt with in papers II and III.

RQ3) How were public clients' values and end-user needs developed into the clients' requirements in the early stage of the building process?

RQ4) How did construction professionals transform the public clients' requirements and end-user needs during the strategic briefing process?

The third and fourth research questions are about *how* stakeholder value is created by stakeholders' and end-users' predicted value of building houses of culture. The value creation processes are limited to the study of how requirements and needs have been communicated between stakeholders and actors. The third and fourth research questions are studied by a retrospective study of the early phases of the building process and the strategic briefing process. The third research question is dealt with in paper IV and the fourth research question in paper V.

RQ5) What factors influence the development and construction of building houses of culture?

This last research question is dealt with in papers I, IV, V and VI as well as creating the basic condition for the development of the value-based model supporting briefing in the early phase of the building process. The model is tested in a study of four other houses of culture using interviews with clients and end-users as well as secondary data describing end-users' evaluation of the building, presented in chapter 5.

1.8 Terminology

Brief is a description of what is included in a project, expresses its goals, the client's values, vision as well as quantities, functionalities and quality of premises for the activities that the project is intended to support (Blyth and Worthington, 2001).

Briefing is the process in which the client's needs, wishes and ambitions are identified, expressed and clarified in the building process (Blyth and Worthington, 2001).

Building is describing any type of building: houses, offices, factories, hospitals, care centres, schools, universities, sport centres, cinemas, shops, restaurants, airports, stations, parking garages, etc. enabling/supporting end-user processes like living, working, caring, learning, recreating and transporting. Building also describes the process during which a house or any other type of building is built.

Building industry is in this thesis synonymous with **Construction industry** (Swedish) and described as input- and output of deliveries from and between private and public industries, such as building, manufacturing, consulting, including design, construction and installation, as well as public

administration, education, transport, communication etc., with an important impact on the national economy as well as on the labour market (Bröchner and Kadefors, 2010).

Building project is in this thesis synonymous with **construction project** with the definition of a project performed by actors within the construction/building industry for the purpose of delivering any type of building to end-users.

Building process is in this thesis used as a combination of activities performed by different actors related to a building during its life-cycle.

Built environment refers to the man-made surroundings that provide the setting for human activity, ranging from the large-scale civic surroundings to the personal places.

Client is the person carrying out or having carried out building, construction, demolition or other site works, on his own account (Swedish Planning and Building Act, PBL, 1995).

Construction client is the person carrying out or having carried out building, construction, demolition or other site works, on his own account (Swedish Planning and Building Act, PBL, 1995) as well as the person who interprets and translates the needs, expectations and desires of the end-user into requirements and conditions for the building and construction projects (Swedish Construction Clients Forum, 2010).

Construction industry (Swedish) is in this thesis synonymous with **Building industry** and described as input- and output of deliveries from and between private and public industries, such as building, manufacturing, consulting, including design, construction and installation, as well as public administration, education, transport, communication etc., with an important impact on the national economy as well as on the labour market (Bröchner and Kadefors, 2010).

Construction project is in this thesis synonymous with **building project** with the definition of a project performed by actors within the construction/building industry for the purpose of delivering any type of building to end-users.

Collaboration is a structured, recursive process where two or more individuals work together toward a common goal that is creative in nature by sharing knowledge, learning and building consensus.

Concurrent Design means that a large number of sequential design activities are co-ordinated and performed at the same time by interdisciplinary teams. Concurrent design in a construction setting is largely a question of interaction between clients, design specialities and contractors by using integrated project groups.

Co-operation is referred to collaborative process in which the actors focus on a shared problem and try to negotiate a mutually acceptable way of solving it. Two or more actors co-operate when they engage in a joint venture for a common goal of which the actions of each are necessary. Co-operation implies trust and sharing of information.

Economics is the social science that is concerned with the production, distribution, and consumption of goods and services.

Feasibility study is the investigation of the conditions, benefits and consequences of an idea before deciding to start a construction project.

House of culture consists of varying venues combining different cultural activities, e.g. a concert hall with a library and an art gallery in the same building (Laurell Stenlund, 2008; 2010).

Public client is in this thesis referred to a client initiating, financing by taxes and developing a public building with the same responsibilities as the construction client.

Stakeholders are individuals or organisations that are actively involved in the construction project and those whose interests may be positively or negatively affected of the effects of the project (Olander, 2007).

Strategic briefing is concerned with understanding the client's business processes and defined as the process where the client’s visions and overall goals are implemented in the construction project, i.e. when all the players are responsible for adopting the operation’s overall goals, developing them and realising them in the best possible way in the individual project (Green and Simister, 1999; Ryd, 2004; Ryd and Fristedt, 2007).

Value Management is a planned, multidisciplinary group decision-making process that supports the improvement of the value of a project, process, or product in a manner consistent with the business goals of the stakeholders and customers (Connaughton and Green, 1996).

1.9 Outline

This thesis is divided in the six following chapters:

Chapter 1 introduces the reader to the background and motivation of this research. Also, the purpose, aim and research questions are also presented together with the delimitations of the research.

Chapter 2 presents the theoretical framework on which the empirical study presented in this thesis is based. The chapter is finally concluded with gaps in recent studies in this area.

Chapter 3 gives an overview of the research design and describes the methods used during this study.

Chapter 4 presents a detailed summary of each appended paper including the title of the paper, authors, publication, research questions in focus, keywords, introduction and objective, method and finally the result and scientific contribution.

Chapter 5 analyses the results from the papers and presents a model for value-based briefing discussed with a benchmarking study of four other public construction projects.

Chapter 6 offers conclusions, discussions and recommendations for future research. The research questions are first answered followed by a discussion about the contribution, trustworthiness, validation and possibilities to generalise the results from this thesis.

The content of this thesis is based on six appended papers (four journal papers and two conference papers) and the combined analysis of these results. These papers are summarised below in chronological order with a description of their content as well as the authors' contribution to the work presented in the paper.

1.10 Appended papers

Paper I: Chronéer and Laurell Stenlund (2006) Determinants of an effective product development process: Towards a conceptual framework for process industry. *International Journal of Innovation Management*, 10(3), 237-269.

The first paper appended in this thesis gives a theoretical framework to product development in general as well as an introduction the theoretical framework presented in this thesis. The paper has resulted in an understanding of how different factors in three groups: innovation type, technology strategy and organisational aspect (i.e., the company's own unique attributes) influence, as well as are influenced by, the specific industry.

The paper presents the results from three separate studies: a qualitative case study of four steel and paper companies from 1997 to 1999; a qualitative case study of three steel and metal companies from 1998 to 2000 and a quantitative survey of 50 mining, steel, paper, rubber, plastic, chemical and dairy companies conducted 2000-2003.

My contribution to the paper has been to conduct the second qualitative case study (with data collection and analysis). The paper was written together with Diana Chronéer, who was the main author; the main part of the literature review together with two of the three studies was performed by her. However, together we conducted analyses within and among the three case studies resulting in paths of product development processes presented as a narrative insight into product development in the process industry. The results from the analysis, our conclusions and theoretical discussions are results from our collaboration and presented in the paper.

Paper II: Laurell Stenlund (2010) Using grounded theory method and rich picture diagrams when analysing value creation in houses of culture in Sweden, accepted for publication in *Built and Human Environment Review.*

This paper describes how grounded theory methods (GTM) and rich picture diagrams (RPDP were used when analysing stakeholder value when developing and constructing houses of culture. A first version of the paper, blind reviewed, was presented at the RICS construction and building research conference in 2009. The paper was then developed, submitted, blind reviewed and resubmitted to the journal *Built and Human Environment Review*.

Paper III: Laurell Stenlund, Ryd and Vennström (2009) Client's decisions in strategic briefs and their impact on user values. *Proceedings 25th Annual ARCOM Conference. Nottingham: Association of Researchers in Construction Management*, 361-370.

Paper three presents the empirical data and a qualitative data analysis from the in-depth case House of Culture in Luleå. The results from the study show that the public client's decisions in the early phases of the building processes were crucial to the development of end-users' value. The public client's role of combining different cultural activities in one building, together with the communication between construction professionals in strategic briefing, contributed to a successful construction project as well as to end-users' successful evaluation of the final building.

My contribution to the paper has been to analyse how the public client's decisions affected the community and its citizens by studying the requirements formulated in the strategic brief. First a content analysis of the data (from interviews, archives, documents and open questions in a survey) was performed. Data was first categorised into two main fields, the building process and the building performance. Secondly the data was coded and analysed by using the model for values surrounding building, developed by Boyd and Chinyio, (2006, p.80). This paper was written with Nina Ryd and Anders Vennström, who assisted in the theoretical framework and in drawing conclusions.

Paper IV: Laurell Stenlund and Wihlborg (2010) A time-geographical perspective on stakeholders articulating end-user needs when building houses of culture, re-submitted to *Building Research and Information*.

The fourth paper presents the analysis of how stakeholders expressed end-user needs in the early phases of the building process. The analysis, performed by means of a time-geography approach, resulted in an analysis of how stakeholders moved between phases until the construction project and procurement forms were settled with the contractors. The results give new understanding of how and when different stakeholders express end-user needs differently. The study shows how stakeholder groups consisting of politicians and public administration identified the public client's values before the construction project was decided and settled. During the planning process the public client's values were developed into specific client requirements. By opening up the early phases of the building processes, through a time-geographical perspective, theses can be visualized and integrated and thereby

show the complexity of end-user needs in public building processes. The co-author was Elin Wihlborg, who assisted in developing the evaluation model and in drawing conclusions.

Paper V: Laurell Stenlund, Ryd and Olofsson (2010) Creating stakeholder value in strategic briefing when building houses of culture, *Submitted to Construction Management and Economics*.

The fifth paper investigate how stakeholder value is created in strategic briefing by focusing how construction professionals have transformed public clients' requirements and end-user needs during strategic briefing. Data was collected by means of interviews, archives and documents as well as a survey. The result from the study shows how stakeholder value is created during the strategic briefing process. In the case of the house of culture strategic briefing created different solutions to the building's final performance evaluated by the visitors of the house of culture expressed in use value: Form & Shape, Activities and Place & Space. This paper was written with Nina Ryd and Thomas Olofsson, who assisted in developing the theoretical framework and in drawing conclusions.

Paper VI: Laurell Stenlund and Eriksson (2010) Design factors' influence on value creation when building Houses of Culture, Proceedings *26th Annual ARCOM Conference. Leeds: Association of Researchers in Construction Management, 2010.*

This last paper presents the analyses of a survey of visitors to a house of culture. A questionnaire was handed out randomly on seven different occasions when different cultural activities in the building were performed. Multiple hierarchical regression analyses revealed that technical and multifunctional design factors have an impact on end-users' experience of the activity performed in the building. These different types of design factors contribute to the understanding of how clients and construction professionals can develop public buildings for cultural activities creating landmarks in small cities. The co-author was Per Erik Eriksson, who assisted in the statistical analysis and drawing conclusions.

2 THEORETICAL FRAMEWORK

How can value creation and benefits of a public building be analysed? A theoretical framework for analysing value creation in construction of public buildings and the effects for public clients, construction professionals and end-users is presented here. First the value concept is presented in terms of value creating processes and by defining a project's value, worth and values. These two sections are followed by a discussion of benefits to clients, construction professionals and end-users when developing and constructing public buildings. The chapter is concluded by presenting the research questions in an analysis model developed from the theoretical framework.

2.1 Value creating processes in construction industry

An effective product development process is a way of organising and managing activities, resulting in either the production of a given output with fewer resources, i.e. lower costs (efficiency), or the production of better or new products (effectiveness) (Chronéer and Laurell Stenlund, 2006). Product development is in this thesis described as the process that identifies a market opportunity and transforms it into a product available for sale (Krishnan and Ulrich, 2001). To transform an idea into a product requires thus an organization that can adapt to changes and focus on required activities. Studies of the process industry highlight the importance of having a customer focus as well as a production process focus when determining innovation in product development processes (Chronéer, 2003; Chronéer and Laurell Stenlund,

2006). The change of perspective and the content of product development, i.e. new ideas and new ways of developing new ideas within intra-firm and inter-firm processes are also influence on an effective product development process in process industry. Intra-firm processes include the integration of technology strategies with the firm's overall goals and the organization of teams in product development activities. The team members are suggested to work together in development projects where individual competence and knowledge are developed and organizational learning processes are created. Inter-firm processes include the cooperation with customers and suppliers and building networks in the industry (ibid). Brown *et al.* (2001) argue for the importance of integrating product development activities that emphasize the response to customer expectations of the construction processes.

2.1.1 Intra-firm processes: value chains

When studying companies' abilities to create value and by that achieve a competitive advantage, the method of analysing the generic value chain developed by Porter (1994) has been a common analytical tool. The value chain divides the processes into different kinds of activities, the primary activities, i.e. into manufacturing companies such as logistics, operations, marketing and sales and services and into the supporting activities, i.e. manufacturing companies in firm infrastructure, human resource management as well as research and development. The organisation of and strategies for primary and secondary activities, creates a value to the company and its stakeholders. According to Porter (1994) the generic value chain also answers the question of how the company is going to achieve its mission and goal.

A difficulty in using the generic value chain, when describing the primary and supporting activities within construction industry, is that construction industry and its stakeholders belong to different companies and that construction companies in common have a project organisation (Winch, 2002; Gray and Hughes, 2001; Bröchner and Kadefors, 2010; Segerstedt and Olofsson, 2010). It could be argued that the main difference between construction industry and manufacturing and process industries is the formal organisation. Traditionally, construction industry has mainly been organized in *projects.* Manufacturing and process industries are mainly organized around their production processes within the specific company: by *assembling batches*, e.g. in care manufacturing companies and in continuous *production flows*, e.g. in steel companies (Chronéer and Laurell Stenlund, 2006). Construction industry on the other hand is viewed to have certain peculiarities of construction, like one-

of-a-kind products, temporary organisations, and site production, preventing the attainment of flows as efficient as in manufacturing (Koskela, 2000).

2.1.2 Inter-firm processes: supply chains, networks and stakeholders

Segerstedt and Olofsson (2010) argue that the construction industries differences among other industries must find other solutions and concepts for improving performance and efficiency. The organisational Inter-firm processes in construction companies could be identified by the supply chains and networks consisting of different supplying construction companies, e.g. architectural offices and contracting firms, engaged in the early phases of the construction project (Bröchner and Kadefors, 2010; Segerstedt and Olofsson, 2010). In the early phases of a construction project, these inter-firm processes may create a creative chaos developing new ideas of buildings and constructions. According to Gray and Hughes (2001) the collaboration between individuals is part of the wider collaboration between firms in the construction sector. The construction industry is thus characterized as networks of transactions, a phenomenon that exacerbated discontinuities in the process, but an inevitable feature, given the nature of the tasks and the market (ibid, p. 23).

London and Kenley (2000) adapted Lambert *et al.* (1998) model of supply chain structure form an industrial organization perspective and put the client organisation in the focal point, the system integrator. Vrijhoef and de Ridder (2005) developed this concept further and discussed two strategies for integration; supplier driven integration and client driven integration. In the case of a design-bid-build project the professional client acts as system integrator in the supply chain (London and Kenley, 2000).

Both the supply chain as well as the network consists of different actors having different interest in the construction project. These stakeholders also have different roles in the construction sector as well as in society. Internal stakeholders, active in the construction sector may on the one hand act as clients, financiers and users, on the demand side, and on the other hand act as architects, engineers, contractors and materials suppliers, on the supply side, in the specific construction project (Winch, 2002, p.67). External stakeholders also have a direct interest in the project and can be broken down into private actors (e.g. local residents) and public actors (e.g. local government) (ibid.).

2.1.3 Activities developing new public buildings

According to Barrett and Sutrisna (2009) the chronological nature of the construction project consists of four stages: pre-design, design, construction and occupation. In the pre-design phase the question of what to build is central. In the design phase the architect is the central actor designing the building according to the client's requirements. The design documents are incoming inputs to builders and contractors realising the building.

According to Gray and Hughes (2001) design activities combine the demand side with the supply side. During design clients' requirements and end-users' needs are communicated into visible requirements and transformed into functional and technical solutions (Gray and Hughes, 2001). Saxon (2005) argues that the design of the building should include technical and functional solutions supporting the activities performed in the building when creating an added value in the building processes.

Clients in the performing arts sector tend to be highly focused on the delivery of their original vision. Designing and delivering buildings for arts clients appears also to require additional commitment from construction professionals. Giving form to a coherent "artistic vision" and translating the "vision" into a building design is a cumbersome matter. Dynamic tools and technologies are required to achieve the journey from an emerging and dynamic vision to a built artefact, which is sufficiently uncompromised to deliver that vision (Short *et al*., 2007).

A guideline for clients developed by the Arts Council in England (Commission for Architecture and the Built Environment, 2009a) presents ten steps through the process of creating an arts building. The ten steps go through a general described construction project: prepare, design, construct and use (to be compared with Barrett and Sutrisna, 2009: pre-design, design, construction and occupation and the empirical results from the study presented in this thesis: idea/decisions, design, construction and use).

Designers work in different ways but a common element in the design stage is to implement the design brief and prepare additional data. The design brief includes documents describing the project's very outline, strategic, structural, mechanical and electrical proposals, an outline specification (a written account of proposed materials, forms of construction and performance standards for the building envelope and its key spaces) together with a preliminary cost plan

(Commission for Architecture and the Built Environment, 2009a). The importance of the design stage is described as follows:

> It is at the design stage that most can be done to optimise the value of a building. *National Audit Office, Modernising construction, 2001* (in Commission for Architecture and the Built Environment, 2009a)

2.1.4 Value creation over time and in space

Activities performed within the construction project or even before the project starts are performed in intra- and inter firm processes, i.e. in space and developed over time during different stages in the building process. Time and space are essential cornerstones in analysing the built environment as the concepts are in time-geography. Time-geography builds on a holistic approach to analysing how projects are fulfilled by the resources that the actors have access to and constraints they experience (Hägerstrand, 1985; Thrift, 2005). Time-geography was developed in the 1950s by Hägerstrand to provide tools to combine time-space analyses (Hubbard *et al.*, 2004; Hägerstrand, 1976; 1985). The theoretical approach has become a foundation of different forms of analysis such as innovation diffusion studies as well as everyday life in households (Ellegård and Wihlborg, 2001).

Value creating process in construction industry consists thus of activities that are performed and developed over time during different stages in the building process.

2.2 Values, worth and value contribution of a construction project

There is a difference between value and values (Wandahl *et al.*, 2007). In this section values related to business concepts, worth related to construction projects and value contribution in terms of product quality (Ryd, 2008) are described, see Figure 1. As showed in Figure 1 the definition of values is discussed from a general perspective and then related to the business concepts through a discussion of stakeholder values. The worth of a project is discussed in relation to client's vision of and goals for the construction project. Value contribution is discussed from a product quality perspective, from the construction professionals' perspective (supply side) as well as from the clients' and end-users' perspective (demand side).

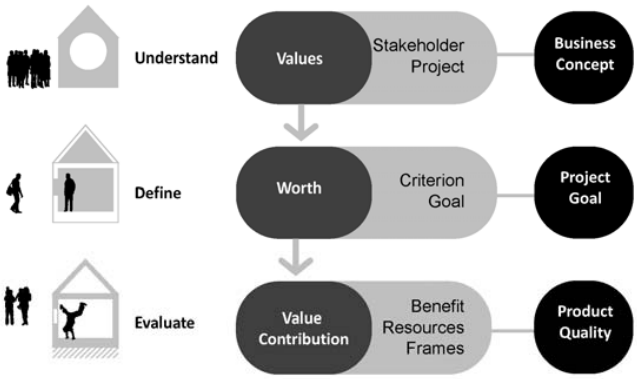


Figure 1 To understand, define and evaluate construction projects
(Ryd, 2008 developed after Saxon, 2005)

2.2.1 Stakeholder values

Values are grounded in personal beliefs, social norms and rules developed in society or related to specific groups, i.e. they are culturally conditioned. Values are principles by which we live (Wandahl *et al*., 2007). They are visualized by the individuals' habits and manifested in society by people's attitudes (Banyard and Hayes, 1994, pp. 378-399). Societies are built on religious values, political values, scientific values, social values and so on. Technology innovation as well as market globalization has been described as an important source to international, national, regional changes influencing scientific and social values (Hughes and Hillebrandt, 2003; Mokyr, 1990; Ziman, 2000). Developing new scientific and social values on one level in society also influences the individual values over time. However, change processes in organizations and society take time; one reason is that individuals have difficulties in changing their values thus values are embedded deep in humans' personality and behavior (e.g. Argyris, 1999). Organizational theories describe how organizations' business concepts have developed through individual values, i.e. from the companies' founders through leadership and management (e.g. Schein, 1988). In the building process values are the core fundament of successful interpersonal communication, coordination and understanding, e.g. cooperation (Wandahl *et al*., 2007).

Stakeholder values are different due to the specific organizational belonging, their position in society and their personal interests. Some stakeholder groups have a strong influence on society, i.e. legitimate demands and power to use their values when putting pressure on politicians and private and public organizations (Freeman, 1984; Mitchell *et al*., 1997). Stakeholder values should be managed and balanced in the building processes (Barrett, 2007) giving an understanding of the business concept (Saxon, 2005).

2.2.2 The worth of the project

The construction project should make sense to its owners, users, initiators, developers and above all to its investors when realized. Politicians as well as the public client have thus a responsibility to consider citizens' desires and demands, in many cases represented by interest groups.

When investing in a new building with cultural content, the local government, the municipality and the politicians have to make decisions regarding a new theatre or a concert hall. Politicians use different arguments based on their political agenda but also on the municipality's commission of acting as a public client when conducting a construction project as well as on the financial situation. Clients' arguments, preferable in terms of a vision and goals, when initiating and developing a construction project describe the worth of the project.

After the decision the client's business processes should be communicated to the actors in the construction project. Strategic briefing (Green and Simister, 1999) by implementing the client's visions and overall goals is important (Ryd 2004; Ryd and Fristedt, 2007). According to Ryd and Fristedt (2007) all the players in the strategic part of the briefing process are responsible for adopting the operation's overall goals, developing them and realising them in the best possible way in the individual project. This process also involves the identification and documentation of the different stakeholders' aims and goals (Lindahl and Ryd, 2007). The written brief describes how the client's requirements and end-user needs are going to be fulfilled (Boyd and Chinyio, 2006).

The second stage of the briefing process comprises the conceptualization of built solutions and issues of performance specification. During this second stage the client's requirements and end-user needs are transformed into functional and technical documents (Barrett and Stanley, 1999; Green and Simister, 1999; Ryd, 2003).

2.2.3 Value contribution in terms of product quality

The value concept in construction is in general described in terms of quality referring to product, services, functions, etc. which fulfil the client's needs and requirements and are hence related to the physical building, its design and use as well as to the total cost of the building (Wandahl *et al.*, 2007). Saxon (2005) defines value as it is what you give in relation to what you get and it is personal and not an objective fact. From the field of quality technology and management quality is defined as follows:

> "The quality of a product or service is its capability to satisfy or preferably exceed the customer's need and expectations" (Bergman and Klefsjö, 1995, p.17)

2.3 Evaluating the benefits of public buildings

The benefits of a construction project could be described by the traditional project model, see Figure 2, with focus on quality, time and cost, which also defines the success of the construction project (Winch, 2002, p.185).

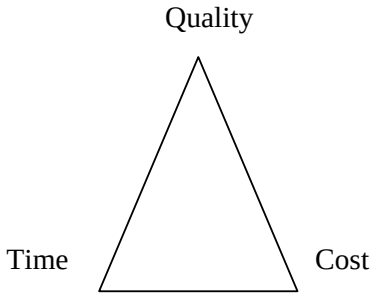


Figure 2 The traditional construction project model

2.3.1 Quality measures for clients

The classical Vitruvian formulation of the building's quality of architectural design in terms of 'commodity, firmness and delight' is still today used by clients, architects and other construction professionals when developing evaluating criteria from end-users' needs when evaluating the building performance. Common among design terms today is to use an expression of the end-users' desired properties of utility, durability and aesthetics in the final building (Courtney, 2008).

Another perspective on the building's quality is an economic, social and environmental perspective on the value of the product quality. For the construction client, private as well as public, the global expressed need for sustainable development highlights that construction clients ought to consider societies' needs for a sustainable built environment in accordance with the Brundtland Commission report (United Nations, 1983).

Value management literature emphasizes the benefits of building performance to clients where benefits are quantified in business terms: relationships among costs, time, and quality where quality includes esteem, exchange, and use value (Kelly *et al.*, 2003).

Winch (2002, p. 57) suggests that the construction client could apply the concept of product integrity when defining the intention of the product, see Figure 3.

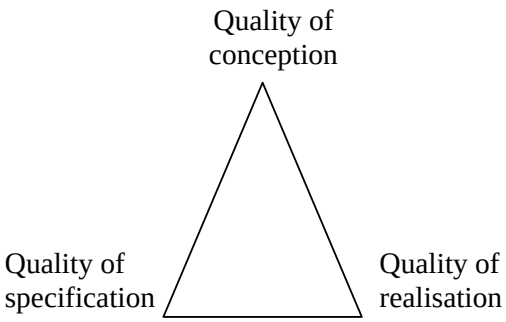


Figure 3 Product integrity in construction: the quality of intention
(Winch, 2002, p. 58)

The three dimensions of the integrity of the constructed product are defined in terms of quality, because what is central to the creation of new value is the quality of the asset resulting from the process according to Winch. The dimensions of integrity are described by Winch as follows:

- The symbolic aspects are captured by the quality of *conception*, in terms of elegance of form, spatial articulation, contribution to the urban culture, and the like, measured through the professional peer review process.

- The functional aspects are captured by the quality of *specification*, in terms of the fit and finish desired, and the fitness for purpose of the completed facility measured through performance in use.

- The programme and budget are assessed by the quality of *realisation*, in terms of the objectives set for programme and budget, and the service delivery experience for the client measured through process benchmarks for comparator buildings.

The trade-offs within and between the three criteria take many forms and have to be made according to Winch (2002, p. 58).

The public client, when investing in a public building, may have an interest in developing the municipality and the region by creating an economic value in terms of increased population and new taxpayers but also in terms of creating social value to citizens (Macmillan, 2006).

Buildings for sports venues create a social value for their users, that is, e.g. for the football team and the audience. When the sport arena is also useable for other events than sports, for example a conference, the building is used for multiple activities with possibilities to give back both an economic and a social value to its stakeholders. Icon buildings symbolize urban revival and also create a brand mark for the city or country (Jencks, 2005). According to Bröchner (2009, p. 21) monumental buildings, landmarks or icon buildings signal innate qualities of cities, devised to attract temporary visitors or more permanent settling of firms and individuals. The example that everybody mentions is the case of the Sidney Opera. The Sidney Opera has created both a symbolic value to the city and its citizens and an economic value to its occupying organisations (CRC Construction Innovation, 2007). Another example is the "Bilbao effect" (Anon, 2007) which describes how architects have created brand marks and how urban revival has been driven in the community.

In the following quotation the value of a public place to its citizens is described.

> […Delivering the best possible service to the local community is the goals shared by all local authorities. In our cities, residents especially value our parks and green spaces for their amenity and facilities, as well as for the presence of nature in the urban realm. It can be difficult to place a value on what parks mean to people.

> It is much easier to identify costs. Oscar Wilde quipped that a cynic is someone who knows the price of everything but the value of nothing. I am no cynic but it is essential that we have an informed basis for deciding what we spend on our parks to maintain them. …] *Barry Quirk, CBE, Chief executive, London Borough of Lewisham* (Commission for Architecture and the Built Environment, 2009b)

Environmental questions have also become important for construction clients to manage, e.g. the utilization of resources and energy consumption (Preiser and Vischer, 2005).

2.3.2 Quality measures for construction professionals

The relation between the client's quality intention regarding the product and the construction project's quality intention regarding the process integrity (Winch, 2002, p. 186) is described in Figure 4.

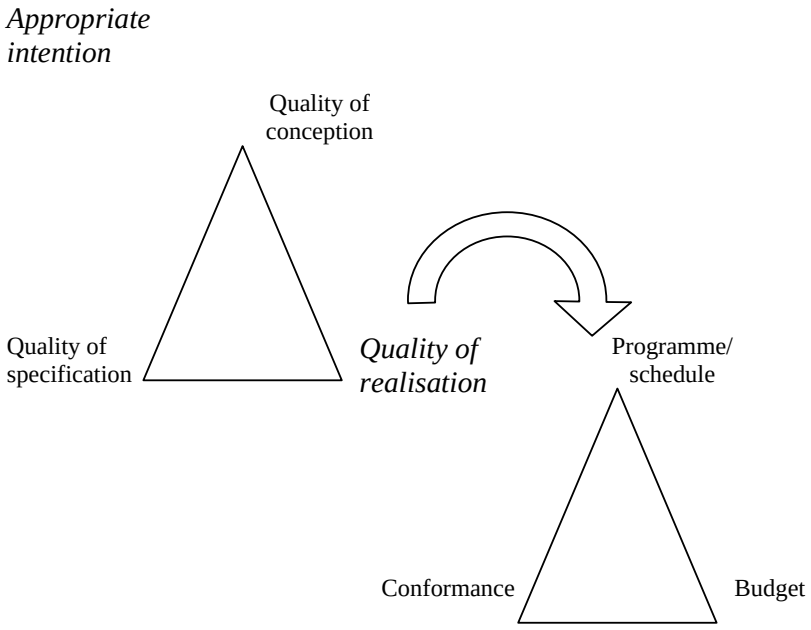


Figure 4 Product and process integrity in construction (Winch, 2002, p. 186)

During the briefing process the client's *appropriate intention* is defined together with the project's vision. Managing the process of *realising* that mission through planning and execution on site are important design and construction activities, in Figure 4 termed Programme/schedule, Budget and Conformance. A successful construction project delivers a product demanded by the client. For construction professionals the benefits of a construction project are described in the success of performing the project on time, building it to costs in the budget and in accordance with the client's requirements, already procured with the client.

The construction project thus creates economic benefits directly for the actors putting resources in the building processes. This perspective is based on the input-throughput-output perspective of economic growth theories meaning that an input of different resources is used and developed in a context (throughput) that affects the use of resources, leading to an output in terms of economic profit (Coase, 1937/1998). Bon (2001) argues that the building process should be described as an economic process with an input-output perspective.

According to Flanagan *et al*. (2007), the performance within the construction industry is generally discussed in terms of productivity. Various productivity measurements, i.e. labour productivity, capital productivity or total factor productivity, have captured the cornerstone of research on achieving excellence in the construction industry. Productivity is generally seen as a measure of effectiveness.

However, Flanagan *et al*. (2007) have recommended a shift, from looking just at productivity, to the wider concept of competitiveness. On the construction project level, competitiveness refers to a contractor's capacity to compete for a project (Flanagan *et al*., 2007). It enables a contractor first to win the contract and secondly to undertake the project successfully. Clearly, competitiveness for a project stems from the competitive advantage possessed by a firm. Competitiveness for a project varies according to project attributes such as type, size, and so on. Competitiveness for a project also depends on the competitive strategy a contractor adopted to compete for that given project according to Flanagan *et al*. (2007).

Construction professionals will gain benefits in terms of increased productivity and thereby cost savings and they may also develop a competitive advantage from the specific construction project when using and developing resources in an appropriate way in production (e.g. Penrose, 1959; Hamel and Prahalad, 1994). Using and developing unique resources (Grant, 1991) and dynamic

organizational capabilities determine the success of the company (Dosi *et al*., 2008). A sustainable competitive advantage is also created when pursuing a business vision and a strategy (Grant, 1991; Shoemaker and Amit, 1997). The type and size of the construction project influence the competitiveness for a project (Flanagan, *et al.*, 2007).

The benefits developed for construction professionals when conducting a construction project could thus be traced to resources and activities performed in the briefing process by identifying value adding activities performed in intra- and inter-firm process, i.e. value chains, supply chains and networks.

The time factor defined by the programme and the schedule of the construction project are crucial for the success of the construction project. Business activities as well as public activities need to be performed, where a construction project overrunning its times schedule may have a negative influence on the business activities as well as on public activities (Murdock and Hughes, 2008). Planning artists and performances is made a long time in advance. For concert halls and theatres the costs for cancelling planned performances with popular artist may be very expensive. The time factor is thus also related to the cost factor. Overrunning material and construction budgets will have a negative influence on the construction project. Experiences from developing buildings with artistic design constructions have shown that many of these buildings exceed the project budget (Short *et al.*, 2007). These buildings are known to be expensive to build, and increased costs will consequently give the client problems. The construction project's parameters: time and costs, are thus important criteria to consider when defining the benefits of developing and constructing a public building. The customer in a construction project is synonymous with the client. In the meantime, when the client not is the same person using the building, the construction project should also consider the client's customer.

A construction project may be successful in costs and time as well as in delivering a building according to the written brief, the client's requirements and the building documents, but fail in quality due to end-users' evaluation of the building, i.e. a failure in identifying the customer's customers' needs. This failure indicates a briefing problem (Winch, 2002, p. 183).

2.3.3 Quality measures for end-users

End-users' evaluation of a building is in general based on functional and technical solutions of the final building (Preiser and Vischer, 2005). Quality

can thus describe something that is good, that works and does not fall into pieces (Strannegård, 2007).

> "But, if we shall get the things that we think are good, we need to define what we mean about quality. The problem is that today we have many criteria difficult to define and specify. How do we measure beauty? How do we measure the good thing? How do we measure non quantitative values? (Strannegård, 2007, p. 10)

The questions quoted from Strannegård describe the difficulties in defining and quantifying a product's quality in terms of value to the customer. With a customer perspective on the product, the quality of a building could be described in terms of market value and utility value as follows:

> "Utility value is associated with the technical architectural, and functional use of the construction, e.g. brick type, tip lighting, colour, usability, flexibility etc. Market value is related to demand and describes how much a customer is willing to pay for the value of the product." (Wandahl *et al.*, 2007)

Value is accordingly what one gives in relation to what one gets and it is personal and not an objective fact (Saxon, 2005).

Feedback systems from earlier construction projects are suggested to support the construction professional in defining end-user needs in the briefing process (Barrett and Stanley, 1999; Green and Simister, 1999; Kamara and Anumba, 2001; Gray and Hughes, 2001; Ryd, 2003; Preiser and Vischer, 2005). Feedback systems (Building Performance Evaluation) regarding the building performance with focus on end-users evaluation of the building, are developed from Maslow's human needs hierarchy, into hierarchical system of users' needs and synthesized into the 'habitability framework' (Prieser and Vischer, 2005).

According to Preiser (1983) is the 'habitability framework' important when developing information systems based on the links between human behaviour and the physical environment with a system approach. The framework consists of the *elements of habitability*: 1) Buildings and settings, 2) Occupants and Occupant needs and 3) the subscale of each element: work station, room, building; individual, group, organisation, health/safety, functional performance, psychological comfort and satisfaction. The *built environment* addressed the hierarchy of scales, 1) region: an assembly of communities on

the geographic scale; 2) community: an assembly of city blocks or neighbourhoods; 3) facility: a complex of buildings such as a military base, a campus, etc, 4) building: an assembly of rooms or spaces; 5) room: an assembly of work stations or activity/behaviour settings; 6) activity setting: the proximate environment in which behaviour occurs e.g. a workstation.

Building Performance Evaluation creates systematic feedback and evaluation during every phase of building delivery, ranging from strategic planning to occupancy, throughout the building's life cycle (Preiser and Vischer, 2005). Client needs and goals that arise out of end-users' interaction with a range of settings in the built environment are redefined as performance levels. As a consequence, BPE systematically compares the actual performance of buildings, places, and systems to explicitly evaluate expected performances as they relate to pre-determined criteria.

The usefulness is in literature described as utility and can be related to a predicted result, a business goal or be compared with costs and benefits of a predicted investment, e.g. by a cost-benefit analysis and marketing studies (Cascio, 2000; Kelly *et al.*, 2003; Nyström and Sjögren, 2008).

The quotation from an architect describes the importance of creating a building that considers not only the latest technology but also creates a building with feelings:

> In the less utilitarian buildings it is essential to evoke deliberately an emotional response from those who use and see them. A relevant example of this is the design of theatres, which, although they may have the latest technology, are failures when they have no magic. *Peter Moro: A sense of proportion, memoirs of an architect, unpublished MS, 1990:76* (in Commission for Architecture and the Built Environment, 2009a)

In the early phases, when developing and constructing a public building with cultural content, it is thus important for the client and other construction professionals to evaluate the end-user needs and understand the development of end-users' value in terms of market value as well as utility value including the 'magic' and tacit feeling of the building.

2.4 Research questions in analyses model developed from theoretical framework

In Figure 5 the first and second research questions are illustrated by the triangle to the right concerning end-users' values, goals and benefits of public buildings. According to Wandahl *et al.* (2007) value should be seen from a product view and a process view. The product viewpoint summarizes the client's requirements on the product, e.g. quality, usability, flexibility, design, price, etc. The process viewpoint summarizes the cooperation among stakeholders in the building processes. The success of the construction project is thus highly dependent on the personal values of the participants and the common values of the project (Wandahl *et al.*, 2007). The clients' quality of intention, as presented in the model The Product integrity in construction: the quality of intention (Figure 3, Winch, 2002, p. 58) describes also client values, goals and benefits, expressed in terms of Specification of utility: economic value; Conception by aesthetics: social value; Realisation by durability: environmental value.

In Figure 5 the third research question concerns the question of how public clients' values have been developed into clients' requirements. The fourth research question presented in Figure 5 concerns the transformation of clients' requirements and end-user needs in briefing. The transformation in the briefing process is described by the relation between the public clients' values, goals and benefits of a public building and the construction project in terms of the construction professionals' values, goals and benefits, when planning, conducting and accomplishing a construction project. The relation is based on the Product and process integrity in construction (Figure 4, Winch, 2002, p. 186). Finally the fifth research question is presented in Figure 5. This research question concerns the relation between the client's and end-users' utility value and the factors influencing the development and construction of building houses of culture. This relation is based on previous research in the field of value management regarding use value (Kelly *et al.*, 2003).

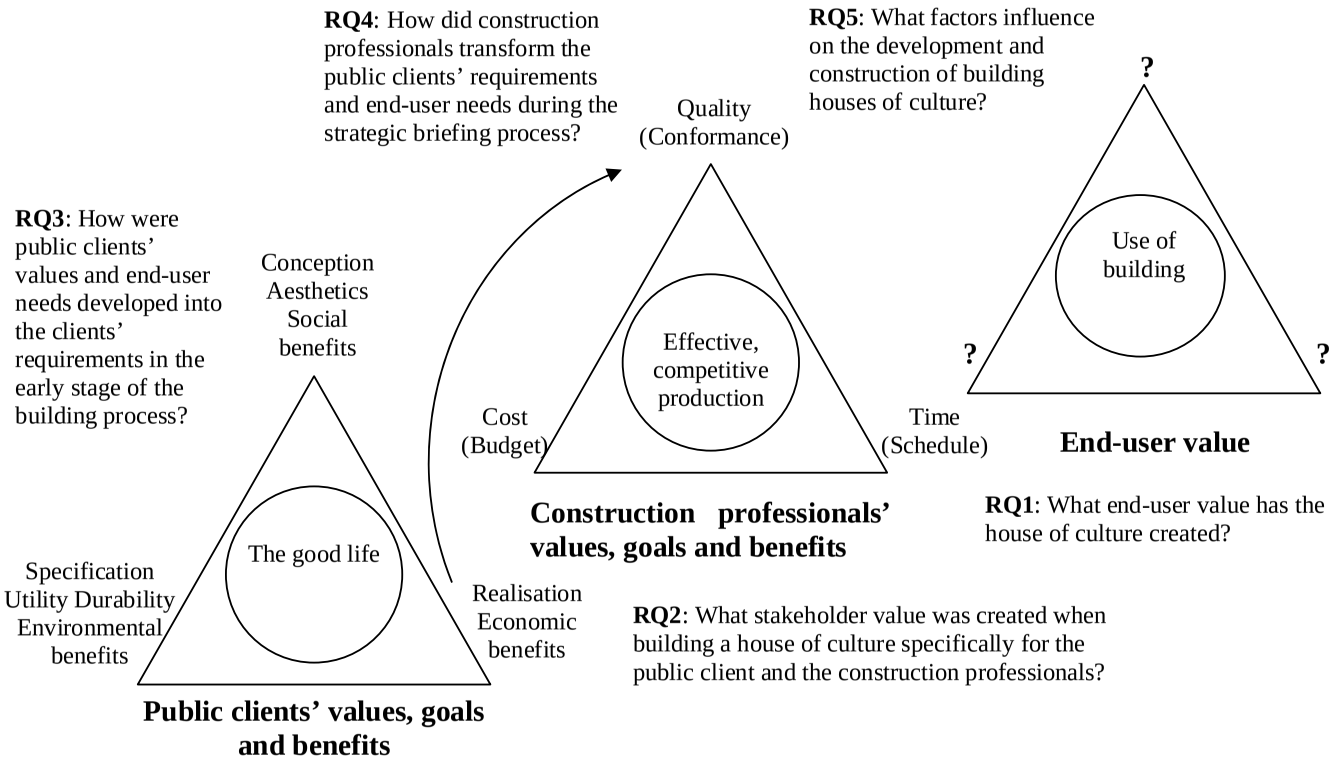


Figure 5 Research questions in analysis model developed from theoretical framework

3 METHODOLOGY

Research projects and research design may be seen as two sides of a coin, thus the validity, reliability or trustworthiness of the research project are effects of the applied research design and its methods. The coin is the methodology.

3.1 Research design: case study methodology

The purpose of the thesis, to explore and explain value creation in development and construction of public buildings, involves research questions such as *what* and *how (*Alvesson and Sköldberg, 2000). According to Yin (1994, p. 6) research design concerns first the selection of a research method related to the type of research questions. "What questions' are suggested to be suitable for survey and archive analyses, and 'how questions' for case studies and history studies (Yin, 1994). However, the case study methodology also allows a research design of what and how questions by combining qualitative and quantitative data analyses (Eisenhardt, 1989; Yin, 1994).

The case study underpinning the analyses presented in this thesis is based on the complex methodology where different forms of data are collected and analysed in several steps (Eisenhardt, 1989). The case study methodology was chosen based on its possibilities to include different types of data analysis within one study.

The expectation of the accomplished study is to contribute to the development of new methods and tools in briefing with a value-focused approach for clients and construction professionals, including designers (Winch, 2006; Atkin, 2009,

pp. 145-147) within the research discipline of Construction Management, CM (Langford, 2009, p. 4). CM is seen as one of six sub-categories of Building in the field of Architecture, Building and Planning (Langford and Hughes, 2009). Improving processes and product value has been studied in CM based on theories from adjacent management disciplines e.g. economy, industrial organisation, psychology and sociology. Theories regarding improved processes are found and developed within Lean production (Womack *et al.*, 1990) and Lean construction (Koskela, 2000). Wandahl *et al.* (2007) argue that a transformation of the value concept into the context of construction projects not is straightforward and needs to be further investigated. Previous studies (for example Short *et al.*, 2007) have discussed that arts clients require additional commitment from construction professionals. Value creation in development and construction of houses of culture is thus relevant to investigate by means of a case study. In this chapter the research framework and research process with its different methods will be presented.

3.2 Research framework and research process

The research design is based on qualitative research methods (Miles and Huberman, 1994; Denzin and Lincoln, 2008), the design of case study research (Yin, 1994), grounded theory building (Glaser and Strauss, 1967) and the extended work made by Eisenhardt (1989) in areas such as a priori specification of constructs, triangulation of multiple investigators, within-case and cross-case analyses, and the role of existing literature. In Table 1 a summary of the research design and research process is presented. The first column categorises the study in eight steps, following Eisenhardt's process of building theory from case study research. The second column in the table describes the research process in terms of the main objectives of the thesis, related to Eisenhardt's process steps and to the overall purpose and aim of the thesis. The third column describes the main activities, the work tasks, performed during the research process documented in appended papers and research reports (column six). The fourth and fifth columns present data collection and analysis methods for the specific activity. Finally column seven combines the research process activities with the research questions.

Table 1 Research framework and research process

Step in research process	**Main objectives in thesis**	**Work tasks in analysis**	**Data collection methods**	**Analyse methods**	**Main output**	**Research questions**
1. Getting started	1. Develop research questions	1. Product development, Value adding activities	Literature study Individual interviews Observations Archive Documents	Case study Qualitative & quantitative data Content analysis Descriptive	Paper I Pre-study report**	Theoretical background Preliminary information gathering
2. Selecting cases	2. Define the concept of Houses of Culture	2. Investigate current research	Literature study Individual interviews Observations Archive Documents	Content analyse Descriptive	Pre-study report** Research report** Paper II	Preliminary information gathering
3. Crafting instrument and protocols	3. Investigate analyse methods	3. Investigate current research methods	Literature study	Case study Qualitative & quantitative data Grounded theory methods	Thesis Paper II	RQ all RQ1 & 2

Step in research process	Main objectives in thesis	Work tasks in analysis	Data collection methods	Analyse methods	Main output	Research questions
4. Entering the field	4. Evaluate client's requirements *1	4. Evaluate values, worth, and value	Literature study Individual interviews Observations Archive Documents Survey	Case study Qualitative & quantitative data Content analysis Descriptive, Analytic	Paper III Research report**	RQ1& 2
5. Analysing Data	5. Evaluate stakeholder value *2	5. Evaluate stakeholder value	Literature study Individual interviews Observations Archive Documents Survey	Case study Qualitative & quantitative data Grounded theory methods Descriptive	Paper II Paper III	RQ1 & 2
	6. Analyse end-user value in relation to client's requirements *4	6. Analyse end-user needs in early phases	Literature study Individual interviews Observations Archive Documents	Case study Qualitative & quantitative data Within-case analysis	Paper IV	RQ3

5. Analysing Data	7. Analyse briefing processes in design and construction *3	7. Analyse value creation in building	Literature study Individual interviews Observations Archive Documents & Survey	Case study Qualitative & quantitative data Within-case analysis	Paper V	RQ4
	8. Develop pre-model within-case analyses *5	8. Apply model to other cases	Interviews Documents	Cross-case pattern search	Thesis	RQ5
6. Shaping hypo-theses	9. Analyse the value of the buildings activities * 4	9. Analyse design factors' influence	Survey	Search for evidence for "why" behind relationships Builds internal validity	Paper VI	RQ5
7. Enfolding Literature	10. Comparison with conflicting and similar literature	10. Develop analytical framework	Literature study	Builds internal validity, raises theoretical level	Thesis	RQ5
8. Reaching Closure	11. Value-based model	11. Conclusions of research			Thesis	RQ5

* Equals steps 1-5 developed in pre-study (Laurell Stenlund, 2008, p. 3)

** Not included in the thesis. However, the results are used to develop the overall assumption.

3.2.1 Getting started: previous research and pre-study

From previous research in competence supply and product development (Chroneér and Laurell Stenlund, 2006) a pre-study was performed from December 2007 to May 2008 with the aim of investigating the relevance of studying value creation in public buildings with cultural activities. The pre-study is described in a research report where the definition of houses of culture was first presented (Laurell Stenlund, 2008). The research project was conducted from August 2008 to June 2010.

3.2.2 Selecting cases: houses of culture

The House of Culture in Luleå was selected due to the researcher's access to data as well as to the interest from the public client and the construction professionals. The public client as well as the construction professionals participated in the process of evaluating the effects of the development, construction and use of the building, in so called reference group meeting and focus group interviews. A single case study makes it possible to capture different angles and perspectives in depth based on an inductive research strategy open for analytical generalisation and implications from a theoretical perspective rather than comparison with other cases (Eisenhardt, 1989).

A multiple case study makes it possible to compare results from different cases (Eisenhardt, 1989; Yin (1994). After the pre-study four other cases were selected. During the pre-study observation studies were performed by visiting different houses of culture. Pictures were taken during the visits, showing the buildings' functional solutions as well as some technical ones and notes were written. Analyses of observation studies together with documents were first used to select four specific cases. The varying criteria of the selected cases are based on the type of client (public), types of activities performed in the building (at least two combinations of cultural activities), the completion of the project (within the last five years), the region (place) of its location. Yin (1994) argues that the results from a case study with more cases and with different methods for data collection can be theorized and generalised.

3.2.3 Crafting instruments and protocols: broad and open data

Both quantitative and qualitative data collection methods were used. The total data collection was broad and open based on several methods, i.e. integrative focus groups, participatory observations, archive data, documents, semi-structured interviews and a survey (Yin, 1994, p. 80). Semi-structured interviews with key stakeholders were based on the archive records. According to the Swedish principle of free access to public records all archive data from the construction project was available and could be analysed. See appended papers for more details regarding data collection.

3.2.4 Entering the field: evaluating effects of building houses of culture

The data collection methods related to the five houses of culture are presented in Table 2.

Table 2 Data collection methods

Case	**House of Culture in Luleå**	**Vingen House of Culture**	**Vara Concert Hall**	**Uppsala Concert & Congress**	**Mimers House in Kungälv**
Data analysis	Qualitative Quantitative	Qualitative	Qualitative	Qualitative	Qualitative
Data collection methods No of resp. informants and times visiting the building in parenthesis	Observation (<10) Interviews (19) Archive data Document Workshop (1) Survey (452)	Observ. (2) Interviews (2) Archive data Document	Observ. (1) Interviews (2) Archive data Document	Observ. (2) Interviews (2) Archive data Document	Observ.(1) Interviews (2) Archive data Document

Compilations and analyses of the data were validated in different steps, in group meetings, in focus group interviews, in individual meetings with the researcher and at a workshop with stakeholder representatives. The compilation was first sent back to the respondents for their confirmation and then also presented during a workshop with actors from the construction project as well as internal and external end-users of the building. A summary of the collected data is found in Appendix A.

A reference group was connected to the project with representatives from industry. The reference group meetings were documented by means of notes. Individual meetings with the academic advisers were continuously held throughout the research project. The main role of the reference group was to follow the research project: in a reflective way discuss the ongoing analysis in the project as well as validate the empirical results from the evaluation of the building in use. At the meetings the members of the reference group also contributed their different perspectives on how to describe the effects of building a house of culture. In addition six focus group interviews were arranged as reference group meetings as well as a workshop concluding and confirming the description of the process (Appendix B).

3.2.5 Analysing data

By starting from the case the interpretations are built through an inductive process in relation to the analyst's theoretical pre-understanding as inspired by grounded theory (Geertz, 1993; Bryant and Charmaz, 2007) and reflective abduction (Alvesson and Sköldberg, 2000). The analysis of the collected data was performed in several steps (Bryant and Charmaz, 2007). First the raw data was coded in chronological order describing activities related to the briefing process and to different phases in the building process (Appendix C). During this phase the coding was performed in an open way by "letting the data talk", i.e. the codes emerged from the empirical data. The conclusions resulted in descriptive "stories" of the activities performed during different processes.

The next step in the analyses procedure was to make specific within-case analyses where the empirical data was related to previous research and theories, giving new insights and findings. From the interviews in the single case, emergent categories first led to the idea of factors influencing the development and construction of building houses of culture. The theoretical framework, presented in chapter 2 is a result from the inductive research. Different factors were more deeply investigated with data from the single case (see appended papers). The results from the analysis presented in the appended

papers are the source of building a concept and a model that is applied in a cross-case analysis between the single case and four other cases (see chapter 5). The results from the case study are summarized in chapter 6.

The research project and continuous analyses were followed by a national academic network: The Swedish Construction Network consisting of four construction management research groups from Luleå University of Technology, Lund University, Chalmers University of Technology and KTH Royal Institute of Technology. Project plans, research design as well as research methods were discussed with senior researchers at five meetings, including one Nordic doctoral seminar at Copenhagen (Autumn 2007), two national doctoral seminars at KTH (Spring 2008 and 2009) and two individual meetings at KTH and Lund (Autumn 2008). The purpose of these meetings was to get critical review comments on the ongoing research project.

3.2.6 Shaping hypothesis

A survey with external end-users (that is, visitors to the building) is a result of hypotheses developed from the qualitative analyses where the primary questions were: Why do citizens visit the House of Culture? What influence do design factors have on citizens' visiting frequency, i.e. do citizens visit the building due to its form and shape? What other design factors influence visitors? Based on an open question in the questionnaire, qualitative analyses of different visiting groups were performed (Appendix D). The results from data analyse triangulation confirmed the hypotheses, see chapter 5.

3.2.7 Enfolding literature: literature search

The literature search was a part of analyzing the data. The theoretical discussion is based on a literature study performed in two different ways. When starting the project the literature study consisted of literature "known" through the researcher's pre-knowledge and was performed by "tracing" research studies from one study to another, complemented with database searches of "new published research" during 2008-2009. The focus was on the field of construction management, briefing and value management.

A systematic literature search was performed in Scopus on 11 November 2009 by searching on the keywords: value management, construction, briefing, client, resulting in 92 articles in 40 journals. The literature search was finally focused on the articles categorised in the subject area "Business, Management and Accounting" and a new search created 78 articles. This systematic

literature search verified the earlier found literature. Still there may be earlier research that is relevant for this study that the researchers have no knowledge of.

3.2.8 Reaching closure: validity and reliability

The purpose of this thesis was to explore stakeholder value and explain value creation in development and construction projects of public buildings. According to Eisenhardt (1989) the case study process comes to an end when marginal improvements become small and when a theoretical saturation is possibly reached. In this thesis a case study is presented that was performed with conditions based on a time schedule of two and a half years to costs covering activities performed during a fulltime period of two years.

The limitations of the research project, in terms of time and costs, drove the closure of the project, as did the project plan developed in the beginning of the project. The difficulties when developing a project plan is to calculate the costs and time it takes to conduct the project in relation to the goals, i.e. the formulated research questions. To increase the studies validity, i.e. to ensure that the data analysis are based on data relevant to the research questions as well as to the purpose with the study (Miles and Huberman, 1994), the results from the analyses were compared with previous studies and discussed with the respondents. This procedure also had an impact on the studies reliability, i.e. that the methods used for data collecting (interview guides, questions in enquiry and so on) contribute to the use of relevant data in the study (Miles and Huberman, 1994). The selection of respondents was grounded in their knowledge of the project as well as their use of the building. To create an open communication, the researcher let the respondent tell their story and then ask complementing questions, also asking the respondent to develop their story when the researcher did not understand. When the survey was handed out the researcher stayed close by to be able to answer the respondents' questions.

To strength the studies internal validity, data analyses were triangulated, i.e. collected data was analysed with different research methods giving the same results. In the next chapter the appended papers are presented, describing the analyses and results more in detail, followed by a summary of the results in chapter five. In this study the results from the single case study was discussed in relation to four other cases to strength the external validity of the study. However, the model applied, in chapter five, still needs to be developed and the relations between the factors analysed.

4 SUMMARIES OF PAPERS

In this chapter, each of the six appended papers is summarised. The papers provide an insight into the research work and its results. The summaries include title of the paper, the authors, research questions in the thesis, introduction, purpose, methods and a summary of the main contents, results and contribution.

4.1 Paper I

Title: Determinants of an effective product development process: towards a conceptual framework for process industry

Authors: Diana Chronéer and Kristina Laurell Stenlund

Research question in focus: The paper introduces the concept of product development process and gives a theoretical framework of the early phases of the building process, before the specific idea of a construction project is developed.

Keywords: Product development process, innovation type, technology strategy, organisational aspect, process industry.

Introduction: An effective product development process is a way of organising and managing activities, resulting in either the production of a given output with fewer resources, i.e. lower costs (efficiency), or the production of better or new products (effectiveness). In this paper, the definition of product development is described as the process that identifies a market opportunity and transforms it into a product available for sale. To sharpen our

understanding of the product development literature, its organisation into areas of factors that may affect the creation of the product development process is useful. During the last decades academic researchers have shown an increasing interest in investigating the organisation of product development, e.g., activities of the product development process, collaboration and the role of networks. Managing the product process is also a central theme in management research.

Purpose: The purpose of the paper is to give an increased understanding of the changed innovation pattern in the process industry and its implication for activities concerning organisation and management of the product development process.

Methods: The paper is based on three studies investigating companies in industries, i.e., process industries, where all have some kind of development project focusing on the product or the production process. The three studies include two exploratory studies consisting of case studies with in-depth interviews and secondary data from the companies' activity records. The first study focused on product development work, the second study on strategic competence supply, and the third study had a more quantitative approach with the perspective on development work.

The first case study was based on in-depth interviews with 21 product development engineers from four steel and paper companies and was conducted from 1997 to 1999 with a focus on product development work. The second study of three steel and metal companies was conducted from 1998 to 2000 with 45 respondents representing actors working in production, management as well as with product development issues. The focus of the second study was on strategic competence supply including individual and organisational competence development together with performance evaluation and analysis in relation to the companies' production and development processes. Finally the third study was a quantitative survey of 50 mining, steel, paper and rubber, plastic, chemical and dairy companies conducted from 2000 to 2003. The survey enabled generalisation and confirmation of results from the previous two case studies as well as giving empirical evidence for theorizing an understanding of change patterns in process industry.

Summary of the main contents: The characteristics in the processes industry create specific conditions for an effective product development. The effectiveness and efficiency of the product development process in process industry depend both having a costumer focus as well as a production process

focus when determining innovation. The change of perspective and the content of product development, i.e. new ideas and new ways of developing new ideas within intra-firm and inter-firm processes are also influence an effective product development process. Intra-firm processes include the integration of technology strategy with the firms overall goals and the organization of teams in product development activities. The team members are suggested to work together in development projects where individual competence and knowledge are developed and organizational learning processes created. Inter-firm processes include the cooperation with customers and suppliers and building networks in the industry.

Results and contributions: The paper resulted in an understanding of how innovation type, technology strategy and organisational aspects (i.e., the company's own unique attributes) influence and are influenced by the specific industry.

The conceptual model of determinants of effective product development processes in the process industry is in this thesis applied when analysing how new public buildings can be developed. Construction processes consist of actors belonging to different organisations. In the process industry the collaboration among different actors from different companies and organisations is described by inter-firm processes (discussed in chapter 2 in relation to the construction industry).

Inter-firm processes could be identified when working in the early phases of the building processes with different actors from different organisations with different interests. These inter-firm processes may create a creative chaos developing new ideas of buildings and constructions.

4.2 Paper II

Title: Using grounded theory method and rich picture diagrams when analysing value creation in houses of culture in Sweden.

Authors: Kristina Laurell Stenlund

Research question in focus: RQ1, RQ2

Keywords: Case study, grounded theory methodology, intellectual capital, rich picture diagrams.

Introduction: What kind of value does a public building for cultural activities create for clients, construction professional and users, i.e. for society, the municipality and its citizens? One approach to understand the complexity of ongoing processes over time is by identifying value adding activities in building processes. However, value added activities are difficult to analyse especially when related to resources that have an immaterial character, e.g. knowledge, know how and social relations. Immaterial resources are difficult to identify and measure. The characteristics of immaterial resources and how these resources are developed are according to the resource-based view creating unique resources and dynamic organisational capabilities, difficult to imitate and replace. The industry and the context of the studied processes in terms of technology strategy and organisational issues are therefore important to consider when studying value creation when building houses of culture.

Purpose: The purpose of this paper is to describe how grounded theory methods (GTM) and rich picture diagrams (RPD) were used when analysing stakeholder and end-user value when developing and constructing houses of culture.

Methods: Based on an in-depth case study stakeholders' evaluation of a construction project and end-users evaluation of the final building were pictured in a rich picture diagram. Data was collected by interviews, archive data, documents and from a workshop.

Summary of the main contents: The crucial part was to find relevant methods for analysis of value adding activities and stakeholder value in terms of intellectual capital. Here also the valuation of soft measures involves a range of different uncertainties and estimations. Intangibles are difficult to understand, to identify and to describe. Rich picture diagrams (RPD) have been found as a suitable tool for analysis of case studies together with GTM.

Results and contributions: The results from the analysis show that building a house of culture creates stakeholders' and end-users' value that can be categorised into human, organisational and social capital. The strength of combining GTM and RPD is thus the ability to study complex organisational structures and relations between different actors, and specific as shown in this case, when analysing value creation in a construction project with many stakeholders with different interests and value.

4.3 Paper III

Title: Client's decisions in strategic briefs and their impact on user values

Authors: Kristina Laurell Stenlund, Nina Ryd and Anders Vennström

Research question in focus: RQ1 and RQ2

Keywords: Briefing process, culture, decisions, public client, user value.

Introduction: The public client has in the early phase of a construction project an important role of managing the strategic brief and delivering economic value and social benefits to the stakeholders and end-users.

Purpose: The purpose of this paper is to analyse how the public client's decisions have an impact on the community and its citizens by studying the requirements formulated in the strategic brief.

Methods: Single case study with qualitative analysis based on interviews, secondary data and a survey amongst visitors (in this paper one question is analysed).

Summary of the main contents:

The public client, the municipality, was the investor and developer of the project and is today also the owner and the facility manager of the building. The House of Culture has two concert halls, a public library and an art hall. These three cultural activities together with the Reception, Tourist information office and the Car parking are managed by the municipality. The municipality also has its administration for cultural activities, including conference management, within the building. The Restaurant and the Café are managed by private companies. The municipality has thus to manage different client roles and can be regarded as a manager client relating their decisions in the construction process to their own organisation's responsibility to society. The public client also acted as initiator of the building project, first by deciding and conducting the feasibility studies and then by the decision of starting the building project in 2003. Here the new municipal commissioner played an important, innovative client role.

The public client's role during the strategic briefing process was important. Different people in the client's organisation were involved in the development of the feasibility studies, taking political decisions and developing the project

directives with requirements regarding cost, time and responsibilities. In the strategic brief the public client formulated the overall vision and goals of the building and the end-users' functional requirements. People from the cultural organisations, the end-users, were involved, partly in the brief. The public client's procurement decisions regarding the architectural competition made it possible for the architect to create a "dream-team" of consultants working together with the brief, design and planning of the project.

Results and contributions: The public client's decisions had an impact on creating user value for the community in terms of change in attitudes, in terms of economic value regarding new job opportunities, development of organisational and business activities and in a multitude of cultural activities in one building and for the citizens in terms of social values related to design (form and shape, e.g. in terms of beauty, comfort, safety) and location (place and space, e.g. in terms of easily accessibility).

The public client's decisions, including the client's role together with the communication between constructions professional in the strategic brief, were crucial in the development of end-user values. The citizens have expressed that the House of Culture is easily accessible and creates a meeting area for everybody and that the variety of cultural activities in one and the same building is very positive. The building itself is characterized as beautiful, standing with and air of comfort and confidence for its end-users. The cultural organisations in the municipality have been given space for cultural activities.

4.4 Paper IV

Title: A time-geographical perspective on stakeholders articulating end-user needs when building houses of culture

Authors: Kristina Laurell Stenlund and Elin Wihlborg

Research question in focus: RQ3

Keywords: Briefing, culture, end-user needs, political decisions, stakeholder, time-geography.

Introduction: Public clients have a responsibility to consider citizens' desires and demands in many cases represented by interest groups. Expressing end-user needs and including them into the public building process is crucial to the

public client when making an informed and legitimate decision and implementation of the construction project.

Purpose: The aim of this article is to show how end-user needs are articulated and taken up differently by stakeholders through the early phases of the public building process.

Methods: A case study of a House of Culture in Sweden, with a time-geography approach.

Summary of the main contents: The use of time and space is fundamental for all social and natural processes, but still not commonly integrated as an explicit precondition for scientific analysis. During the idea phase, local policy makers first articulated end-user needs for two new buildings, one for concerts and one for the city library. Moving to the planning phase, the first feasibility studies were accomplished but rejected. After processing new ideas, developing them during the planning phase and going back to the idea phase, local policy makers found a consensus solution of "a cultural house with different cultural activities". In relation to the end-users' needs it becomes obvious that the stakeholder groups have different capacities for, and interests in expression these. Legitimacy has in this perspective to be gained both from those whose interest they try to express and among other stakeholders as well as the structural setting of the building process. However, the stakeholders considered the issue of the House of Culture variously urgent during the stages of the process over time, and thus their participation in the process can be illustrated in a time-space.

Public clients have a unique role compared to private market clients when encouraging stakeholders to express needs not yet formulated, i.e. to identify stakeholders who are not in the position of holding a stake and then promote their articulation of it. They are supposed to speak for others, to be altruistic and express not yet foreseen needs and interests.

Results and contributions: The case study shows that different stakeholders articulated end-user needs differently. The temporal perspective on the phases gives a new understanding of how and when different stakeholders express end-user needs differently. We conclude that stakeholders moved between phases until the construction project and procurement forms were settled with the contractors. By opening up the processes through a time-geographical perspective, theses can be visualized and integrated and thereby show the complexity of end-user needs in public building processes.

4.5 Paper V

Title: Creating stakeholder values in strategic briefing when building Houses of Culture

Authors: Kristina Laurell Stenlund, Nina Ryd and Thomas Olofsson

Research question in focus: RQ4

Keywords: Briefing, construction professionals, end-user, public client, stakeholder value, use value, value management.

Introduction: In the early phase of the construction project briefing is critical to deliver a successful project. However, the challenge is thus not only to conduct a successful project in terms of productivity and efficiency and not to exceed a budget appropriation, but also to follow policies and improve stakeholder values in the built environment.

Purpose: This research aims to investigate how stakeholder value is created in strategic briefing.

Methods: The study is based on a case study of building houses of culture with focus on how construction professionals have transformed public clients' requirements and end-user needs during strategic briefing. Data was collected by means of interviews, archives and documents as well as a survey.

Summary of the main contents: The briefing was performed in two stages, where the first stage, the strategic briefing, articulated the citizens' needs for a House of Culture, combining a new concert hall with the city library and art hall in the same building in a brief for architectural competition. During the second stage of the briefing process, the operational brief, design requirements were communicated and documented in functional and technical specifications during the design phase as well as during the construction.

Results and contributions: The empirical study show that the public client's requirements were communicated between the client and the design and construction teams describing a briefing process that ran throughout the construction project. The design and construction teams' capability of communicating and articulating clients' requirements has been crucial when developing stakeholder value in the strategic briefing process. Transforming the client's requirements into stakeholders' use value creates a description of the value that building a house of culture creates in the built environment. The

results show how stakeholder value is created during the strategic briefing process. In the case of the house of culture strategic briefing created different solutions to the building's final performance evaluated by the visitors to the house expressed in use value: Form & Shape, Activities and Place & Space.

4.6 Paper VI

Title: Design factors influence value creation when building Houses of Culture

Authors: Kristina Laurell Stenlund and Per Erik Eriksson

Research question in focus: RQ5

Keywords: Architecture, Briefing, Client, Design, End-user evaluation.

Introduction: What drives municipalities to invest tax money into public buildings with a cultural content? One reason is that customer needs create market demands for certain products. However, public buildings involve political decisions. Public clients may require that an investment in a public building for art performances should become a successful landmark in the city. Successful landmarks or iconic buildings of today express ideas in their architecture differently from traditional, monumental buildings.

Purpose: The aim of the paper is to investigate how design factor influence value creation when building houses of culture. The questions investigated concern how different design related factors affect how visitors experience the activities performed in a house of culture and how this affects their visiting frequency.

Methods: Survey study with 452 visitors of a house of culture, factor analysis followed by a multiple hierarchical regression analysis.

Summary of the main contents: A factor analysis was conducted resulting in four design factors describing end-user evaluation of a house of culture: (1) technical design (2) multifunctional design regarding spaces for experiences (3) multifunctional design regarding spaces for consumption (4) experience of activities.

Results and contributions: Multiple hierarchical regression analyses revealed that technical and multifunctional design factors have an impact on end-users' experience of the activity. However, the relation between design factors and

visiting frequency is slight and almost negligible. The visiting frequency, i.e. a measure of visitors coming back to the building, is thus not a useful measure of describing how a public building attracts its visitors. Many visitors may be temporary visitors, coming from the region or different cities just to visit the building. More interesting would it be to understand why visitors are coming to the building. In the meantime the result from the factor analysis contributes to our understanding of end-user value when building houses of culture.

5 RESULTS

In this chapter the results from the appended papers are discussed with the aim of answering the five research questions presented in chapter 1 and in relation to the analysis model developed from the theoretical framework presented in chapter 2. The results from the analysis presented in the appended papers are the source of building a concept and a model that is applied in a comparative study of the House of Culture in Luleå and four other houses of culture presented in this chapter.

5.1 Developing ideas create end-user and stakeholder value

When a public building is in use we can ask the employees working in the building, the public, or other users, about their opinion about the building, if it is usable or not, if it fulfils their needs or not.

What end-user value has the house of culture created? (RQ1)

In the case of the House of Culture in Luleå, the public client's ideas of creating a meeting place for people in the community, a symbol for the city visualising future beliefs as well as developing a functional place for performing cultural activities were developed into a brief, an architectural competition, functional and technical solutions and constructed to create user value.

The citizens stated that the House of Culture is easily accessible, creates a meeting area for everybody and that the variety of cultural activities in one and

the same building is very positive. The building itself is valued by the end-users as a beautiful building, standing with an air of comfort and confidence (Laurell Stenlund *et al.*, 2009). The visitors described the building in terms of easy accessibility, aesthetics, comfort, safety and a perfect location (Laurell Stenlund, 2010b).

What stakeholder value was created when building a house of culture specifically for the public client and the construction professionals? (RQ2)

The public client's value was expressed as the community's use of the house of culture, in terms of changed attitudes and benefits of the building and in terms of economic value regarding new job opportunities in the city as well as developed tourist and conference activities (Laurell Stenlund *et al.*, 2009).

The construction professionals' value was expressed as the delivery of project on time and in conformance with agreements and documents, i.e. following the schedule and budget (Laurell Stenlund *et al*., 2009).

Stakeholder value described in terms of human capital, organisational capital and social capital has been visualised in rich picture diagrams by analysing the value perceived by public clients, the participators in the construction project and internal and external users of the building and the building process with grounded theory methods (Laurell Stenlund, 2010b).

- The human capital is a result of the actors' individual capability of taking decisions and performing the activities conducted during the idea, planning, design and construction phases of the building project.

- The organisational capital is developed within the construction project by actors performing different value activities in inter-firm constellations, in knowledge, creating a goodwill value within the contractors firms, usable in coming construction projects.

- The social capital is developed based on the public client's ambitions to create a building with symbolic value and also on the distinctive feature of having created future beliefs in the city.

The results show that developing and constructing the House of Culture in Luleå has created value to end-users and stakeholders summarized in economic and social value. Environmental value in terms of the building's durability was expressed by the architect when selecting materials between cost aspects, the

building's life cycle and maintenance. The ground and frame are built of concrete, the buildings walls of granite and wood and the roof is covered with sheet metal. More specific technical details about the building materials together with heating and cooling systems were not analysed.

The economic value to the municipality is a) building, owning, and managing the property and its activities, b) fulfilling internal employee needs, and c) developing business, trade and tourism sectors in the city. The economic value to business, trade and tourism sectors is created by the House of Culture offering a place for conferences and congresses. The costs associated with the performance of a conference in the House of Culture create indirect benefits by calculating the benefits for the companies in terms of knowledge development and marketing, that is in developing the intellectual capital within the organisation.

The social value to the municipality is a) a space for public debates and democracy, b) attracting people to the city, c) developing knowledge through cultural activities in the building. The public client described this value by the change of attitudes towards culture and art performances among the inhabitants. A common expression among inhabitants is "I was not interested in culture before, but the House of Culture helps me to experience new types of entertainment and art performances".

In Table 3 the results from the research questions RQ1 and RQ2 are summarised by describing the economic and social value of building a house of culture for a) end-users, i.e. employees working in the building and the visitors (the public) taking part in the building's activities, b) the public client, i.e. the community, and c) the construction professional, i.e. the industry.

Table 3 Value and measures of building houses of culture

Value	End-user	Community	Industry
Economic value in terms of **financial revenue**: Salary, tax revenue, rents, increased business turnover, increased market value of private properties close to attractive building, etc.	*External stakeholders* Employees working in the building, e.g. musicians, artists etc.	*Internal stakeholders* Employees working in the building, e.g. employees in library, art hall, reception, conference arrangements	*Internal stakeholders of construction project* Construction industry *External stakeholders* Industry, Trade, Hotels, Restaurants, Tourism Private residents Local government
Social value in terms of perceived **use value**	*External stakeholders* Visitors/Public **Activities** **Form & Shape** **Place & Space**	*Internal and external stakeholders* Employees **Meeting place** **Municipal asset** **Regional symbol**	*External stakeholders* Private and public industry: **Meeting place**

The results summarized above indicate that public buildings create different kinds of stakeholder value developed from individual values and successful construction projects. Stakeholders' value has been categorised terms of economic and social value. The result from the building process is thus an economic input, throughput and output process where economic value is created according to Bon (2001).

5.2 Relation between clients and construction professional

When a public building is built we can ask the actors how they performed the activities within the construction project. We can analyse how construction projects are planned, designed and produced to fit the particular needs they are meant to meet, i.e. if they consider end-user needs.

How were public clients' values and end-user needs developed into the clients' requirements in the early stage of the building process? (RQ3)

From a time-geographical perspective the development of the client's requirements may be analysed, based on how internal and external stakeholder groups articulated end-user needs in the early phases of the building process, i.e. when the interest groups presented their needs to the politicians in the community and how public administrators developed end-user needs into the public client's requirements. When end-user needs were articulated in the city, the need for a new building was also discussed in relation to its location. Different phases of the building process were identified, the idea phase, the planning phase and the design phase. Due to the public client's decisions of design-bid-built agreements, new end-user needs were not considered in the construction phase. The temporal perspective on the phases gives a new understanding of how and when different stakeholders express end-user needs differently. Stakeholders moved between phases until the construction project and procurement forms were settled with the contractors. By opening up the processes through a time-geographical perspective, theses can be visualized and integrated and thereby show the complexity of end-user needs in public building processes (Laurell Stenlund and Wihlborg, 2010).

The relations between the public client and the construction professionals were in the early phase connected informally by the architect. The architect was related to the interest groups for a music hall in the city. However, in the idea and planning phase the public client did not engage any professional consultant for briefing end-user needs.

The results from the analysis show that social value is developed during change processes, i.e. ideas of combining different cultural activities develop user value and the architect's process of communication with people belonging to the same interest group develops architectural solutions. Economic value on the other hand is created by managerial processes where resources are used for economic purposes to create profitable companies, i.e. resources are transformed into products for trade on the market.

How did construction professionals transform the public clients' requirements and end-user needs during the strategic briefing process? (RQ4)

The idea phase was conducted before the political decision was taken and before the construction project formally started, i.e. a preject[1]. During the preject the strategic briefing process started when end-user needs were developed in written feasibility studies. During this early phase the public client's management group conducted the brief, i.e. the public client organisation developed its own requirements before the formal political decision was taken and after, when the formal project started by the development of the brief for architectural competition.

After the jury's decision the winning architect office, the local architect in the city, was contracted as general planners responsible for the design and coordination of the design team consisting of consultants and engineers. During this process the architect communicated directly with the contractors and the public client's project manager (Laurell Stenlund *et al.*, 2010). In this design-bid-build case the public client, through his project manager, acted as system integrator between their own demand organisation and the consultants' and contractors' supply organisations in accordance with London and Kenley (2000). However, the architect, acted as a general planner during the whole construction project, not just during the design phase, continuing with his direct contacts with the contractors and end-users. The construction project was organised in a network of three teams: the client's management team, the architect's design team and the contractors' constructions team. Among these teams the public client's project manager was the "glue between the groups" as he himself described his role.

[1] The term has been picked from Byggeriets Innovation, Building LAB DK, Bygherreforeningen, 121207, 2008.

Briefing was performed continuously during the different phases of the construction project, also under construction, in accordance with previous research (Boyd and Chinyio, 2006; Blyth and Worthington, 2001; Barrett and Stanley, 1999; Ryd, 2003). The transformation in the briefing process was performed in two stages. First strategic briefing (Green and Simister, 1999; Ryd and Fristedt, 2007) was conducted where the public client briefed his and the end-users' needs together with the vision and goals for projected building. Secondly in an operative briefing process were the construction professionals transformed the public client's requirements, not only from the brief for architectural competition or from the building documents, but also by involving employees with their coming workspaces in the building (Fristedt and Ryd, 2004, 2006).

The relations among the actors in the construction project, within the analysed case study, might be described as inter-firm processes where actors (stakeholder groups) from both the public client's demand side and the architect's and contractors' supply side worked in a supply chain (Segerstedt and Olofsson, 2010). However, there were also other relations between the constructions professionals and the end-users, e.g. the architect had a relation with the external stakeholder groups for a music hall. The public client also had their relations with end-users. Thus the employees from the public administration were internal stakeholders and could be described as collaborating in networks (Gray and Hughes, 2001). These relations describe a network of internal and external stakeholders belonging to the demand as well as to the supply side (Winch, 2002). The complex relations among different stakeholders' different values may thus be a complicated managerial matter, in the planning phase as well as in the management of the final building.

Activities performed during the strategic briefing process communicate clients' visions, goals and requirements and transform them into functional and technical specifications. These activities develop new buildings in the built environment and are seen here as product development activities in the construction industry.

5.3 Management of multicultural activities in the building

The last question to be answered from the results from the case study is:

What factors influence the development and construction of building houses of culture? (RQ5)

The result from the study show that the House of Culture in Luleå has been described by its stakeholders and end-users as a successful construction project in terms of time and cost as well as in terms of quality when meeting the clients' requirements, but also in terms of developing and creating a building with functional and architectural design on the right place as discussed below.

5.3.1 Time and cost

The construction project was delivered according to the budget. The analysis of stakeholder value with rich picture diagrams visualises the activities performed in the building process in relation to the specific phases in the building process over time.

However, the time-geographical analysis contributed new insights regarding the development of end-user value during the preject. The time aspect, where stakeholder group trajectories developed over time, within and between the different stages in the building process is crucial. The analysis of the early phases, where end-user value developed during the preject and where stakeholder value was created when the project had just started, describes the importance of time, related not only to the project but also to the time before the project in relation to space.

5.3.2 Quality

From the result of the in-depth case study we can draw the conclusion that the success of the construction projects' quality, by meeting the clients' requirements and the building in use, depends on:

- conditions within the industry,
- the type of the building, e.g. an icon, a landmark, a prefabrication,
- management of end-user and stakeholder value by the development of the buildings functionality in accordance with activities during the

preject and by creating strategic and operational briefing activities during the project identifying clients' requirements and end-user needs.

5.3.3 Form & Shape, Place & Space and Activities

Visitors' evaluation of building a house of culture resulted in four main factors influencing their valuation of a house of culture: 1) Technical design, 2) Multifunctional design with spaces for experience, 3) Multifunctional design with spaces for consumption, and 4) Experience of activity. The visitors were both permanent citizens (70 %) and temporary visitors (30 %) (Laurell Stenlund and Eriksson, 2010).

When relating them to previous analyses of end-user value, these four factors describe:

- the building's technical design, i.e. the functionality of the technical solutions in a specific room of the building and are similar to end-user value in terms of *Form & Shape*

- the building's multifunctional design in terms of space for experiences (concerts, art performances and library) as well as the building's multifunctional design for consumption (restaurant and café) is similar to end-user value in terms of *Place & Space*

- experience of the activity is the same as expressed by the end-users in terms of *Activity*.

The factor analyses thus confirm previous analyses of end-user value. When transforming clients' requirements into the public client's value, the value that building a house of culture creates in the built environment may be described as:

- a symbol for the city creating future beliefs articulating use value: *Form & Shape* with symbolic value – a cultural hub for the region

- a meeting place for people articulating use value: *Place & Space* with social value – a house for everybody

- a functional place for performing cultural activities articulating use value: *Activities* with economic value – an asset for the citizens.

5.4 Value-based model

The value-based model (Figure 6) consists of five management topics for public clients to consider during the preject and project when developing and constructing a public building:

- QUALITY manage *stakeholder and end-user value by strategic and operational briefing*
- TIME develop/deliver building and its *Activities* on time
- PLACE choose the right *Place & Space*
- DESIGN select attractive/interesting *Form & Shape*
- COST develop budget for *value.*

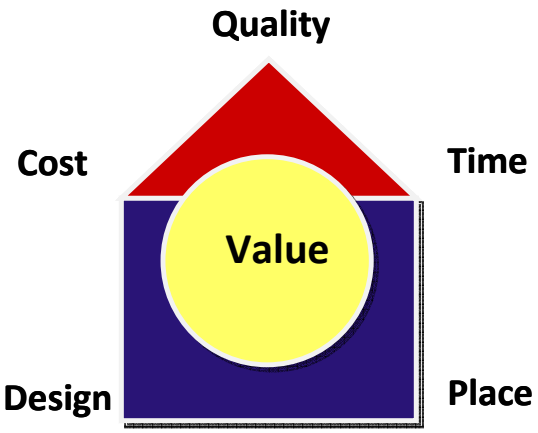


Figure 6 Five management topics in value-based briefing

Value-based briefing consist of the identification of both economic and social stakeholder value in value management decisions, thereby contributing with a perspective on the building's performance for different stakeholder groups. In value management decision processes the construction project as well as the building's performance should be considered. According to Kelly and Male (1993) and Kelly *et al*. (2003) value management contributes to the development of value in a project, in a process or related to a product when it is consistent with stakeholder interests and business goals and customers' requirements.

5.5 Applying value-based model on five cases

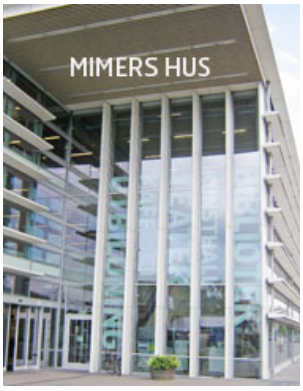
The model was applied in a comparative study of the House of Culture in Luleå and four other houses of culture.

Kulturens hus i Luleå

Kulturhuset Vingen

Vara Konserthus

Uppsala Konsert & Kongress



Mimers Hus

In Table 4, on page 68-69, data from the five construction projects is presented. In the following description the cases are introduced by the buildings' activities and the overall political goals for the buildings. The four following managerial issues are described with examples from one or two of the four other cases in relation to the Luleå case. The analyses are based on the interviews and secondary data from information material (Appendix A and reference list).

5.5.1 Quality

The five houses of culture have all a main hall in their buildings usable for several activities. The Concert hall is the main hall in Kulturens hus i Luleå, Vara Konserthus and Uppsala Konsert & Kongress and the Theatre is the main hall in Mimers hus and Kulturhuset Vingen. There are different strategies behind the decisions of building a concert hall and a theatre respectively.

The non-profit organisation "Folkets hus" lost its house in Torslanda in a fire 13 years before the new Kulturhuset Vingen was built. Money from the insurance together with voluntary support and a funding from the local municipality was the financial ground for building a house of culture outside Gothenburg. The theatre has digital film and media equipment. On the repertoire live opera performances from the Met in New York are appreciated by the inhabitants in Torslanda. The cultural activities are not supported by the municipality. The non-profit organisations have to manage all their activities by "selling" their productions. This is a difficult situation, and in the long run impossible to manage according to Vingens manager. Managing the cultural activities are closely related to the investment and owner situation and thus to the costs of not only building the house, but also to maintaining the activities within it.

Luleå and Uppsala have both a separate theatre in the city. In both cities the interest groups were advocating the need for a concert hall. The theatres acoustics are not comparable with a fully equipped concert hall. The political and public discussions, in both cities, continued for many years before the political decision was taken. In Luleå there was total agreement among the different political parties when the decision was taken. In Uppsala the local political government in majority took the decision, but one year before the building was opened, the opponent party became responsible, and still is, for the building and its activities. The opponent party were against the decision to build Uppsala Konsert & Kongress.

Uppsala also has a difficult situation, as the building's architectural form articulates that it is suitable for spectacular performances. There is an expectation among the public that spectacular performances do and will always take place in Uppsala, and that is expensive. Luleå and Uppsala have similar relationships between the activities and the design of the building in terms of the client's requirements of developing a landmark based on the architectural design, also involving the requirements of advanced technical equipment in the concert halls.

Vara concert hall was built close to the upper secondary school with the municipality's ambition to create a cultural meeting place in the region. Vara is an old farmer city, without any industries and important businesses. Vara needed "something" to attract new inhabitants, and the phenomenon of Vara Konserthus is a success, due to all the cultural activities performed in the building. In this case the activities create the landmark rather than the architecture of the building, even though the visitors think that the building is beautiful. Both Luleå and Vara have the same local municipality managing the building as the one that invested in the construction project. These two municipalities still have the ambition to invest in the activities with tax revenues related to the building's capacity. It is always easy to engage expensive artists, but, according to Vara's manager, they have to plan their activities in accordance with their budget.

Comparing these cases one conclusion is that the building's capacity needs to be used. A house of culture, must be filled with culture, otherwise the building is useless, unless it has become monumental, an icon.

Mimers hus and Luleå have both a library in their houses. This makes the house usable even when there are no activities in the concert hall or in the theatre. Still, visitors have complained when the library closes early on the weekends. They want an open house. Mimers hus was built close to an upper secondary school, as in Vara, but with a totally different strategy. The upper secondary schools started to compete for students several years ago in Sweden. One strategy was to attract students to study at Mimer's upper secondary school due to a new, well equipped city library and a theatre, also for student use.

5.5.2 Time

Developing new end-user value takes time. Uppsala Konsert & Kongress received the prestigious full prize ”Stora samhällsbyggarpriset 2008” for successful project management when communicating functional and technical specifications in close collaboration among the actors of the construction project, e.g. client, architect, technical specialists, contractors and managers of the cultural activities. During the construction phase the time was short and therefore the communication even more important. The working organisations during design and construction were similar in the Luleå case, where the architect kept the direct contact with the end-users, and the contractors during the whole construction project.

5.5.3 Place

The location of the building has been described in the Luleå case as important. Three of the five houses of culture have central locations in the city. The buildings in Vara and Uppsala are placed off centre. Uppsala Konsert & Kongress is supposed to develop a city block in a former not so attractive part of the city. Here the location in place is closely related to the development of the space. Uppsala Konsert & Kongress is today contributing to economic benefits in the block, by increasing the property value of the buildings and blocks close by, and local businesses around the building have increased their profits. The location of the building is closely related to the client’s purpose of developing the city when making an investment in a public building with cultural activities. That is also the same strategy that Vara’s politicians mentioned. Vara is a small city. Even though the concert hall is not in the middle of the city, it does not take more than 20 minutes to walk there. The parking area outside the building is important to the visitors. Almost all the concert visitors travel by car, from the villages and cities within an area of about 50 kilometres.

5.5.4 Design

When initiating a public building project for multicultural activities, the public client needs to know what s/he really wants. In these five cases representatives from the different cultural activities were involved in the planning, design and construction phases. The manager of the city library in the Luleå case described how their work began even before the construction project started. A new building creates new opportunities for the activities to change and develop. In close collaboration between the architect and the end-users new

solutions develops. Four of the five cases were design-bid-build projects and exposed to architectural competition.

5.5.5 Cost

In the case of Luleå, the public client started by calculating the costs for the construction project, based on a square metre price, relevant for the building in use. The costs were also qualifying criteria in the architectural competition. The building was not allowed to exceed the costs calculated early in the project. The winning solution in Uppsala needed to be changed and reduced in costs. Many design changes had to be made before the contract with the architects was settled and an agreed budget for the construction project established. One citizen summarise her impression of Uppsala Konsert & Kongress as follows:

> "In our city our Concert hall has been an object for VERY intense discussions. I have been positive to the building and I still am. It is a trendy house on a place where the building is maybe not shown it its best light, but its central and that is good. Unfortunately, the Concert hall has an economic problem giving all the critical Uppsala citizens arguments for not having built the house. I hope it will change, the activities are fantastic, really varying, satisfying everybody's taste. This weekend, the building and the square outside will be occupied by a 'manga convent' with thousands of young people in different Japanese costumes in various colours and shapes. Great fun!" *(A citizen's evaluation of Uppsala Konsert & Kongress, 2010-04-12)*

Table 4a Construction project descriptions of five cases of houses of culture

Case	**Kulturens hus i Luleå**	**Kulturhuset Vingen**	**Vara Konserthus**	**Mimers Hus**	**Uppsala Konsert & Kongress**
House of Culture	Concert hall Library Art hall Conference Restaurant Café	Theatre Conference Exhibition Restaurant Café	Concert hall Library Restaurant Café	Theatre Library Restaurant Café	Concert hall, Conference Exhibition Restaurant Café
City inhabi. Approx	Luleå 74 000	Torslanda 23 000	Vara 16 000	Kungälv 41 000	Uppsala 195 000
Dec. to build	2003-09	2003-05	2001-06	2001-01	2004-04
Build period from:	Decision architectural competition 2004-2006	Construction phase 2004-2005	Construc-tion phase 2002-2003	Decision architectural competition 2002-2004	Decision architectural competition 2002-2007
Client	Municipality	Non-profit Municipality Torslanda Kulturhus AB	Municipality	Municipality	Municipality
Open date	12 Jan. 2007	26 Oct. 2005	5 Sept. 2003	19 Aug. 2004	16 Sept. 2007
Client	Public client	CA Consult AB	Public client	Public client	Public client
Project manag. *Archit.*	Tirsén & Aili Architect office	Frenning & Sjögren Architect office	Arkitekt-triangeln i Trollhättan Kjell Hadin	Wingårdh Architect office	Hifab, Tema, Ramböll Henning Larsen Tegnestue
Contr.	Skanska Strängbet. Nåiden	Peab	Peab	JK Bygg	Peab

Table 4b Construction project descriptions of five cases of houses of culture

Case	**Kulturens hus i Luleå**	**Kulturhuset Vingen**	**Vara Konserthus**	**Mimers Hus**	**Uppsala Konsert & Kongress**
Total area	14 000 m^2 and 6500 m^2 parking area	5 300 m^2	4 000 m^2	8 800 m^2	14 600 m^2
Total cost *10 SEK= 1 Euro*	370 MSEK	78 MSEK	85-100 MSEK	350 MSEK	529 MSEK
Library	Public library 3400 m^2		School library (not incl. in area)	Public library 2000 m^2	
Main hall	Concert hall 1000 seats	Theatre 350 seats	Concert hall 517 seats	Theatre 341 seats	Concert hall 1141 seats
Add. halls	Hall B, 300 seats Art hall 500 m^2	Exhibition hall 131 m^2	Hall B, 67 seats Hall C, 48 seats Dance hall 130 m^2	Exhibition hall 120 m^2	Hall B 390 seats Hall C 150 seats Hall D 960 seats Lounge 60 seats
Conf. rooms	7 rooms with seating for 2-80 people	9 rooms with 15-150 people	1 room	7 rooms for lectures	9 rooms with seating for 8-90 people

Childrens corner, library in Mimers Hus

Preparing a conference, Uppsala K & K

Peter Mattei and Malena Ernman in House of Culture in Luleå (press-photo)

The way to Vara Konserthus

A Lady in red at an art exhibition at Vingen

5.6 Summary of results

Figure 7 summarizes the results from the case study. The public client's value and the end-user value of a public building in use are illustrated with focus on design and place together with the traditional project model, with aspects of quality, time and cost when describing the performance of a construction project. The construction professional's value is illustrated with focus on cost, time and quality with focus on costumers.

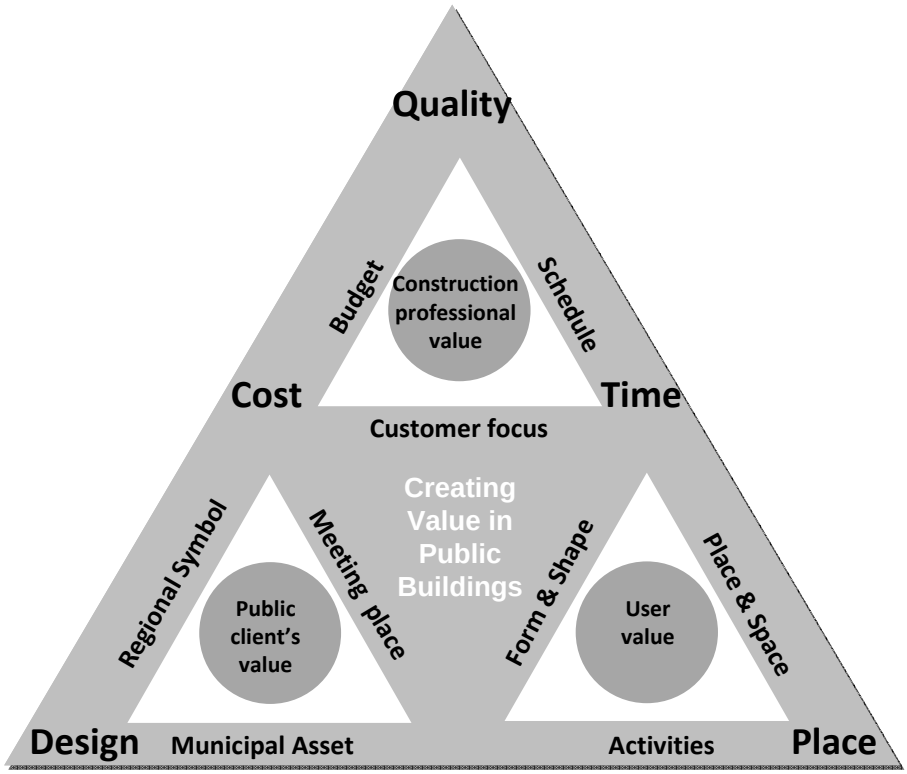


Figure 7 Results from case study of developing and constructing a house of culture

Value creation in development and construction of public buildings is represented by building Houses of Culture, based on a single case study with different analyses methods and different theoretical perspectives and a comparative study with four other houses of culture. In Figure 7 the public client's value are described as 1) a regional symbol, developed by creating an idea, a concept of combining different cultural activities in one building 2) a meeting place, developed by design factors such as functional and technical solutions on a specific place in the city and 3) a municipal asset that was created on the base of the realisation of the construction project. The realisation of the projects was described as 1) meeting the customer's needs by realising the public client's requirements to 2) an agreed budget and 3) on time. The house of culture creates a value to its end-users' by delivering cultural and consumption services in terms of 1) activities by its 2) form and shape and its 3) place and space.

6 DISCUSSION AND CONCLUSION

The result from the case study is a greater understanding of how public clients identify, develop and transform end-user needs into a strategic written brief, creating end-user and stakeholder value. Suggestions for further research together with some final remarks conclude the research study presented in this thesis.

6.1 End-user and stakeholder value

Economic and social stakeholder value was created during the construction project, by the building and its performance in accordance with requirements in the strategic brief. The development and formulation of the client's requirements have been crucial for the result of the project. Shared goals regarding costs and time led to a successful project and trust was built among the client, designer and contractor (builder) in the project. The client's intention of creating a meeting place and a cultural house for all kinds of people, were achieved through the client's capability to combining different cultural activities; manage political rules; develop real and viable project goals and developing a written strategic brief with an overall vision and goal for the building and the building performance.

In the case of the house of culture user value has been categorised from three perspectives: Activities, Form & Shape and Place & Space. Users of the building value the activities performed within it in terms of music and art performances, library services, conferences etc. They value the form and shape of the building in terms of the architecture, the multifunctional solutions in the building and developed technical solution regarding sound and light. Users

also value the building's space as a room for social meetings as well as the place where the building is located, in the central city.

6.2 Strategic briefing builds trust between public clients and construction professionals over time

The main result is a deeper understanding of how public clients identify, develop and transform end-user needs into a strategic written brief, creating stakeholder value in the built environment over time.

Results from the comparative study of five cases show that the public client's capability to develop a new vision for the building and to find new functional solutions during the early stages of the building process has an impact on developed end-user value and thus also an influence on the built environment.

When developing ideas the public client would benefit from developing a strategic brief, where end-user needs and identified use value are related to the building's activities and overall goals. Public clients and construction professionals should benefit from including value-based briefing as a method for identification and evaluation of effective and sustainable functional and technical specifications.

6.3 Future research

In this thesis the analyses show that public buildings create different kinds of stakeholder value developed from individual values and successful construction projects. Stakeholders' value has been categorised in economic and social value. The economic input, throughput, output model describes how economic value is created. However, the results from the case study show, as is argued here that, social value is developed during change processes and economic value is created by managerial processes where resources are used for economic purposes to create profitable companies, i.e. resources are transformed into products for trade on the market. Further research regarding social and economic value creation is thus required in the early phases of the construction project.

The time-geographical analysis contributed new insights regarding the development of end-user value during the preject. The time aspect, where stakeholder group trajectories developed over time, within and between the different stages in the building process is crucial. Investigating these

development processes of end-user value over time in space is an issue for further research.

When the public client invests in a development and construction project of a public building the purpose is not to sell the building on the market, the purpose is to fill the building with activities contributing to the communities' development, including the development of trade and business organisations with goals for profitability. The relation between economic value and social value is thus also an issue for further research within the field of value management.

The direct influence of the built environment on economic growth is still difficult to measure, and it is also difficult to understand how public clients can create the good life for its citizens. It is also predetermined that it is impossible to know in advance if a building will become a landmark or not. However, the results from this study have given managerial implications to public clients. The public value of public building depends on its activities as well as on its design and location. It is thus important for public clients to consider these issues when planning and designing a new public building in their community. However, these results need to be further investigated. Even though the results are based on different data analyses, from a single case study and a comparative study, this study needs to be followed up by other studies.

6.4 Final remarks – contribution of research results

This study of cultural building projects has provided a better understanding of the briefing process with respect to value-based briefing processes in the construction sector. In turn, this study can be used to develop innovative cultural spaces and encourage the implementation of value management that responds to a client's performance needs (i.e. a community).

A more effective value-based briefing and accurate evaluations of cultural building performance will lead to better value of expensive municipality construction projects. This research has also made tangible suggestions for improving how to identify and evaluate end-user needs and the assessment of those needs in a way that adds value to their projects. More specifically, this project has made both theoretical and practical contributions to the following areas:

To the building industry as a whole regarding terms of increased insight into the types of evaluations needed to ensure that public construction projects are

planned, designed, and produced to fit the particular needs they are meant to support. The results are adaptable to most municipalities and construction companies;

To the construction client's organization in terms of a thorough analysis of client-driven value-based briefing processes. This will also encourage clients to implement innovative performance-based specifications. In the long term, this will encourage better working environments and increased productivity at the public and cultural workspaces; and finally to the public clients in terms of understanding how a public building can be developed into a successful landmark and create use value.

References

Alvesson, M. and Sköldberg, K. (2000) *Reflexive methodology: new vistas for qualitative research*, London: Sage.

Anon. (2007) Will Boston's new Institute of Contemporary Art be its 'Bilbao on the Harbor'? *Architectural Record, 195*(3), 14.

Argyris, C. (1999) *On organizational learning* (2nd ed) Oxford, Malden, Mass: Blackwell.

Atkin, B. (2009) Future of Construction Management. In Langford, D and Hughes, W (eds.) *Building a Discipline, The story of Construction Management*, W, ARCOM, UK: University of Reading. 143-147.

Atkin, B. and Flanagan, R. (1995) *Improving Value for Money in Construction*, London: Royal Institution of Chartered Surveyors.

Banyard. H. and Hayes, N. (eds.) (1994) *Psychology: Theory and Application*, London: Chapman & Hall.

Barrett, P. (2007) Revaluing Construction: a holistic model. *Building Research & Information, 35*(3), 268-286.

Barrett, P. and Stanley, C. (1999) *Better Construction Briefing*, Oxford: Blackwell Science Ltd.

Barrett, P. and Sutrisna, M. (2009) Methodological strategies to gain insights into informality and emergence in construction project case studies. *Construction Management and Economics, 27*(10), 935-948.

Bergman, B. and Klefsjö, B. (1995) *Kvalitet från behov till användning*, [Quality from demand to use], Lund: Studentlitteratur.

Bloxham Zettersten, G. (2007) *Political behaviour and architectural vision: Two Swedish/Danish processes in contemporary public architecture*, Gothenburg: Chalmers University of Technology.

Blyth, A. and Worthington, J. (2001) *Managing the Brief for Better Design*, London: Spon Press.

Bon, R. (2001) The future of building economics: a note. *Construction Management and Economics, 19,* 255-8.

Boyd, D. and Chinyio, E. (2006) *Understanding the construction client*, Oxford: Blackwell Publishing Ltd.

Brandon, P. and Lu, S-L. (eds.) (2008) *Clients driving innovation*, Chichester: Blackwell Publishing Ltd.

Brown, D.C., Ashleigh, M.J., Riley, M.J. and Shaw, R.D. (2001) New project procurement process. *Journal of management in engineering, 17*(4), 192-201.

Bryant, A. and Charmaz, K. (2007) *The SAGE handbook of Grounded Theory*, London: SAGE Publications Ltd.

Bröchner, J. (2009) The changing nature of the built environment, an economic perspective, in Ruddock, L. (ed.), *Economics for the modern built environment*, London and New York: Taylor and Francis,11-33.

Bröchner, J. and Kadefors, A. (2010) *Värden och värdekedjor inom samhällsbyggande, förstudie.* [Values and value chains in building societies, prestudy], Stockholm: KK-stiftelsen.

Cascio, W. (1996) The role of utility analysis in the strategic management of organizations. *Journal of Human Resource Costing and Accounting, 1*(2), 85-95.

Commission for Architecture and the Built Environment and Arts & Business (2008) *Artists & Places*, London: UK government's advisor on architecture, urban design and public space.

Commission for Architecture and the Built Environment (2009a) *Building excellence in the arts: A guide for clients*, London: UK government's advisor on architecture, urban design and public space.

Commission for Architecture and the Built Environment (2009b) *Making the invisible visible: the real value of park assets*, London: UK government's advisor on architecture, urban design and public space.

Coase, R. (1937/1998) *The Firm, the Market, and the Law*. Chicago, London: The University of Chicago Press.

Courtney, R. (2008) Enabling clients to be professional. In Brandon, P. and Lu, S-L. (eds.) *Clients driving innovation*, Chichester: Blackwell Publishing Ltd. 33-42.

CRC Construction Innovation (2007) FM as a business enabler, Solutions for managing the built environment. *Cooperative Research Centre for Construction Innovation*, Brisbane, Australia: Icon.Net Pty Ltd.

Chronéer, D. (2003) Have process industries shifted their center of gravity during the 90s? *International Journal of Innovation Management, 7*(1), 95-129.

Chronéer, D. and Laurell Stenlund, K. (2006) Determinants of an effective product development process: Towards a conceptual framework for process industry. *International Journal of Innovation Management*, *10*(3), 237-269.

Connaughton, J.N. and Green, S.D. (1996) *Value Management in Construction*: A Client's Guide: Special Publication 129, London: CIRIA.

Danish Association of Construction Clients (2010) Homepage http://www.bygherreforeningen.dk/, 2010-07-30.

Denzin, N.K. and Lincoln, Y.S. (2008) *Strategies of Qualitative Inquiry*. US: Sage Publications Inc.

Dosi, G., Faillo, M. and Marengo, L. (2008) Organisational Capabilities, Patterns of Knowledge Accumulation and Governance Structures in Business Firms: An Introduction. *Organization Studies, 29*(08&09),1165-1185.

Eisenhardt, K.M. (1989) Building theories from case study research. *Academy of Management Review, 14*(4), 532-550.

Ellegård, K. and Wihlborg, E. (2001) *Fånga vardagen: ett tvärvetenskapligt perspektiv,* Lund: Studentlitteratur.

Flanagan, R., Lu, W., Shen, L. and Jewell C. (2007) Competitiveness in construction: a critical review of research. *Construction Management and Economics, 25*(9), 989-1000.

Florida, R. (2002) *The Rise of the Creative Class- and how it's transforming work, leisure, community, and everyday life*, New York: Basic Books.

Freeman, R.E. (1984) *Strategic Management: A Stakeholder Approach*, Pitman Publishing: Boston, MA.

Fristedt, S. and Ryd, N. (2004) *Att lyckas med program, Kontinuerligt programarbete för bättre styrning av byggnadsprojekt* [Succeeding with programming, integrating programming for better management in construction projects], Stockholm: ARKUS, Byggförlaget.

Fristedt, S. and Ryd, N. (2006) *Ju förr desto bättre. Programarbete i tidigt skede av byggprocessen* [Better earlier than late, Programming in early phases of building processes], Stockholm: U.F.O.S.

Geertz, C. (1993) *The interpretation of cultures: selected essays*, London: Fontana.

Glaser, B.G. and Strauss, A.L. (1967) *The Discovery of Grounded Theory: Strategies for Qualitative Research,* Chicago: Aldine.

Grant, R.M. (1991) The resource based theory of competitive advantage: Implications for strategy formulation. *California Management Review, 33*(3), 114-135.

Gray, C. and Hughes, W. (2001) *Building Design Management*, Oxford: Elsevier Ltd.

Green, S.D. and Simister, S.J. (1999) Modelling client business processes as an aid to strategic briefing. *Construction Management and Economics, 17*(1), 63-76.

Hamel, G. and Prahalad C.K. (1994) *Competing for the Future*. Boston, Massachusetts: Harvard Business School Press.

Hughes, W.P. and Hillebrandt, P.M. (2003) Construction industry: Historical overview and technological change. In: Mokyr, J (ed) *The Oxford Encyclopaedia of Economic History*, Oxford: Oxford University Press, *I.* 504-512.

Hubbard, P., Kitchin, R. and Valentine, G. (2004) *Key Thinkers on Space and Place*, Sage Publications Ltd. 149-153.

Hägerstrand, T. (1976) Geography and the Study of Interaction between Nature and Society. *Geoforum*, 7, 329-344.

Hägerstrand, T. (1985) Time-Geography. Man Society and Environment. *The United Nations Newsletters, 8***,** 193-216.

Jencks, C. (2005) *The Iconic Building*. London: Frances Lincoln Ltd.

Kamara, J.M. and Anumba, C.J. (2001) ClientPro: a prototype software for client requirements processing in construction. *Advances in Engineering Software*, 32, 141-158.

Kelly, J. and Male, S. (1993) *Value management in design and construction: the economic management of projects*, London: E & FN Spon.

Kelly, J., Hunter, K., and Male, S. (2003) The Client's Value Systems Explored: Case Studies from the UK Public Sector, *International CIB Symposium: Knowledge in Construction*, October 22-24, 2003, 1, 423-433.

KK-stiftelsen (2005) *AHA-Akademin – affärsutveckling i upplevelsesamhället*. [AHA Academy – business development in the experience society], Stockholm: Stiftelsen för Kunskaps- och Kompetensutveckling.

KK-stiftelsen (2006) *Aims to boost Sweden's competitiveness*, Stockholm: Stiftelsen för Kunskaps- och Kompetensutveckling.

Koskela, L. (2000) *An exploration towards a production theory and its application to construction*. VVT Technical Research Centre of Finland.

Krishnan, V. and Ulrich, K. (2001) Product development decisions: A review of the literature. *Management Science, 47*(1), 1-21.

Lambert, D.M., Cooper, M.C and Pagh, J.D. (1998) Supply chain management: implementation issues and research opportunities. *The International Journal of Logistics Management*, *9*(2), 1-20.

Langford, D. (2009) Introduction: What is a discipline? In Langford, D and Hughes, W, (eds.) *Building a Discipline, The story of Construction Management*. ARCOM, UK: University of Reading. 1-4.

Langford, D. and Hughes, W. (eds.) (2009) *Building a Discipline, The story of Construction Management*, ARCOM, UK: University of Reading.

Laurell Stenlund, K. (2008) *Förstudie: Kulturens materia*, [Pre-study: The Matter of Culture], Research Report, Luleå: Luleå University of Technology.

Laurell Stenlund, K. (2010) *Effekter av byggandet av Kulturens hus i Luleå, [The Matter of Culture],* Research Report, Luleå: Luleå University of Technology.

Laurell Stenlund, K. (2010b) Using grounded theory method and rich picture diagrams when analysing value creation in houses of culture in Sweden, *Accepted for publication in Built and Human Environment Review.*

Laurell Stenlund, K., Ryd, N. and Vennström, A. (2009) Client's decisions in strategic briefs and their impact on user values. *Proceedings 25th Annual ARCOM Conference. Nottingham: Association of Researchers in Construction Management*, 361-370.

Laurell Stenlund, K. and Wihlborg, E. (2010) A time-geographical perspective on stakeholders articulating end-user needs when building houses of culture, *Re-submitted to Building Research and Information.*

Laurell Stenlund and Eriksson (2010) Design factors' influence on value creation when building Houses of Culture, Proceedings *26th Annual ARCOM Conference. Leeds: Association of Researchers in Construction Management, 2010.*

Laurell Stenlund, K., Ryd, N. and Olofsson, T. (2010) Creating stakeholder value in strategic briefing when building houses of culture, *Submitted to Construction Management and Economics.*

Lindahl, G. and Ryd, N. (2007) Clients' goals and the construction project management process. *Facilities, 25*(3/4), 147-156.

London, K. and Kenley, R. (2000) Mapping construction supply chains: widening the traditional perspective of the industry, *Proc. 7th Annual European Association of Research in Industrial Economic EARIE Conference*, Switzerland.

Macmillan, S. (2006) Added value of good design. *Building Research & Information, 34*(3), 257-271.

Miles, M.B. and Huberman, A.M. (1994) *An Expanded Sourcebook, Qualitative Data Analysis*. 2ed. California, London: Sage Publications Inc.

Mitchell, R.K., Agle, B.R. and Wood, D.J. (1997) Toward a Theory of Stakeholder Identification and Salience: Defining the principle of who and what really counts. *Academy of Management Review, 22,* 853-886.

Mokyr, J. (1990) *The lever of Riches*, New York: Oxford University Press.

Murdock, J. and Hughes, W. (2008) *Construction Contracts, Law and management* (4 ed) Oxford: Taylor & Francis.

Nyström, V. and Sjögren, L. (2008) *Nyttovärdering av bibliotek*, [Utility analyses of libraries], Lund: BTJ Förlag/BTJ Sverige AB.

Olander, S. (2007) Stakeholder impact analysis in construction project management. *Construction Management and Economics, 25*(3), 277-287.

Olander, S. and Landin, A. (2008) A comparative study of factors affecting the external stakeholder management process. *Construction Management and Economics, 26*(6), 553-561.

Penrose, E. (1959/1995) *The theory of the growth of the firm,* Oxford: Oxford Univ. Press.

Porter, M. (1994), *Toward a Dynamic Theory of Strategy*, in R.P. Rumelt, D.E. Schendel, and D.J. Teece (ed.) *Fundamental issues in strategy*, Harvard Business School Press. 423-461.

Preiser, W.F.E. (1983) The habitability framework: a conceptual approach towards linking human behaviour and physical environment. *Design Studies, 4*(2), 84-91.

Preiser, W.F.E. and Vischer, P. (2005) *Assessing Building Performance*, Oxford: Elsevier Butterworth-Heinemann.

Ryd, N. (2003) *Exploring Construction Briefing, from Document to Process*. Chalmers University of Technology: Theses, Dept of Architecture.

Ryd, N. (2004) The design brief as carrier of client information during the construction process. *Design Studies, 25,* 231-249.

Ryd, N. (2008) *Initiating building projects, clients' and architects' front-end management of projects*, Department of Architecture, Chalmers University of Technology. Gothenburg: Chalmers.

Ryd, N. and Fristedt, S. (2007) Transforming strategic briefing into project briefs, *Facilities, 25*(5/6), 185-202.

Saxon, R. (2005) *Be Valuable: A Guide to Creating value in the Built Environment*, London: Construction Excellence.

Segerstedt, A. and Olofsson, T. (2010) Supply chains in the construction industry. *Supply Chain Management, 15*(5), 347-353.

Schein, E.H. (1988) *Process Consultation: Its role in organisation development*, (2nd ed) Reading, Massachusetts: Addison-Wesley.

Shen, Q., Li, H., Chung, J. and Hui, P. (2004) A framework for identification and presentation of the client requirements in the briefing process. *Construction Management and Economics, 22*(2), 213-221.

Shoemaker, P. and Amit, A.R. (1997) The Competitive Dynamics of Capabilities: Developing Strategic Assets for Multiple Futures, in Day, G.S. & Reibstein, D.J. with Gunterh R.E. (eds.) *Wharton on Dynamic Competitive Strategy*. New York, Chichester: John Wiley & Sons. 368-394.

Short, C.A., Barrett, P., Dye, A. and Sutrisna, M. (2007) Impacts of value engineering on five Capital Arts projects. *Building Research and Information, 35*(3), 287-315.

SKL (2008) Nytt om kultur [News about culture]. *Sveriges Kommuner och Landsting, 1*(4).

Spencer, N. and Winch, G. (2002) *How buildings add value for clients*, Construction Industry Council. London: Thomas Telford Ltd.

Strannegård, L. (ed) (2007) *Den omätbara kvaliteten*, (The immeasurable quality], Norge: Nordstedts Akademiska Förlag.

Swedish Construction Clients Forum (2006) *The Role and Mission of the Construction Client*, Stockholm: Byggherrarna.

Swedish Construction Clients Forum (2010) Homepage, www. http://www.byggherre.se, 2010-07-08.

Swedish Planning and Building Act, PBL (1995) Plan- och bygglag (1987:10) 9 kap. Byggnadsarbeten, tillsyn och kontroll §1 Lag 1995:1197. *Svensk författningssamling*, Stockholm: Miljödepartementet.

Thrift, N. (2005) Torsten Hägerstrand and social theory. *Progress in Human Geography, 29*, 337-340.

United Nations (1983) *Our Common Future*. Report of the World Commission on Environment and Development, at the Center for a World in Balance. Retrieved, 2008.12.06. US:UN.

Wandahl, S., Faber, L. and Bejder, E. (2007) A diverse understanding of value in the building industry. in *Procs COBRA 2007*, London: RICS.

Vennström, A. (2008) *The construction client as a change agent - contextual support and obstacles*, Thesis, Environmental Engineering, Construction Management, Luleå University of Technology.

Winch. M.G. (2002) *Managing Construction Projects*, UK: Blackwell Science Ltd.

Winch, M.G. (2006) Towards a theory of construction as production by projects. *Building Research & Information, 34*(2), 154-163.

Womack, J.P., Jones, D.T. and Roos, D. (1990) *The machine that changed the world*, New York: Rawson Associates.

Vrijhoef, R, and de Ridder, H. (2005) Supply chain integration for achieving best value for construction clients: client-driven versus supplier-driven integration. *Proc. QUT Research Week, 4-6 July 2005, Brisbane.*

Yin, R.K. (1994) *Case Study Research: Design and Methods,* California: Newbury Press, Sage.

Yu, A.T.W., Shen, Q.P., Kelly, J. and Hunter, K. (2006) An investigation of critical success factors in construction briefing by way of content analysis. *Journal of Construction Engineering and Management, 132*(11), 1178-1186.

Yu, A.T.W., Shen, Q., Kelly, J., Hunter, K. (2008) Comparative study of the variables in construction project briefing/architectural programming. *Journal of Construction Engineering and Management 134*(2), 122-138.

Ziman, J. (2000) *Technology Innovation as an Evolutionary Process*, Cambridge: Cambridge University Press.

Archive data and Documents

Allmän material- och arbetsbeskrivning (AMA), 2009, Stockholm: Svensk byggtjänst.

Arbetsmiljöverkets föreskrifter (AFS) http://www.av.se/lagochratt/afs/ 2010-02-21.

Befolkningen i Luleå (2009), Stadsbyggnadskontoret, Luleå kommun 2009-05-07.

Byggverkets byggregler (BBR), http://www.boverket.se/Bygga forvalta/ Bygg--och-konstruktionsregler-ESK/Boverkets-byggregler/. 2010-02-21.

Fotografier från studiebesök i Växjö, Linköping och Nyköping, 2003-11-10---2003-11-11, Luleå: abm Arkitektkontor.

Förstudien för ett konserthus i Luleå, Luleå kommun, 2002-08-15.

Fördjupad förstudie, Konserthus – Kulturens Hus i Luleå, Luleå kommun, maj 2003.

Informationsmaterial från Kulturens hus i Luleå, Vingen, Uppsala Konsert & Kongress, Mimers Hus, Vara Konserthus.

Kommunallagen (1991) Lagar och föreskrifter http://www.notisum.se/.

Luleå kommuns kulturpolitik (2009) http://www.lulea.se/politikochkommun/ forvaltningar/kulturforvaltningen.4.6ebed23a109d954a35980001253.html 2009-01-30.

Mötestidplan, Kulturens hus, Luleå kommun, projekt 30716, upprättad av Tirsén och Aili arkitekter 2004-06-27.

Plan- och bygglag (PBL), http://www.notisum.se/rnp/sls/lag/19870010.HTM 2007-11-08.

Program för inbjuden arkitekttävling, Kulturens hus i Luleå, 2003-2004, Luleå kommun, 2003-12-22.

Projektdirektiv för projektet Luleå K-hus, 2003-10-20, Luleå kommun.

Projektering Kulturens Hus, Samordnat lokalprogram, Luleå kommun, 2003-12-22.

Röda siffror för Kulturens hus, NSD, 20070919, http://www.nsd.se/nyheter/artikel.aspx?ArticleID=3578294.

Sammanträdesprotokoll, Luleå kommun, septkf21, 2003-08-25/2003-09-15/2003-09-29, Luleå: offentlig handling.

Standardkontrakt ABK, AB, ABT, beställes via http://www.bygg.org/standardavtal.asp.

Verksamhetsberättelse Kulturnämnden 2008, Luleå kommun.

Publications not included in this thesis

Laurell Stenlund, K. (2009) Value creation in Houses of Culture: developing intellectual capital, *COBRA 2009: The construction and building research conference of the Royal Institution of Chartered Surveyors, University of Cape Town, 10-11 September,* 1675-1686.

Laurell Stenlund, K. 2009 Value creation in the House of Culture: values for clients, construction professionals and users, *Proceedings of 5th Nordic Conference on Construction Economics and Organisation,* University of Reykjavik, Reykjavik, 32-43.

Laurell-Stenlund, K. (2004) *Three perspectives on measuring and valuing losses of key competence*. (Licentiate thesis in Swedish), Luleå: Luleå University of Technology.

Summary of data collection (secondary data, see reference list)

Kulturens Hus, Luleå Culture manager, 070601, 1 h ;080117, 1 h; 080925, 1 h Employee, 070905, 2 h Orchestra society, 070905, 1,5 h Project manager Contractor, 071004, 1 h Cultural manager & Client project man. 080117, 1,5 h Client project leader, 080220, 1,5 h (not recorded) Client municipal commissioner, 080421, 1 h; 080919, 1 h; 081204, 1 h Project leader contractor, 080930, 2 h Architect, general planner, 081002, 1,75 h Manager library, 081006, 1,75 h Manager art hall, 081015, 1,75 h Manager concert hall, 081015, 1,5 h Tourist manager, 081022, 1,75 h Employee tourist office 081022, 1,75 h Manager trade & industry, 081023, 1,75 h Project leader conference, 09, 1 h Project leader trade and business, 09, 1 h	**Vingen, Torslanda** Manager, former 071122 (not recorded) Manager 081203 **Mimers Hus** Culture manager and manager Mimers hus 071121 (not recorded) Theatre consultant 071122 telephone **Uppsala Konsert och Kongress** CEO, 080825 (not recorded) CEO and Economy director 20100319 **Vara Konsert hus** Concert Manager 2010-03 Marketing employee 2010-03 **Survey** Enquiry to visitors at House of Culture in Luleå 2009-03 **Workshop I** Kulturens hus, Luleå 20090331
Study visits 20071007 Operan i Köpenhamn 20071008 Dunkers Hus, Helsingborg 20071009 Turning Torso, Malmö 20071010 Den svarta diamanten, Köpenhamn 20071024 Acusticum, Piteå 20071121 Mimers Hus, Göteborg	20071122 Vingen, Torslanda 20080406 Kulturhuset, Stockholm 20080407 Konsert & Kongress, Linköping 20080517 Centre George Pompidou, Paris 20080825 Uppsala Konsert och Kongress 20090615 Operan i Oslo 20100324 Vara Konsert Hus

Summary of reference group meetings and workshop

Reference group meetings incl. focus group interviews	Focus group interview Workshop	Meetings between researcher and individual reference group members (meetings with academic advisers not included)
18th February 2008, House of Culture in Luleå 29th April 2008, House of Culture in Luleå 3rd-4th December 2008, Vingen in Torslanda 25th February 2010, House of Culture in Luleå	20th December 2007 Petschler, Patomella 31st March 2009 Workshop – reference group together with Stakeholders House of Culture in Luleå	8th August 2008 Broström 4th September 2008 Sandesten 19th September 2008 Petersen 22nd September 2008 Patomella 25th September 2008 Broström

Chronological description of important dates, case House of Culture in Luleå

2003-09-29	**The municipal council decided to build a House of Culture**
2003-09-30	**Development of the brief outline**
2003-10-20	The project directive is presented giving the start of the construction project 'K-huset' is secured.
2003-12-22	**Brief for architectural competition** is distributed with an invitation to the architectural competition.
2004-02-28	The contributions from the architectural competition are received from the selected 9 competitors. The jury process starts based on the developed qualifying criteria's.
2004-03-28	The jury proposal is handled over to the municipal council.
2004-03-29	**Municipal council decide according to the jury proposal**
2004-03-29	**Architects design the building** The winning architect office = The general planners
2004-12-21	**Political decision** to include the local music organisation
2005-02--03	Specification phase 1 and 2 (ground and frame)
2005-03-10	**The final brief is settled**
2005-04-04	**Start of Construction** Phase 1 and 2
2005-07-30	Specification phase 3 (building)
2005-08/09	**Start of Construction phase 3**, during this phase the users requirements regarding functional solutions are modified in accordance with the users
2006-01	Specification phase 4 (interior)
2006-07	**Start of Construction phase 4**, during this phase the users requirements regarding interior equipment are modified in accordance with the users
2007-01-13	**Opening of the House of Culture**

Appendix D

Questionaire to visitors in House of Culture in Luleå

LULEÅ TEKNISKA UNIVERSITET

The following questionnaire is a part of an ongoing research project at the Department of Civil, Mining and Environmental Engineering

Value Creation in Houses of Culture

As a part of an ongoing research project we ask you, as a visitor of the House of Culture in connection with (the activity typed here)

What is the main purpose of your visit today?

Describe with your own words_____

1. Have you visited the House of Culture before?	**2. Have you attended any programme that has taken place in the Main Concert Hall before?**	**3. Have you attended any programme that has taken place in the Small Concert Hall before?**
○ **Never** ○ **1 time/year** ○ **2-4 times/year** ○ **5-8 times/year** ○ **9 or more times/year**	○ **Never** ○ **1 time/year** ○ **2-4 times/year** ○ **5-8 times/year** ○ **9 or more times/year**	○ **Never** ○ **1 time/year** ○ **2-4 times/year** ○ **5-8 times/year** ○ **9 or more times/year**

4. What was your experience of the room/place in the House of Culture?

Was it suitable for the event/activity you just attended

In general	**Regarding the sound**	**Regarding the scene picture/decoration**
○ Very good ○ Good ○ Less good ○ Not good at all	○ Very good ○ Good ○ Less good ○ Not good at all	○ Very good ○ Good ○ Less good ○ Not good at all
Regarding the convenience (seating space, the design of the chairs, surrounding audience) ○ Very good ○ Good ○ Less good ○ Not good at all	**Your experiences of the show/exhibition/activity?** ○ Very good ○ Good ○ Less good ○ Not good at all	**What was you experience of the spectator's accommodations?** ○ Very good ○ Good ○ Less good ○ Not good at all

5. What do you think is the best part about the House of Culture?

Write down your thoughts

_____

6. What is your opinion regarding the different activities in the house?

The library is o Very good o Good o Less good o Not good at all o Don't know	The art hall is o Very good o Good o Less good o Not good at all o Don't know	The tourist information is o Very good o Good o Less good o Not good at all o Don't know
The restaurant is o Very good o Good o Less good o Not good at all o Don't know	The café is o Very good o Good o Less good o Not good at all o Don't know	The bar is o Very good o Good o Less good o Not good at all o Don't know
The conference activities o Very good o Good o Less good o Not good at all o Don't know	The box-office/reception o Very good o Good o Less good o Not good at all o Don't know	The handicapped adjustments o Very good o Good o Less good o Not good at all o Don't know

7. How do you find the appearance of the House of Culture looking at it from the out side? Check the alternatives you find appropriate:

o Good looking	o Haven't thought of that	o To big
o Ugly	o Just like any house	o Big enough
o Nice	o Nothing special	o To small
o Beautiful	o Only for the elderly	o Is it possible to enter?
o Cool	o Only for the youth	o I want to go there
o Pleasant	o For all kinds of people	o Your own words:

8. Is there anything else you would like to tell us about the House of Culture?

_____

9. Is there something you would like to present to the managers of the House of Culture?

_____

We would also be very grateful if you fill in the following information:

10. Check the municipality where you are currently resident, or write it down.

o Luleå municipality	o Bodens municipality	o Piteå municipality
o Kalix municipality	o Other municipality	

11. Occupation (check the most suitable alternative)

o Compulsory school student	o Senior citizen	o Craftsman
o University student	o Unemployed	o Industrial worker
o Student vocational education	o Parental leave	o Cultural worker
o Service sector (commerce/tourism/restaurant)	o Civil servant/office worker (state/county council/local authority/private)	o University graduate (state/county council/local authority/private)
o Consultant (state/county council/local authority/private)	o Entrepreneur *(Self-employed, manager, consultant)*	o Something else: _____

12. How do you look at your self (Check multiple alternatives that fits your personality)

o Childish	o Introvert	o Ordinary
o Youthful	o Outgoing	o Serious
o Adult	o Unusual	o Humorous

13.

- o ***Female***
- o ***Male***

14. Age _____

We greatly appreciate you participation!

Information:
www.ltu.se/shb
Avd för arkitektur och infrastruktur – Byggproduktion
Kristina Laurell Stenlund, 0920-491449

PAPER I

International Journal of Innovation Management
Vol. 10, No. 3 (Sept. 2006) pp. 237–269

ICP Imperial College Press
www.icpress.co.uk

DETERMINANTS OF AN EFFECTIVE PRODUCT DEVELOPMENT PROCESS: TOWARDS A CONCEPTUAL FRAMEWORK FOR PROCESS INDUSTRY

DIANA CHRONÉER* and KRISTINA LAURELL-STENLUND

Industrial Organization, Luleå University of Technology
5-971 87, Luleå, Sweden
**Diana.Chroneer@ltu.se*

Received 31 January 2005
Revised 17 October 2005
Accepted 20 October 2005

Organisation and management of the product development process have been an issue in both academia and industry for over three decades. The literature on product development is growing, but Process Industry is often lacking in these discussions. Therefore, this paper focuses on linking the determinants of an effective product development process to Process Industry and the implication this may have on a traditionally very process-oriented industry by nature. Further, the paper organises the burgeoning product development literature into three main determinants: innovation type, technology strategy and organisational aspect. The selection of determinants to the conceptual framework, adjusting for Process Industry origins in previous written research material and our own empirical work of product development in Process Industry, is briefly presented at the beginning of the paper. Our literature review focuses on the product development process and builds the framework of our conceptual model detailing the elements of intra- and inter-firm processes in the product development process of the Process Industry. Our purpose is to give an increased understanding of the changed innovation pattern in Process Industry and its implication on activities concerning organisation and management of the product development process.

Keywords: Product development process; innovation type; technology strategy; organisational aspect; process industry.

Introduction

What makes a product development process in the Process Industry effective today? In other words, how can companies in the Process Industry increase efficiency by an effective product development process? An effective product development process is a way of organising and managing activities, resulting in either the production of

a given output with fewer resources, i.e. lower costs (efficiency), or the production of better or new products (effectiveness).

In this paper, our common definition of product development can be described as the process that identifies a market opportunity and transforms it into a product available for sales (Krishnan and Ulrich, 2001). The definition of Process Industry is a type of business focusing on material/metallurgical/chemical properties and production process in product development projects, i.e., product development and process development are closely interrelated. It can also be described as follows: "Process Industry is Production Industry using (raw) materials to manufacture non-assembled products in a production process where the (raw) materials are processes in a production plant where different unit operations often take place in a fluid form and the different processes are connected in a continuous flow" (Lager, 2002, p. 108).

The main aim of this paper is to increase the understanding of product development in the Process Industry and to organise determinants of effective product development in a conceptual model adjusted to the Process Industry. This is achieved by illustrating the context of the Process Industry and state of the art of research concerning organisation and management of the product development process. However, existing theory on product development is vast. Therefore, to sharpen our understanding of the literature, its organisation into areas of factors that may affect the creation of the product development process is useful. During the last three decades academic researchers have shown an increasing interest in investigating the organisation of product development, e.g., activities of the product development process, collaboration and the role of networks. Managing the product development process is also a central theme in management research. The organisation and management of the product development process have different names within the literature: new product development (NPD) (Hart and Baker, 1996), simultaneous engineering (SE), concurrent engineering (CE) (Andreasen and Hein, 1987) and integrated product development (IPD) (Ulrich and Eppinger, 1995).

But, what creates an effective product development process in the Process Industry? The Process Industry has often been regarded as a mature industry, where both the products and production process are stable. The characteristics of the Process Industry have been stable markets, fixed production processes focusing on economy-of-scale and cost efficiency. But the tradition to solely concentrate on the process development and hunt costs has changed.

Process Industry as a term has come to symbolise an industry heavily invested in its technology. However, balancing the need to develop more customer-specific products and keeping costs down with process development is a dilemma. Today, companies within the Process Industry, like steel and paper, are closing in on other manufacturing industry concerning the need to develop more "customer-specific"

products (Chronéer, 2003). The type of innovation is changing, from merely production-oriented to a more customer-oriented perspective in development work (e.g., development of niche products), i.e., the pattern of innovation in the Process Industry has changed from a production-oriented to a more customer-oriented perspective (Chronéer, 2003; Van Donk, 2000). This change of a condition in product development for the Process Industry will require a change of the content and activities in the product development process. Other aspects must be considered to survive, e.g., developing niche products. How a company belonging to the Process Industry will cope with such a change will depend on organisational aspects, i.e., how to organise and manage intra- and inter-firm processes. What activities must be undertaken? What internal and external forces must be considered? What competencies must be maintained, acquired or both? However, a dilemma for companies in the Process Industry is the interlinked process and product development. A change in a material property requires a change in some of the production process parameters and vice versa.

The remainder of this paper is organised as follows. The next section presents a narrative consisting of product development in the Process Industry, and is mainly based on earlier research in the Process Industry and our own studies. Literature review discussing some of the determinants of an effective product development process is given in the section after it. The literature research is connected to the product development process, including articles published in major English-language, organisation-oriented North American and European journals where this work is likely to appear.[1] We specifically concentrate on the literature focusing on the efficiency and effectiveness of the new product development process, i.e., factors that explain the product development process. Even with these constraints, covering all studies in one review paper is impossible. The literature research has also been conducted in databases with links to other journals discussing the topic of organisation and management of the product development process. In the last section we analyse how the product development process is conducted in the Process Industry and present a conceptual framework of the determinants of an effective product development process for the Process Industry.

Product Development in the Process Industry — A Narrative Insight

A product development process exists in an industry context. This paper focuses on the Process Industry due to the few research attempts focusing on the product development process and Process Industry. This section gives a brief narrative

[1] We included *Research Policy*, *Journal of Management Studies*, *California Review, Journal of Product Innovation Management*, *International Journal of Innovation Management*.

insight of product development in the Process Industry, focusing on organisation and management, and the relation between product development and the material characteristics.

Products in the Process Industry are processed with minimal interruptions in any one production run or between production runs of products exhibiting process characteristics, such as liquids, fibres, powders and gases (Gunasekaran, 1998). The general characteristics of this industry add value to materials by mixing, separating, forming or chemical reactions. The Process Industry obtains its raw materials from mining, forestry or agriculture. These raw materials vary naturally in quality, with many products being produced from a few kinds of raw materials compared with the usual schedule in discrete manufacturing where end items contain many different components (Gunasekaran, 1998). Product development in the Process Industry can be a major risk due to the cost and time involved. There has, however, been a recent reawakening with companies cutting costs and repositioning themselves in the market place. Since technological developments are moving at an evermore rapid pace, product life cycles are becoming shorter (Ita and Gross, 1995).

From production of commodity raw materials like steel, paper and glass to value-added materials such as advanced ceramics, process industries are uniquely built around production processes that manipulate material properties to produce raw materials for use in a variety of applications (Barnett and Clark, 1996). The characteristics of the Process Industry are very different from assembly/fabrication industries and may require a different type of management emphasis (Utterback, 1996). Process development is an often difficult and constraining aspect of product development in the Process Industry, and it is assumed that since product and process are symbiotically related in the production system, fundamental changes in the one must then incite parallel fundamental changes in the other (Etienne, 1981).

Managing and organising the product development process

Our main understanding of how product development in the Swedish Process Industry is conducted is based on three studies investigating companies in industries, i.e., process industries, where all have some kind of development projects focusing on the product or the production process. Our description of product development in the Process Industry in this section is complemented with examples from the websites of other companies.

The three studies include two exploratory studies consisting of case studies with in-depth interviews. The first study focused on product development work, the second study on strategic competence supply, and the third study had a more quantitative approach with the perspective on development work, see Table 1.

Table 1. The composition of the three studies incorporated in this paper.

Study no.	1	2	3
Time of study	1997	1998	2000
Nature of study	Qualitative	Qualitative	Quantitative
No. of companies participating	4	3	50
Type of industry	Steel and paper	Steel and metal	Mining, steel, paper, rubber, plastic, chemical, dairy
Number of respondents	21	45	50
No. of employees on average	300–400	1100	50–1000
Unit of analysis	Product development work	Company	Development work

Few research attempts on product development in process industry companies led us to consider personal and telephone interviews to be best at this stage of the research, since it is an area of little knowledge. A semi-structured interview technique was applied with a focus on certain issues, e.g., organization of product development, competence supply.

Product development work

Our studies show that the main ideas to product development projects in the Process Industry have traditionally come from the production process. Some process industries, like mining, steel and paper, have traditionally been production-oriented in their product development projects, i.e., the production process states the limits within where products can be developed. However, chemical and dairy industries have more tradition of close interaction with their customers. This is about to change due to a trend towards a change of orientation for all types of process industries, i.e., towards a more customer- and product-oriented focus. For instance, customers today are more involved in the product development process. However, product and process development is still an interlinked process and difficult to separate. This change of orientation will require other types of competences in product development as well as knowledge of how to manage the product development process and how to acquire competence and spread information.

Product development activities and parallel and iterative processes

In the product development process, different activities are accomplished within the team, between the teams, and between the team and other functions within

the organisation, suppliers and customers. However, problems when organising for an effective product development exist. The "right" organisation for product development in one company may not be best for another. When organising the work and activities related to the product development process, it should be seen as a multifunctional process with parallel and iterative processes within and between the firms.

From this perspective, the trend of a changed focus from process development to product development will have an impact on intra- and inter-firm processes, including the relationships to customer and suppliers in the product development process.

Managing human resources and developing and acquiring competencies in the Process Industry will be a cumbersome matter in the coming years. The change of technology from manual work to a high grade of automation due to advanced information technology has led to the demand for a highly skilled workforce. However, the tacit knowledge developed by individuals within a specific company has a crucial impact on the strategic competencies of that company. Individual competencies, including many years of experience, can be difficult to replace in personnel turnover situations. The challenge is to maintain the experiences gained in daily work situations considered important for product development as well as in developing new experiences to prevent the use of obsolete knowledge. The uniqueness of the different activities and work conditions in the Process Industry has created a culture that is different from other manufacturing industries. The environment is hard, and in many cases dangerous. The experiences of how to manage and perform activities in this unique environment are embedded in the organisational and individual capabilities. For example, operational work in the mining and steel industries is conducted in teams. These teams develop a tacit knowledge of how to handle critical situations and how to prevent a stop in the production process. Shared between its members, this tacit knowledge may determine the efficiency of the company. In the product development process, the tacit knowledge of operational work is an important factor when developing new products, as well as knowledge of the material characteristics. In the highly automated production process, some activities are still manual where this tacit knowledge is used. When managing the product development process, the technical competencies consisting of professional knowledge and skills related to material properties, quality improvements and the development of a wider product range are also important. This explicit knowledge, together with the tacit knowledge developed in the company creates an important group dynamic process when building product development teams and their relations to customers and suppliers.

To understand these processes, a brief insight into product development in the Process Industry is provided by discussing its relation to material characteristics.

The relation between the product development process and material characteristics

Steel is one of the world's most widely used structural materials, able to meet varying demands. Much developmental work focuses on products with a special market interest, such as polished, brushed and decorated surfaces, and work hardened high-strength stainless steels and grades with a special corrosion resistance (http://www.outokumpu.com). Both material properties and production techniques are of interest in the steel industry. The most important demands come from today's consumers. When buying products containing steel, they may have specific demands regarding, e.g., cost, life expectancy, appearance, strength, weight or environment-friendly properties. Lighter products are one category of product development, since high-strength steels are stronger than ordinary steels, allowing the customer to need less steel for a given task. Other aspects of developing high-strength steel are the extended useful life and improved durability of a product and the reduced material cost. As an example, products will be stronger and more shock resistant. The Swedish steel industry concentrates largely on special purpose products requiring very high quality. The industry's continuing competitiveness entails substantial investment in research and development, with "machinability" being a major aspect for steel producers. An often important cost factor in production as well as being complex, machinability is a measure of how easily a material may be worked in different cutting operations (e.g., measure of the tool life length) and depends on the interplay with other factors, especially machines, tools, skills and material. Another important aspect for steel products is quality, i.e., that a company can guarantee quality is an absolute necessity considering the ongoing integration between producers and customers. Product development can also consist of offering technical assistance and advice in the areas of process and production development (http://www.ssabtunnplat.com). Commercial steel has undergone radical change and development over the past ten years. Traditional types of steel have been refined regarding both dimensional tolerances and uniformity of mechanical properties, while numerous steel grades have been developed for new applications, e.g., cold-forming steels and quenched-and-tempered structural and abrasion resistant steels.

Another example of a product development issue in the Process Industry is when the product is often an intermediate industrial material to be manufactured further, i.e., transformed by customers. With paper, pulping is a process stage preceding paper manufacturing where basic raw material is converted into a fibrous pulp. Few paper grades are produced from only one type of pulp. Different pulps, fillers and other chemicals are usually combined to achieve the desired paper properties. As an intermediate industrial material, paper does not exist in its own right, but is further

converted into a variety of end products. Some of the most important characteristics of a paper are low cost, high performance to weight and convenience of use. As an example, pine and birch can be the primary raw materials in packaging papers. However, depending on the type of tree and its pace of growth, the developed fibres will be different (http://www.billerud.com). These fibres are then processed into pulp that is converted into packaging paper at a mill. The product development process consists of combining the raw material, technology and production processes and creating paper of high quality, e.g., advanced kraft paper, sack paper and raw material (liner and fluting) for containerboard. Further, packaging paper can be supplied to different types of converters that convert the paper into packaging for the industrial, agricultural, pharmaceutical and food sectors. Conversion often takes place in different stages, e.g., the paper is first printed, then coated with plastic or aluminium and finally folded and glued into a finished packaging. During conversion the paper must meet many requirements. It must be strong, clean and hygienic and have an even surface that suits production in fast, modern machinery (http://www.billerud.com).

Product development in the mining industry can consist of mineral extraction and producing high-quality metals in a cost-effective and environmentally friendly way. For example, the mining company can extract base and precious metals from concentrates of copper and lead as well as recycled materials. Achieving high quality is essential, since the smelter is an integrated metallurgical complex that extracts high-purity metals at low cost and with minimal environmental impact. Continuous process development also has to deal with new raw materials of complex compositions and to meet the market's needs for top-quality products (http://www.boliden.com).

The chemical industry is built on both product and process development, where a company's fortunes can still rise and fall with news of its latest research advances and setbacks. But with customers increasingly demanding better products, lower process and more tailored services, the industry is changing its approach to innovation. Chemical companies have always been market focused, though that focus has not always played a leading role in product innovation. Now, industry leaders are committed to building market awareness into every stage of the product development process. Product development is a complex process of how to mix the raw material and know the outcome of the chemical process.

New conditions?

Summarising the above discussion, the product development process in the Process Industry can be seen as an innovation that consists of developing new modified materials and new application areas. Further, the interest in networks has increased for

the Process Industry. Other Process Industry changes concern the fact that product life cycles are getting shorter, and the close coupling of business and technology strategy has become critical. The role of customer and supplier in product development has increased, and the content of development projects has changed to include other aspects like material properties and customer service. To remain competitive today, there are indications that companies in process industries are developing more customer-specific products. Competing on cost-effectiveness is difficult for small industries in particular.

However, since a product in the Process Industry is manufactured in a continuous production process, which dictates the conditions of the product, a huge variety of products are not possible. Therefore, product development can be more than just development of material properties, it can also include development of the product's application, i.e., the product (the material) can be used in a new range of consumer products (e.g., product development includes finding new customers who can value-add the material further).

In sum, the following aspects have changed for the Process Industry:

(1) The aspect of innovation has changed, i.e., the content of product development has changed, leading to a changed asset of information and required competence.
(2) The actors involved in the product development process have changed. It consists of a long chain of actors, since the product is further value-added by customers along the supply chain.
(3) There is an increased need for collaboration with customers and building networks. This requires a change of organisational aspects and new means and tools.

To transform an idea to a product requires an organisation that can adapt to changes and focus on required activities. To create effective product development in a Process Industry is to enable information and knowledge flows through the entire supply chain. Therefore, the following main determinants are essential to understand what activities to emphasise in the product development process of the Process Industry, and are further investigated in our literature review of the product development.

- Type of innovation; i.e., Do the customer, production process, or a mixture of both determine innovation?
- Technology strategy; i.e., the concept of innovation can embody both the product and the technology (interlinked process).
- Organisational aspects — the internal processes and conditions must be adjusted to create effective product development.

A Literature Review of Determinants of an Effective Product Development Process

This third section of the paper discusses an effective product development process by reviewing the literature in-depth concerning the main determinants that we have found essential to understand in relation to the Process Industry. To discuss the complexity of an effective product development process, Fig. 1 organises the areas of the factors that may affect the efficiency and effectiveness of the product development process.

In Fig. 1, the intra- and inter-firm processes are highlighted within and between the determinants: innovation type, technology strategy, organisational aspect (i.e., the company's own unique attributes), and industry context. The intra- and inter-firm processes are concurrent, multi-disciplinary and with characteristics of companies and their competitive environment. Maffin *et al.* (1997) listed no less than 37 factors frequently occurring in the best practice literature concerning product development in the manufacturing industry (e.g., strategy, technology management, marketing and project initiation, project management, management and decision-making, organisation, process and integration, design methods, modelling and analysis). To understand the complexity and identify the intra- and inter-firm processes, Fig. 1 organises the areas of factors that may affect the efficiency and effectiveness of the product development process summarized from the above references.

Below, we discuss the determinants and their elements in more detail to illustrate the state of the art of research concerning organisation and management of the product development process.

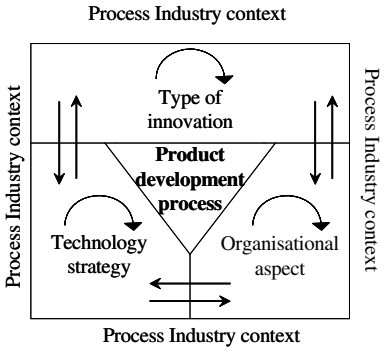


Fig. 1. Determinants of effective product development process (the arrows illustrate the intra- and inter-firm processes).

Product development process

Because of major developments in the operating environment of manufacturing firms, product development has felt the pressure of tighter cost targets, reduced development cycle times, increasing speed of technology obsolescence, faster changing customer demands and the need for improved product quality. This has led to a new way of organising product development projects, i.e., known in the literature as the NPD (Doz, 1996; Hart and Baker, 1996; Jones, 1997). It means that the rules of the game in NPD are changing due to the importance of speed and flexibility when developing new products today (Cooper, 2001; Takeuchi and Nonaka, 1986). The concept of NPD is a new way of organising product development. Cross-functional integration, project organisation, effective problem solving, transference of innovation, etc., are examples of subjects within NPD (Barclay, 1992a, b).

However, as Sands (1983) points out, problems of organising for effective new-product development do exist. What is the "right" organisation for new-product activities? Sands states that there is no "best" new-product organisation, i.e., what is best for one firm might not be best for another. In actual practice, a range of new-product organisations can be found. Other researchers such as Cavone *et al.* (2000) explore whether a certain managerial/organisational style relates to the type of R&D process (which varies from industry to industry) and to the different nature of the R&D activities, i.e., organisation of innovation and R&D must be adjusted to the industry concerned.

One factor of new product success is found in the product development process (PDP) activities and their efficient execution. It is, therefore, important to be able to identify what activities are present and should be present in a particular PDP (Fairlie-Clark and Muller, 2003). Many manufacturing companies have evolved their own models, some being very comprehensive. But as per Gomes *et al.* (2001) emphasis, managing the product development process is more than just identifying the activities. They show that the role and intervention of senior managers in the product development process is more complex than previous research had suggested. Continually looking for opportunities to improve the process, to do things smarter, faster and with more synergy is needed (Graber, 1996). The literature often describes product development in the manufacturing industry as a process, including all activities to transform a product concept to a physical prototype (Wheelwright and Clark, 1992).

The product development process can also be described as a multifunctional process with parallel and iterative processes, though not as sequential (Andreasen and Hein, 1987; Clark and Fujimoto, 1991; Hayes *et al.*, 1988). Product development is then a creative and a multifunctional process, i.e., an interaction between the phases

within the product development process exists where the phases overlap with each other. The process can be described with four stages according to Wheelwright and Clark (1992): *Concept Development* including product architecture, conceptual design, target market; *Product Planning* including model building, small-scale testing, investment/financial; *Product/Process Engineering* including detailed design of product and tools/equipment, building/testing prototypes; and finally *Pilot Production/Ramp-Up* including volume production prove out, factory start-up, volume increases to commercial targets.

Other researchers divide the product development process into more elements. Fairle-Clarke and Muller (2003) found 18 generic elements in the product development process, stating that it is important to identify what activities are present in a particular product development process and what activities should be present. Successful application of coordination processes, such as scheduling, resources allocation and concurrent engineering, also depends on having a complete representation of the product development process activities.

So, how can the product development process be summarized? It can be described as a process where data about market opportunities and technical possibilities, as well as important information assets for production are transferred. During the product development process these information assets will be created and then screened, stored, combined, decomposed, and transferred among various media (Clark and Fujimoto, 1991). As shown, information and knowledge assets are important aspects in the product development process and are connected to a firm's intra- and inter-firm processes. A more innovative context requires highly flexible management procedures through greater utilisation of existing knowledge and information, so as to identify the type of innovation the company is focusing on, to create a technology strategy and to adjust organisational aspects that enable an effective product development process.

In the Process Industry, a product is further value-added by a long chain of actors in the supply chain, i.e., a large part of the supply chain has to be managed and understood. The management of technology can also be regarded as an innovation process, e.g., a multi-institutional networking process with strong linkages to leading-edge customers and the strategic integration of primary suppliers. This can be compared with supply chain management, which often requires the integration of inter- and intra-organisational relationships and the coordination of different types of flows within the entire supply chain structure. Inter-company integration and coordination via information technology have become keys to improved supply chain performance. Barut *et al.* (2002) show that recent advances in information technology enable firms to manage the coordination, not the physical flow, of materials effectively and inexpensively, but also the flow of different types of information such as demand, capacity, inventory and scheduling through a supply

chain. Further, focusing on the supply chain allows us to concentrate on strategic decisions that reach beyond the linkage within the chain, including a set of organising principles for the complete product and material flow process (Schary and Skjøtt-Larsen, 1995). The supply chain management perspective also shows us the complex network of interrelated activities in supply chains (Chen and Paulraj, 2004). How supply chains will change in the future is important for managers to understand (Lancioni, 2000). Supply chain management offers the opportunity to capture the synergy of intra- and inter-company integration and management (Lambert *et al.*, 1998).

Type of innovation

The different perspectives of a firm to innovation can change as the firm matures (Utterback, 1996). Therefore, it is important to understand the type of innovation the firm is involved with, i.e., understand the factors that determine innovation (Love and Roper, 1999; Tatikonda and Stock, 2003) and the success of that innovation (Van der Panne *et al.,* 2003). The concept of product innovation is complex. It may even embody other innovation types, such as technological and process (Salavou, 2004). To understand the process of innovation, it is essential to understand the definition of innovation.

Rothwell (1994) gives a historical perspective in his article of the innovation process. He introduces the so-called fifth-generation innovation process, a "system and integration networking model", as a multi-institutional networking process (strong linkages with leading-edge customers, strategic integration of primary suppliers). The content of innovation is changing, e.g., the changing role of R&D (Germeraad, 2001) and the pattern of innovation (Gupta and Wilemon, 1996). Some research indicates a change from product innovation to a more solution innovation (Shephard and Ahmed, 2000).

What determines innovation and therefore product development? Tatikonda and Stock (2003) integrate literature on new product development, supply chain management and technology management and build on organisational theory to present a conceptual model of determinants of product technology transfer success. They identify the process of product technology transfer as a key activity in the process of new product development. This is similar to Love and Roper (1999), who widen the determinants of innovation beyond R&D to include technology transfer and networking effects.

Salavou (2004) suggests a shift in emphasis from organisational to product innovativeness, i.e., a shift from the general question of "what factors influence a firm's tendency to innovate" to "what factors affect the innovativeness of a new product". As an example, innovation is regarded essential by most small food firms (Avermaete *et al.*, 2003), which tend to continuously introduce new

products, develop new processes, make changes in the organisational structure and explore new markets. Rogers (2004) shows that evidence of persistence in innovative activities and the use of networks are associated with innovation in some sector-firm size categories. Specifically, small manufacturing firms exhibit a positive association between networking and innovation. However, discussing product success is not enough. Learning to understand what makes firms fail with innovation might also be needed. Morris (1993) states that obtaining figures on food product failures is difficult. Reasons include defining a successful product, a lack of strategic commitment, no formal development process, poor decision-making, and no incentives for managers, lack of leadership, and a need for focus and discipline. Commitment from top management is critical to new product success.

There are other determinants of innovation. Calderini and Cantamessa (1997) show that exogenous determinants, i.e., computer-aided technologies, design methodologies and organisational structures, interact complexly and adapt themselves to a changing competitive environment.

A possible change in the organisation of the innovation perspective will also affect the phases in the firm's product development process. New members and a new project focus lead to a new mix of activities in the product development process, e.g., market activities are greater emphasised from project start to product launch. An interaction between R&D and marketing must then occur (Griffin and Hauser, 1996).

Research exists stating that product development must be driven primarily by the needs of the customers rather than by technological possibilities (Butscher and Laker, 2000). Understanding market and customer needs is one of the keys to successful innovation (Roberts, 1999). This holds true for both commodity and speciality chemical companies, even though their disparate markets and operations naturally lead to different innovation approaches. Because of the usually high investment and long lead times required to scale up commodity chemicals and plastics, market needs and trends should be more clearly understood over a longer term.

According to Kok *et al.* (2003), market-oriented product development may be regarded as an organisational learning capability that encapsulates knowledge and skills, and as technical and management systems that enable learning about markets through information processing. However, Cooper (1999) found a strong market orientation and customer focus to be lacking in the new product projects of many.

Technology strategy

Since the concept of innovation can embody both product and technological elements, two determinants from the literature to make the product development

process more effective are the management of the technology and the construct of the technology strategy, e.g., the process by which the company constructs its new product development portfolio (Schilling and Hill, 1998) and the use of tools for improving the NPD process (Gerwin and Barrowman, 2002; Schilling and Hill, 1998).

The concept of technology strategy has been a part of management of technology literature since the late 1970s. However, there is still much debate about how to define the concept of technology strategy (Davenport *et al.*, 2003), with broadly differing views of what technology strategy is and how to utilize it (Dodgson, 2000). One way to define technology strategy is to understand the products and services a company brings to market and the intersection of these outputs with their underlying technologies (Ettlie, 2000). Ford (1988, p. 85) writes that a good starting point to understanding technology strategy is to state that "the core of a company is what it knows and what it can do, rather than the products that it has or the markets it serves", i.e., a technology strategy consists of policies, plans and procedures to acquire, manage and exploit the knowledge and ability within the firm (Ford, 1988).

For technology-based firms that rely on their technology for the ability to compete, a technology strategy comprises the definition, development and use of those technological competencies that constitute their competitive advantage. That is, as Dodgson (2000) states, competencies consisting of two elements, namely the resources currently available to a firm, and the innovative capabilities the firm possesses to define and change those resources. To summarise, technology strategy is an important aspect to "chart the way" for a business (Cooper, 2000).

The management of technology is a concept that has expanded to incorporate issues other than just R&D management. The management of innovation and technology is not only confined to what takes place in the firm's R&D department. Thus, the management of innovation typically involves elements of other business processes such as marketing and manufacturing, while the management of technology may involve managing process technologies, which typically lies outside the domain of R&D units (Christensen, 2002). Chanaron *et al.* (2002) state that the management of technology can be clustered into two main research tracks, namely managing technology as an activity and managing technology as a resource, assuming that technology and managerial functions are closely related and impact each other.

Innovation is thought to be a complex issue, and can incorporate not only the product development itself, but also the product and process technology development. Drejer (2002) found that product development deals with technology management on the product/market level, whereas technology development deals with technology management at the internal level.

He emphasises that important issues for product development are:

- What needs does the firm attempt to fulfil with its products?
- How are these needs met in terms of product functionalities?
- Which products should the firm produce?
- Should the firm compete with its products on low cost, on differentiation from other products or by focusing on few customers and their needs?

Technology development, however, deals with technology management at the internal level. Important issues include:

- Which technologies are needed to fulfil the needs of customers?
- Which technologies are needed to produce and sell the current portfolio of products?

Further, product development may be market-orientated or production-orientated. A production-oriented perspective on product development primarily involves an interest in the technological solutions of the production process. Development of this process and equipment is often a link in optimising the production process, i.e., finding a more cost-effective process. Product development will then be a secondary result of the changes of the production process, i.e., product development is defensive (Utterback, 1996). According to Utterback (1996), a project team will then mainly consist of internal personnel such as process engineers and laboratory employees. External cooperation will mainly be with equipment suppliers. R&D is a support function that can provide the development team with research on specific topics like metallurgical properties and that is interrelated to the process development, i.e., it is based on the capability of the production process. However, Utterback (1996) states that if markets require change and a business needs to change perspective on product development projects from a production-orientated to a more customer-oriented perspective, the organisation of the projects will also have to change. Should product development then be a part of process development, where product development issues are discussed in relation to internal production-related questions, or should it be separated, i.e., form a separate unit that focuses on the product not the technological issues? Harmsen *et al.* (2000) declare that for a general overview, it seems reasonable to say that there have been two major views of innovation over the years. They argue that a company's innovation is greatly driven by its orientation, i.e., product orientation, process orientation or market orientation. The competences directly related to the orientation, i.e., market competencies for market orientation, product competencies for product orientation and process competencies for process orientation, will be the most central or core competencies of that company.

Organisational aspect

The organisational aspect can be described as a determinant containing elements that are internal to an organisation (Gerwin and Barrowman, 2002), e.g., where a new product development project is embedded, such as capabilities, information technology and collaboration/integration. Lewis (2001) describes a transformation model with the driving factors of NPD performance, where the "starting conditions" that determine success are often firm-specific in nature and that contextual influences might include, e.g., "type of markets", "technological change", "organisational structure", "internal and external communication" and "functional relations". Input to the product development process can be the process of transforming (people and process technology) and transformed (market and technological information) resources (Lewis, 2001), i.e., NPD can be seen as a specific illustration of organisational learning. This is in accordance with Saban *et al.* (2000), who state that organisational learning is a critical component to new product development and impacts new product performance.

Capabilities

To manage the product development process efficiently and effectively, understanding the company's capability to manage the product development process is critical. As well, understanding the new product development process requires a simultaneous view of customers and technology, i.e., new product development requires joining competencies relating to technology and customers (Danneels, 2002). Other researchers also stress the process of acquiring knowledge into development. Sheasley (2000) illustrates the two key fundamental difficulties in managing new technology development — "Technology" is knowledge and the process of developing new technology is one of acquiring knowledge.

Technical competencies comprise knowledge of methods, processes and techniques suited to the activity. Interpersonal competencies involve, for example, communication and cooperation, while conceptual competencies include analytical capacity, creativity and efficiency in problem solving (Nordhaug, 1993).

Intangible resources and people-based skills are emphasised as strategically important resources in gaining a sustainable competitive advantage (Grant, 1991). Much work within product development is closely tied to the participation of individuals in projects that develop organisational competencies. Kim (1993) argues that organisational competencies are being developed when individuals share their mental models. According to Sveiby (1997) and Edvinsson and Malone (1997), the development of structural capital and organisational competencies, e.g., rules, manuals, networks and information technology systems, is crucial for the company's ability to maintain its competitiveness.

Ferrari and Toledo (2004) present a model to analyse the management of knowledge in organisational processes. Knowledge can be considered as an input, an element of transformation, and as an output of these processes. The results showed a lack of awareness regarding the presence of these knowledge management elements in the everyday activities of the product development process and the importance of integrating these elements to the success of this management. It is necessary to analyse which types of knowledge are more important for the analysed process. Where does the knowledge come from? How does this knowledge enter the process? How is this knowledge exchanged within each stage and between stages of the process? Further, Hughes and Chafin (1996) emphasise the awareness to turn new product development into a continuous learning process, stating that in today's fast-paced environment, customer wants and needs are constantly shifting, and a product's life cycle may be shorter than its development time, i.e., product development must be transformed into a continuous, iterative learning process focused on customer value. The objectives of this development approach are continuous learning, identifying the certainty of knowledge used for decision-making, building consensus and iterative learning process focused on customer value.

Research also shows *organisational learning* to be a critical component in new product development (Saban *et al.*, 2000) as well as the ongoing improvement demanded by the product development process (Smith, 1996). Cumming and Teng (2003) found that the success of knowledge transfer was associated with several key variables, and depended upon (a) both R&D units' understanding where the desired knowledge resides within the source, (b) how much the parties share similar knowledge bases, and the extent of interactions between the source and the recipient to (c) transfer the knowledge and (d) participate in an articulation process where the source's knowledge is made accessible to the recipient. In other words, knowledge that can be readily codified in manuals, diagrams, etc., is less likely to be internalised within the recipient than less articulated knowledge.

Information technology

To have an effective flow of information and create a knowledge asset within an organisation, another determinant of innovation is the use of information technologies (Calderini and Cantamessa, 1997). Tidd and Bodley (2002) review the range of formal tools and techniques available to support the new product development process, and identify the potential mediating effect of project novelty on the process of new product development, as well as some of the dangers of adopting so-called "best practice" methodologies without considering the context or contingencies.

Over the past three decades, information technology has gradually revolutionised work in organisations, and product development is no exception. Literature comprises research concerning information management opportunities and challenges

(Jarvenpaa and Ives, 1994), the role of information technology in the organisation (Dewett and Jones, 2001), the linkages between information technologies (IT) and firm performance (Powell and Dent-Micallef, 1997) and the supporting product development with internet (Howe *et al.*, 2000). The globalisation of product development activities is one of the key management topics of the 1990s; hence, choosing suitable project management is critical (Boutellier *et al.*, 1998; Cooper, 1999).

Information technology is a significant determinant of cooperation (Bensaou, 1997) and makes it possible to coordinate inter-organisational activities (Levary, 2000).

Communication is identified as a critical integrative facilitator in product development projects. In the product development process, project members need the right integration mechanisms to collaborate. However, unless mechanisms are in place to modify the information flow so that it is transferred and available when the downstream teams start their work, nothing changes operationally, i.e., the downstream activity cannot commence (Griffin and Hauser, 1996). For example, Gana (1992) points out that a determinant of innovation in cooper mining was prompt access to technical literature as an important source of new ideas. Sharing experience and knowledge — or even equipment — was crucial to overcoming obstacles in development solutions.

Collaboration/integration

Extensive research on how to collaborate and with whom to collaborate in the product development process exists. Managing complex networks is the key to 21st century innovation success (Rycroft and Kash, 1999). Successful innovation of complex technologies requires equally complex networks of firms and other organisations, often including universities and institutes. However, managing complex network should also be addressed to companies that are part of the supply chain and see the need to change the added value of a product.

Extensive research concerning integration and cooperation in product development also exists. Some forms of integration identified in the literature include: *R&D/manufacturing/marketing integration* (Kahn, 2001; Olson *et al.*, 2001; Song *et al.*, 1997; Song *et al.*, 1998), *R&D/marketing integration* (Griffin and Hauser, 1996; Kärkkainen et al., 2001; Ottum and Moore, 1997), *customer integration* (Butscher and Laker, 2000; Campbell and Cooper, 1999; Dwivedi and Sharma, 2002; Gruner and Homburg, 2000; Pick, 1999), *supplier integration* (Araujo *et al.*, 1999; Hartley *et al.*, 1997; Swink and Mabert, 2000) and *networking* (Comer and Zirger, 1997; Magrath and Hardy, 1994).

The literature also emphasises the importance of the *customer's* role in the product development process. However, this role has changed during recent decades

from the traditional role limited solely as consultative to a more active participant (Gardiner and Rothwell, 1985). Manufacturers can very often deal directly with strategically important customers, often collaborating on development programs (Pick, 1999). Close cooperation with customers can play an important part in assisting the early identification of applications and benefits provided by a new technology, thus permitting the early and clear definition of a technology (Cooper and Kleinschmidt, 1993). Customer involvement can be desirable throughout the product development process, not only in the role of refining the technology, but also as a test of marketability where the customer takes a very active role as a team member in a joint development process (Neale and Corindale, 1998). However, exchanges of people and ideas can be just as crucial (Magrath and Hardy, 1994). Therefore, it is important to create mechanisms that ensure the customer information requirement from various sources is internally consistent (Bailetti and Litva, 1995).

Collaboration in the product development process can also occur with competitors as well as co-development with key *suppliers* (Petersen *et al.*, 2003; Ragatz *et al.*, 1997). Effective integration of suppliers into product development can yield such benefits as reduced costs and improved quality of purchased materials, reduced product development time and improved access to and application of technology. It is important that the interfaces with suppliers are continuously monitored and purposefully managed and that dynamic features are considered (Araujo *et al.*, 1999). Supplier involvement in product development holds great potential, though few companies seem to be able to realise these benefits (Wynstra *et al.*, 2001). In summary, involving suppliers in product development can result in major financial and time benefits (Wynstra *et al.*, 2001). Still, it requires a great deal of thought and effort.

Interest in external collaboration, in *networks*, has recently arisen. Many studies have attempted to analyse networks in-depth, to highlight their make up, relationships between the use of physical collocation (Kahn and McDonough, 1997; Patti *et al.*, 1997) and factors for success or failure (Balachandra and Friar, 1997). Research concerning inter-organisational relationships can relate to understanding the possibilities of networks (Håkansson and Ford, 2002), how to create value through mutual commitment to business network relationships (Blankenburg Holm *et al.*, 1999) and how to manage networks (Biemans, 1990). Organisational networks are becoming keys to successful innovation (Rycroft and Kash, 1999). Harryson (1997) argues that external networking for identification and acquisition of relevant technologies and their related competencies actually enhances a company's ability to implement internal networking mechanisms that drive product innovation. A network management framework proposes various domains of managerial capabilities that a firm must master to compete successfully in a modern network environment (Möller and Halinen, 1999).

Today, management sees supply chain cooperation as an important part of its strategy (Morgan and Monczka, 2003). Complete integration of processes involves determining the product or service wanted and needed by the customer to create the new product or service, i.e., companies need to first establish a total view of the supply chain (Peck and Jütter, 2000). A supply chain consists of interdependent firms involved in the flow and transformation of goods, services, and related information, as well as funds from point of origin through to the end customer (Simatupang and Sridharan, 2002). Chen and Paulraj (2004) illustrate the complex network of interrelated activities in supply chains.

It is important for managers to understand how supply chains will change in the future (Lancioni, 2000). Supply chain management offers the opportunity to capture the synergy of intra- and inter-company integration and management. Further, it deals with total business process excellence and represents a new way of managing the business and relationships with other members of the supply chain (Lambert *et al.*, 1998).

The context of the product development process

Determinates found in the literature that impact an effective product development process are contextual factors of the organisation. New product development is context dependent, i.e., the management of the product development process is dependent on the type of product being developed. To analyse this context structurally, the wide range of activities involved in the development of a new product must be divided into technical and marketing activities (Trott, 1998, p. 152). Industrial products (products developed for use by other industries), such as paper or raw steel products, have many different things to consider compared with a new food product. Cavone *et al.* (2000) identified R&D organisation and management as being heavily affected by the nature of the R&D process and the relative importance of the different activities within R&D. The product development process is contextual, complex and iterative. Rudolph (1995) emphasises that the food product development process has proved difficult to define and model. He continues that progress must be monitored against a planned set of goals to be successful. The contextual factors from this perspective can be either internal to the firm, i.e., type of innovation, technology strategy and organisational aspect, or external to the firm, i.e., due to the industry.

Effective Product Development Process in Process Industry

This last section discusses the organising idea behind the conceptual model in Fig. 2. Multiple determinants create an effective product development process in Process Industry. Specifically, we argue that (a) the conditions for conducting

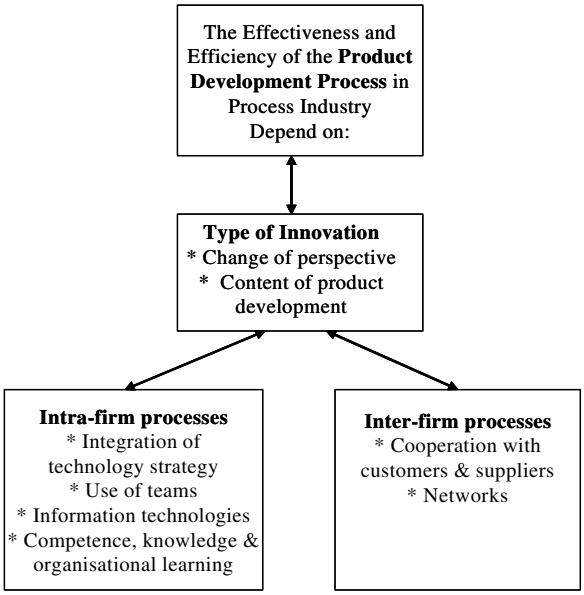


Fig. 2. The conceptual model of the determinants of effective product development process in process industry.

product development in Process Industry have changed, especially for the Swedish Process Industry where it is difficult to compete on cost-effectiveness. Other aspects must be considered to survive, e.g., develop niche products. These changes will affect (b) how to manage and create an effective product development process, i.e., what activities must be undertaken, what internal and external forces must be considered, and what competencies must be maintained, acquired, or both. The product development process and the creation of new product value will require (c) an integrated approach of organisation and management in the entire organisation.

Difference between process industry and other manufacturing industries

To create an effective product development process in the Process Industry, it is essential to understand several conditions that distinguish process-based companies from manufacturing industry (Tottie and Lager, 1995), such as,

- Process industry is often a part of a long chain of customer/suppliers who do not always have access to information from the end-user.
- Suppliers often deliver material, not components.

Table 2. Some differences in the production process in process industry compared with manufacturing industry.

Area	Other manufacturing industries	Process industry
Incoming materials	Components from suppliers	Raw materials
Production plants	Can be small and integrated with plants on different sites	Sometimes very large and often strongly integrated on one site
Customer supply chain	Often producing directly for the end user	Sometimes producing to a long chain of customer and not to the end user
Production chain	Often not a completely continuous production process. Not fully integrated process control	Often a continuous production with on line process control in real time and a central control room
Flexibility	Often flexible production plants not integrated in fixed structures	Often plant configurations that are difficult to change and modify
Product integration	Products are often not interdependent	Products are interdependent and changes in one product or production process can affect other products and processes

(*Source*: Lager, 2001).

Comparing the process industry with other manufacturing industries from a production-oriented perspective, a number of areas where the differences are important and influence innovation activities are found (Lager, 2001). Some of the areas that differ and can influence how product development is performed are incoming material, production plants, and flexibility; see Table 2.

One major difference between the Process Industry and piece goods industry is that the Process Industry generally has very inflexible and costly equipment. The production process is often unique for the purpose of manufacturing a specific product; the manufactured products are often interdependent; and changes of material properties in the raw material affect the entire product group.

Product development is usually context dependent (Trott, 1998). Trott points out that managing the process is dependent on the type of product being developed. A way of looking at this is to divide the wide range of activities involved in the development of a new product into technical and marketing activities. It becomes clear that industrial products (products developed for use by other industries), such as paper or raw steel products, have many different aspects compared with those of a new food product. In the latter, much more emphasis will be placed on promotion, launching and packaging, whereas a steel product requires technical meetings with the customer concentrating on the material properties.

The conceptual model

Our purpose with the conceptual model is to increase the understanding of the changed innovation pattern in the Process Industry and its implication on activities concerning organisation and management of the product development process.

As stated, the following aspects have changed for the Process Industry: innovation (a change of orientation towards a more product-focused development), the actors involved in the product development process, and an increased need to collaborate with customers and building networks. To create an effective product development process in the Process Industry, there is a need to understand what activities can support these changed aspects.

Product development process

First, it is essential to describe and understand the various activities, depending on the company, in the product development process that create value. A company belonging to the Process Industry is often one part of a long chain of customer/suppliers. Therefore, defining the product development process is critical.

The production process of a finished product consists of a continuous flow often incorporating suppliers who deliver material without components and customers who transform the material to suite their purposes. When the pattern of innovation changes, some major areas related to product development process then have to change accordingly, e.g., the activities in the product development process. Activities in the product development process can be viewed differently for various companies, but should be related to the need to collaborate with customers and suppliers and, hence, acquire the needed competence and knowledge in product development.

For some companies in the Process Industry, the product development process can be combined with process development process. It can be visualized as a three-phase model with each phase being the sum of a set of several more specific activity stages: *conceptualization, investment* and *start-up*. In the initial *conceptualization* phase, the paper mill or steel company initiates exploration and idea formation with a particular new product in mind. Product ideas often come from product development (i.e., technical service). If management approves the project plan and if investment in the process technology is needed, the second phase called *investment* starts. This phase comprises the implementation decision, equipment acquisition, construction and installation, test runs, test marketing and feasibility demonstration and initial quality development. The third phase is *start-up*, i.e., the initiation of the production tests. This phase contains a more detailed planning of product development, optimization of several process parameters and market introduction. The product's material properties are established and the product can be tested in the customer's own workshop.

Type of innovation

A second determinant to understand in the Process Industry that creates an effective product development process is the content of innovation. Research proves that some companies within the Process Industry have changed direction. In the Swedish Process Industry, the type of innovation has changed from a production-oriented to a more customer-oriented perspective. Today, companies within the Process Industry can choose to focus on cost-effectiveness and maintain high-volume products, or choose another direction, i.e., towards finding niche products. These two innovation streams require and emphasise different aspects in innovation, i.e., the content of innovation will change with a changed perspective. Product development projects will emphasise other aspects than the production process, e.g., material properties and customer service.

Today, product life cycles in the Swedish Process Industry are becoming shorter and the role of the customer and supplier in product development has increased. Do the customer, the production process, or a mix of both determine innovation? The concept of innovation in the Process Industry can embody both the product and technology. It is an interlinked process.

Intra-firm processes

There are several internal processes and conditions that must be adjusted to create effective product development. In particular, we found that the integration of a technology strategy, the use of teams and information technologies and understanding the needed competence and knowledge are of importance for the Process Industry in its change of perspective.

Technology strategy is an important determinate in the product development process for the Process Industry, since technology and product development are closely interrelated. A change of content in development projects requires a change of competence and knowledge. Therefore, the plans and procedures for acquiring, managing and exploiting knowledge and ability must be organised and managed. To understand what has changed and the implication of this change on the needed competence and resources constitutes the competitive advantage and creates innovation for the Process Industry.

One way to create an effective product development process is to use teams and integrate different functions. If the content in a development project changes, then the actors participating in a development project must also change. A problem is that the Process Industry is often characterised as a part of a long chain of customer and suppliers who do not always have access to or need information from an end-user. Companies dealing with products upstream of the value chain need other types of information today in their development projects. They need more information about

"end-customers". Hence, sharing experience and knowledge can be crucial to overcoming obstacles in development solutions (Gana, 1992). Information technology can be a significant determinant of cooperation (Bensaou, 1997).

Understanding the product development process in the Process Industry requires a simultaneous view of customers and technology. A means to facilitate the collection and storage of information is through information technologies. However, as Utterback (1996) states, if product development changes orientation to a more customer-oriented perspective, the organisation of the projects will also have to change. It should be noted that innovation in a company is greatly driven by its orientation (Harmsen *et al.*, 2000). The competencies that are directly related to the orientation, i.e., market competencies for market orientation, product competencies for product orientation, and process competencies for process orientation, will be the most central or the core competencies of that company.

Inter-firm processes

Inter-firm and intra-firm processes are equally important in the creation of an effective product development process. Determinants like cooperation and networking are important for all types of industries today. Networks have grown for the Process Industry. There are indications that the present Swedish Process Industry is developing more customer-specific products to remain competitive. Especially for small industries, it is difficult to compete on cost-effectiveness. This implies a need for sustainable links with both customers and suppliers to obtain needed information regarding future product/material properties. However, product development can be more than just the development of material properties. It can also include the development of the product application, i.e., the product (the material) can be used in a new range of consumer products (e.g., product development includes finding new customers who can add further value to the material).

Harryson (1997) argues that external networking to identify and acquire relevant technologies and their related competencies actually enhances a company's ability to implement internal network mechanisms that drive product innovation. A network management framework proposes various domains of managerial capabilities that a firm must master to compete successfully in a modern network environment (Möller and Halinen, 1999).

To facilitate the organisation and management of the entire value chain, supply chain management offers the opportunity to capture the synergy of intra- and inter-company integration and management. Further, it deals with total business process excellence and represents a new way of managing business and relationships with other members of the supply chain (Lambert *et al.*, 1998).

References

Andreasen, MM and L Hein (1987). *Integrated Product Development*. Berlin: Springer-Verlag.

Araujo, L, A Dubois and L Gadde (1999). Managing interfaces with supplier. *Industrial Marketing Management*, 28(5), 497–506.

Avermaete, T, J Viaene, EJ Morgan and N Crawford (2003). Determinants of innovation in small food firms. *European Journal of Innovation Management*, 6(1), 8–17.

Bailetti, AJ and PF Litva (1995). Integrating customer requirements into product designs. *Journal of Product Innovation Management*, 12, 3–15.

Balachandra, R and JH Friar (1997). Factors for success in R&D projects and new product innovation: a conceptual framework. *IEEE Transactions on Engineering Management*, 44(3), 276–287.

Barclay, I (1992a). The new product development process: past evidence and future practical application. Part 1. *R&D Management*, 22(3), 255–263.

Barclay, I (1992b). The new product development process. Part 2: improving the process of new product development process. *R&D Management*, 22(4), 307–317.

Barnett, BD and KB Clark (1996). Technological newness: an empirical study in the process industries. *Journal of Engineering and Technology Management*, 13(3–4), 263–282.

Barut, M, W Faisst and JJ Kanet (2002). Measuring supply chain coupling: an information system perspective. *European Journal of Purchasing and Supply Management*, 8(3), 161–171.

Bensaou, M (1997). Interorganizational cooperation: the role of information technology. An empirical comparison of US and Japanese supplier relations. *Information Systems Research*, 8(3), 107–124.

Biemans, WG (1990). The managerial implications of networking. *European Management Journal*, 8(4), 529–549.

Blankenburg Holm, D, K Eriksoon and J Johanson (1999). Creating value through mutual commitment to business network relationships. *Strategic Management Journal*, 20(5), 467–486.

Boutellier, R, O Gassmann, H Macho and M Roux (1998). Management of dispersed product development teams: the role of information technologies. *R&D Management*, 28(1), 13–25.

Butscher, S and M Laker (2000). Market-driven product development. *Marketing Management*, 9(2), 48–53.

Calderini, M and M Cantamessa (1997). Innovation paths in product development: an empirical research. *International Journal of Production Economics*, 51(1–2), 1–17.

Campbell, AJ and RG Cooper (1999). Do customer partnerships improve new product success rates? *Industrial Marketing Management*, 28, 507–519.

Cavone, A, V Chiesa and R Manzini (2000). Management styles in industrial R&D organisations. *European Journal of Innovation Management*, 3(2), 59–71.

Chanaron, JJ, D Jolly and K Soderquist (2002). Technological management: a tentative research agenda. *International Journal of Technology Management*, 23(6), 618–629.

Chen, IJ and A Paulraj (2004). Understanding supply chain management: critical research and a theoretical framework. *International Journal of Production Research*, 42(1), 131–163.

Christensen, JF (2002). Corporate strategy and the management of innovation and technology. *Industrial Corporate Change*, 11(2), 263–288.

Chronéer, D (2003). Have process industries shifted their centre of gravity during the 90s? *International Journal of Innovation Management*, 7(1), 95–129.

Clark, KB and T Fujimoto (1991). *Product Development Performance — Strategy, Organization, and Management in the World Auto Industry.* Boston: Harvard Business School Press.

Comer, JM and BJ Zirger (1997). Building a supplier-customer relationship using joint new product development. *Industrial Marketing Management*, 26(2), 203–211.

Cooper, RG (1999). The invisible success factors in product innovation. *Journal of Product Innovation Management*, 16, 115–133.

Cooper, RG (2000). Product innovation and technology strategy. *Research Technology Management*, 43(1), 38–41.

Cooper, RG (2001). *Winning at New Products: Accelerating the Process from Idea to Launch.* Cambridge: Perseus Publishing.

Cooper, RG and EJ Kleinschmidt (1993). Screening new products for potential winners. *Long Range Planning*, 26(6), 74–81.

Cumming, JL and B Teng (2003). Transferring R&D knowledge: the key factors affecting knowledge transfer success. *Journal of Engineering and Technology Management*, 20(1–2), 39–68.

Danneels, E (2002). The dynamics of product innovation and firm competences. *Strategic Management Journal*, 23(12), 1095–1121.

Davenport, S, C Campbell-Hunt and J Solomon (2003). The dynamics of technology strategy: an exploratory study. *R&D Management*, 33(5), 481–499.

Dewett, T and GR Jones (2001). The role of information technology in the organization: a review, model, and assessment. *Journal of Management*, 27(3), 313–346.

Dodgson, M (2000). *The Management of Technological Innovation: An International and Strategic Approach*. New York: Oxford University Press.

Doz, Y (1996). New product development effectiveness: a triadic comparison in the information-technology industry. In *Managing Product Development*, T Nishiguchi (ed.), pp. 13–33. New York: Oxford University Press.

Drejer, A (2002). Integrating product and technology development. *International Journal of Technology Management*, 24(2/3), 124–142.

Dwivedi, SN and JP Sharma (2002). Role of customers in the development of innovative process and product. *International Journal of Computer Applications in Technology*, 15(1/2/3), 24–36.

Edvinsson, L and MS Malone (1997). *Intellectual Capital, The Proven Way to Establish Your Company's Real Value by Measuring its Hidden Brainpower*. London: Harper.

Ettlie, J (2000). *Managing Technological Innovation*. New York: Wiley.

Fairlie-Clark, T and M Muller (2003). An activity model of the product development process. *Journal of Engineering Design*, 14(3), 247–272.

Ferrari, FM and JC Toledo (2004). Analyzing the knowledge management through the product development process. *Journal of Knowledge Management*, 8(1), 117–129.

Ford, D (1988). Develop your technology strategy. *Long Range Planning*, 21(5), 85–95.

Gana, J (1992). Determinants of innovation in cooper mining. The Chilean experience. *Resources Policy*, 18(March), 21–30.

Gardiner, P and R Rothwell (1985). Tough customers: good designs. *Design Studies*, 6(1), 7–17.

Germeraad, P (2001). The changing role of R&D. *Research Technology Management*, 44(2), 15–20.

Gerwin, D and NJ Barrowman (2002). An evaluation of research on integrated product development. *Management Science*, 48(7), 938–953.

Gomes, J, P de Weerd-Nederhof, A Pearson and O Fischer (2001). Senior management support in the new product development process. *Creativity and Innovation Management*, 10(4), 234–242.

Graber, DR (1996). How to manage a global product development process. *Industrial Marketing Management*, 25(6), 483–489.

Grant, RM (1991). The resource based theory of competitive advantage: implications for strategy formulation. *California Management Review*, 33(3), 114–135.

Griffin, A and JR Hauser (1996). Integrating R&D and marketing: a review and analysis of the literature. *Journal of Product Innovation Management*, 13(3), 191–215.

Gruner, KE and C Homburg (2000). Does customer interaction enhance new product success? *Journal of Business Research*, 49, 1–14.

Gunasekaran, A (1998). Concurrent engineering: a competitive strategy for process industries. *The Journal of the Operational Research Society*, 49(7), 758–765.

Gupta, AK and D Wilemon (1996). Changing patterns in industrial R&D management. *Journal of Product Innovation Management*, 13(6), 497–511.

Harmsen, H, KG Grunert and F Declerck (2000). Why did we make that cheese? An empirical based framework for understanding what drives innovation activity. *R&D Management*, 30(2), 151–166.

Harryson, SJ (1997). How Canon and Sony drive product innovation through networking and application-focused R&D. *Journal of Product Innovation Management*, 14(4), 288–295.

Hart, SJ and MJ Baker (1996). The multiple convergent processing model of new product development. In *New Product Development*, S Hart (ed.), pp. 151–166. London: The Dryden Press.

Hartley, JL, JR Meredith, D McCutheon and RR Kamath (1997). Suppliers' contribution to product development: an exploratory study. *IEEE Transactions on Engineering Management*, 44(3), 258–266.

Hayes, RH, SC Wheelwright and KB Clark (1988). *Dynamic Manufacturing: Creating the Learning Organization*. New York: The Free Press.

Håkansson, H and D Ford (2002). How should companies interact in business networks? *Journal of Business Research*, 55, 133–139.

Howe, V, RG Mathieu and J Parker (2000). Supporting new product development with the Internet. *Industrial Management & Data Systems*, 100(6), 277–284.

Hughes, GD and DC Chafin (1996). Turning new product development into a continuous learning process. *Journal of Product Innovation Management*, 13(2), 89–104.

Ita, PA and AC Gross (1995). Industry corner: World rubber and tire. *Business Economics*, 30(1), 58–63.

Jarvenpaa, SL and B Ives (1994). The global network organization of the future: information management opportunities and challenges. *Journal of Management Information Systems*, 10(4), 25–57.

Jones, T (1997). *New Product Development: An Introduction to a MultiFunctional Process.* Oxford: Butterworth-Heinemann.

Kahn, KB (2001). Market orientation, interdepartmental integration, and product development performance. *Journal of Product Innovation Management*, 18, 314–323.

Kahn, KB and EF McDonough III (1997). An empirical study of the relationships among co-location, integration, performance, and satisfaction. *Journal of Product Innovation Management*, 14, 161–178.

Kärkkäinen, H, P Piippo and M Tuominen (2001). Ten tools for customer-driven development in industrial companies. *International Journal of Production Economics*, 69(2), 161–176.

Kim, DK (1993). The link between individual and organizational learning. *Sloan Management Review*, 35(1), 37–50.

Kok, RA, B Hillebrand and WG Biemans (2003). What makes product development market oriented? Towards a conceptual framework. *International Journal of Innovation Management*, 7(2), 137–162.

Krishnan, V and KT Ulrich (2001). Product development decisions: a review of the literature. *Management Science*, 47(1), 1–21.

Lager, T (2001). *Success Factors and New Conceptual Models for the Development of Process Technology in Process Industry*. Doctoral thesis 2001:26. Department of Business Administration and Social Science, Division of Industrial Organization, Luleå, Sweden: University of Technology.

Lager, T (2002). Product and process development intensity in process industry: a conceptual and empirical analysis of the allocation of company resources for the development of process technology. *International Journal of Innovation Management*, 6(2), 105–130.

Lambert, D, M Cooper and J Pagh (1998). Supply chain management: implementation issues and research opportunities. *The International Journal of Logistics Management*, 9(2), 1–18.

Lancioni, RA (2000). New developments in supply chain management for the millennium. *Industrial Marketing Management*, 29(1), 1–6.

Levary, RR (2000). Better supply chains through information technology. *Industrial Management*, 42(3), 24–30.

Lewis, MA (2001). Success, failure and organisational competence: a case study of the new product development process. *Journal of Engineering and Technology Management*, 18(2), 185–206.

Love, J and S Roper (1999). The determinants of innovation: R&D, technology transfer and networking effects. *Review of Industrial Organization*, 15(1), 43–64.

Maffin, D, A Thwaites, N Alderman, P Breiden and B Hill (1997). Managing the product development process: combining best practice with company and project context. *Technology Analysis & Strategic Management*, 9(1), 53–74.

Magrath, AJ and KG Hardy (1994). Building customer partnerships. *Business Horizons*, 37(1), 24–27.

Morgan, JP and RM Monczka (2003). Why supply chains must be strategic. *Purchasing*, April, 42–45.

Möller, KK and A Halinen (1999). Business relationships and networks: managerial challenge of network era. *Industrial Marketing Management*, 28, 413–427.

Morris, CE (1993). Why new products fail, *Food Engineering*, 65 (June), 130–136.

Neale, RM and DR Corindale (1998). Co-developing products: involving customers earlier and more deeply. *Long Range Planning*, 31(3), 418–425.

Nordhaug, O (1993). *Human Capital in Organizations. Competence, Training and Learning*. Oslo: Scandinavian University Press.

Olson, EM, OC Walker Jr, RW Ruekert and JM Bonner (2001). Patterns of cooperation during new product development among marketing, operations & R&D: implications for project performance. *Journal of Production Innovation Management*, 18, 258–271.

Ottum, BD and WL Moore (1997). The role of market information in new product success/failure. *Journal of Product Innovation Management*, 14, 258–273.

Patti, AL, JP Gilbert and S Hartman (1997). Physical co-location and the success of new product development projects. *Engineering Management Journal*, 9(3), 31–37.

Peck, H and U Jütter (2000). Strategy and relationships: defining the interface in supply chain contexts. *The International Journal of Logistics Management*, 11(2), 33–44.

Petersen, KJ, RB Handfield and GL Ragatz (2003). A model of supplier integration into new product development. *The Journal of Product Innovation Management*, 20(4), 284–299.

Pick, P (1999). Building customer-supplier relationship in electronics. *Long Range Planning*, 32(2), 263–272.

Powell, TC and A Dent-Micallef (1997). Information technology as competitive advantage: the role of human, business, and technology resources. *Strategic Management Journal*, 18(5), 375–405.

Ragatz, GL, RB Handfield and TV Scannell (1997). Success factors for integrating suppliers into new product development. *Journal of Product Innovation Management*, 14(3), 190–202.

Roberts, M (1999). Integrating customer needs into product development. From stage-gate to market-based innovation. *Chemical Week*, 161(11), s8.

Rogers, M (2004). Networks, firm size and innovation. *Small Business Economics*, 22(2), 141–153.

Rothwell, R (1994). Towards the fifth-generation innovation process. *International Marketing Review*, 11(1), 7–31.

Rycroft, RW and DE Kash (1999). Mnaging complex networks — key to 21st century innovation success. *Research Technology Management*, 42(3), 13–18.

Rudolph, MJ (1995). The food product development process. *British Food Journal*, 97(3), 3–11.

Saban, K, J Lanasa, C Lackman and G Peace (2000). Organizational learning: a critical components to new product development. *Journal of Product & Brand Management*, 9(2), 99–119.

Salavou, H (2004). The concept of innovativeness: should we need to focus. *European Journal of Innovation Management*, 7(1), 33–44.

Sands, S (1983). Problems of organizing for effective new-product development. *European Journal of Marketing*, 17(4), 18–33.

Schary, PB and T Skjøtt-Larsen (1995). *Managing the Global Supply Chain*. Denmark: Handelhøjskolens Forlag.

Schilling, MA and CW Hill (1998). Managing the new product development process: strategic imperatives. *Academy of Management Executive*, 12(3), 67–81.

Sheasley, WD (2000). Taking an options approach to new technology development. *Research Technology Management*, Nov–Dec, 37–43.

Shephard, C and PK Ahmed (2000). From product innovation to solutions innovation: a new paradigm for competitive advantage. *European Journal of Innovation Management*, 3(2), 100–106.

Simatupang, T and R Sridharan (2002). The collaborative supply chain. *The International Journal of Logistics Management*, 13(1), 15–30.

Smith, PG (1996). Your product development process demands ongoing improvement. *Research Technology Management*, 39(2), 37–44.

Song, XM, MM Montoya-Weiss and JB Schmidt (1997). Antecedents and consequences of cross-functional cooperation: a comparison of R&D, manufacturing & marketing perspectives. *The Journal of Product Innovation Management*, 14(1), January, 35–47.

Song, XM, RJ Thieme and J Xie (1998). The impact of cross-functional joint involvement across product development stages: an exploratory study. *Journal of Product Innovation Management*, 15(4), 289–303.

Sveiby, KE (1997). The intangible assets monitor. *Journal of Human Resource Costing and Accounting*, 2(1), 73–97.

Swink, M and V Mabert (2000). Product development partnerships: balancing the need of OEMs and suppliers. *Business Horizons*, 43(3), 59–68.

Takeuchi, H and I Nonaka (1986). The new product development game. *Harvard Business Review*, Jan/Feb, 137–146.

Tatikonda, MV and GN Stock (2003). Product technology transfer in the upstream supply chain *The Journal of Product Innovation Management*, 20(6), 444–467.

Tidd, J and K Bodley (2002). The influence of project novelty on the new product development process. *R&D Management*, 32(2), 127–138.

Tottie, M and T Lager (1995). QFD-linking the customer to the product development process as a part of the TQM concept. *R&D Management*, 25(3), 257–267.

Trott, P (1998). *Innovation Management & New Product Development* Financial Times. London: Pitman Publishing.

Ulrich, KT and SD Eppinger (1995). *Product Design and Development*. New York: McGraw Hill.

Utterback, JM (1996). *Mastering the Dynamics of Innovation*. Boston: Harvard Business School Press.

Van der Panne, G, C Van Beers and A Kleinknecht (2003). Success and failure of innovation: a literature review. *International Journal of Innovation Management*, 7(3), 309–338.

Van Donk, DP (2000). Customer-driven manufacturing in the food processing industry. *British Food Journal*, 102(10), 739–747.

Wheelwright, SC and KB Clark (1992). *Revolutionizing Product Development*. New York: The Free Press.

Wynstra, F, A van Weele and M Weggemann (2001). Managing supplier involvement in product development: three critical issues. *European Management Journal*, 19(2), 157–167.

PAPER II

Re-submitted to Built and Human Environment Review

Using Grounded Theory Method and Rich Picture Diagrams when analysing Value Creation in Houses of Culture in Sweden

K Laurell Stenlund
Kristina.Laurell-Stenlund@ltu.se
Luleå University of Technology

Abstract

What kind of value does a public building for cultural activities create for clients, construction professionals and users? One approach to understand the complexity of ongoing processes over time is by identifying value-adding activities in building processes. However, value added activities are difficult to analyse especially when related to resources that have an immaterial character, e.g. knowledge, know how and social relations. Based on an in-depth case study of stakeholders' evaluation of a construction project grounded theory method (GTM) and rich picture diagrams (RPD) were used when analysing stakeholder and end-user value. Data was collected by semi-structured interviews with actors; public client, project manager, architect, contractor, employee and visitors of the building and during a workshop with representatives for different stakeholder groups. The results from the analysis show that building a house of culture creates stakeholders' and end-users' value that can be categorised into human, organisational and social capital. The strength of combining GTM and RPD is the ability to study complex organisational structures and relations between different actors, and specific as shown in this case, when analysing value creation in a construction project with many stakeholders with different interests and value.

Keywords: case study, grounded theory method, intellectual capital, rich picture diagrams

Introduction

Discussions during the last few years (Egan 1998; Finch 2000; Spencer and Winch 2002; Saxon 2005) have shown that integrating design and construction delivers better value for money as well as better buildings, particularly when attention is paid to the full costs of a building over its whole lifetime. Research on how buildings deliver better value for money during their lifetime involves complex data analysis of activities and processes. Value-adding activities consist of complex building processes performed over time. A condition for activities to be value-added is that they are supported by resources that are utilised and developed in a positive way (Laurell Stenlund and Hörte, 1999). According to the resource-based view the resources that are difficult to imitate and replace create a competitive advantage to companies (e.g. Penrose, 1959; Grant, 1991; Hamel and Prahalad, 1994). The characteristics of these resources are described as dynamic organisational capabilities (Dosi *et al*., 2008). However, value-added activities are difficult to analyse. Resources that are immaterial, e.g. knowledge, know-how and social relations (e.g. Sveiby, 1997; Edvinsson and Malone, 1997) are difficult to describe and measure. Sutrisna and Barrett (2007) argue that rich picture diagrams are tools suitable for analysing complex building processes. The purpose with this paper is to describe

how grounded theory method (GTM) and rich picture diagrams (RPD) were used when analysing stakeholder and end-user value when developing and constructing houses of culture. Empirical evidence is developed from a single in-depth case study where data was collected by interviews, archives, documents and during a workshop. In the next section GTM and RPD methods are discussed in relation to the case study. The results from the analyses are finally presented and concluded.

Theories and general conclusions from case studies

A researcher's choice of methodology is not only a matter of strategy. Researchers argue that their "Weltanschauung" (ontology, i.e. our view on how the world is constructed) and opinion of how knowledge is developed (epistemology) are behind the planned or unplanned choice of methodology and research methods. Management studies involves people's decisions and activities and are thus influenced by rules and structures built in society as well as in the specific organisation. The industry and the context of the studied processes are therefore important to consider (Chronéer and Laurell-Stenlund, 2006).

The specific structure of construction industry, mainly project oriented organisations must find other solutions and concepts for improving performance and efficiency according to Segerstedt and Olofsson (2010). Inter-firm processes in construction industry could be identified by the supply chains and networks consisting of different supplying construction companies, e.g. architectural offices and contracting firms, engaged in the early phases of the construction project (Bröchner and Kadefors, 2010; Segerstedt and Olofsson, 2010). In the early phases of a construction project, these inter-firm processes may create a creative chaos developing new ideas of buildings and constructions. According to Gray and Hughes (2001) the collaboration between individuals is part of the wider collaboration between firms in the construction sector. Describing and developing a deeper understanding of these networks also requires new research methods. Case studies are common accepted in management studies. Yin (1994) argues that a case study with one or more cases and with different methods for data collection, both quantitative and qualitative, can be theorized and generalised. A single case study makes it possible to capture different angles and perspectives in depth based on an inductive research strategy open for analytical generalisation and implications from a theoretical perspective rather than comparison with other cases (Eisenhardt, 1989).

Selection of the case

The case presented in this study is selected by the uniqueness of the building itself according to its special functional design and conditions of combining different cultural activities in one building involving art professionals with different goals. The House of Culture in Luleå was selected due to the researcher's access to data as well as to the interest from the public client and the construction professionals. Previous studies (for example Short et al. 2007) have discussed how arts clients require additional commitment from construction professionals. Building a house of culture is in this sense an interesting cultural construction project to study.

Qualitative research based on GTM

Qualitative data analyses with GTM are here applied to describe regularities and sequences (Glaser and Strauss, 1967) for certain building projects in a given situation creating common knowledge within a specific area.

Grounded theory was developed in the 60s by Glaser and Strauss in social medicine (Bryant and Charmaz, 2007). After a couple of years, Glaser and Strauss went in two different directions. Strauss revised the methods where data was interpreted by the researcher (Alvesson and Sköldberg, 2000). Glaser on the other hand continued to develop the classic grounded theory with analytical methods for qualitative data coding with an inductive approach but also including methods for deduction and abduction, i.e. methods for developing and testing theories (Glaser, 1992).

Grounded theory refers to the result of using grounded theory method according to Bryant and Charmaz (2007). The results should be traceable back to the empirical data and the studied phenomena (Sutrisna and Barrett, 2007). In this paper GTM is applied with an inductive approach (Miles and Huberman, 1994). The purpose of using GTM in this study was to investigate what kind of stakeholder value is created when building a house of culture. Stakeholder value is the key variable in this study with the purpose of visualising stakeholders' different value in the building process.

Data collection and data analysis based GTM

Both quantitative and qualitative data collection methods were used in the case study. The total data collection was broad and open based on several methods, i.e. integrative focus groups, participatory observations, archive data, documents, semi-structured interviews and a survey (Yin, 1994, p. 80). According to the Swedish principle of free access to public records all archive data from the construction project was available and could be analysed.

The analyses presented in this paper are mainly based on 17 semi-structured interviews with actors with different interest in the construction project, building documents and data from a workshop with internal and external stakeholders (Table 1). The interviews were recorded and transcribed. After transcription, the interviews were analysed by coding the respondents' activities chronologically in building processes. The interviewed respondents were belonging to different stakeholder groups with different roles in the construction sector as well as in society. Internal stakeholders, active in the construction sector may on the one hand act as clients, financiers and users, on the demand side, and on the other hand act as architects, engineers, contractors and materials suppliers, on the supply side, in the specific construction project (Winch, 2002, p.67). External stakeholders also have a direct interest in the project and can be broken down into private actors (e.g. local residents) and public actors (e.g. local government) (ibid.). In Table 1 the respondents are presented together with their stakeholder classification and role in the project by their title.

Reference group meetings

The public client as well as the construction professionals participated in the process of evaluating the effects of the construction project and the use of the building. They participated in so called reference group meetings and focus group interviews. During the research project four reference group meetings were carried out with two representative from the public client; one initiating the project and one internal end-user of the building, one representative from the construction company, two representatives from construction industry and one representative from a non-profit cultural organisation together with three academic researchers. During these meetings the first evaluation results were presented and discussed. The relevance of the results was discussed and new questions developed for further investigations.

Focus group interviews

The empirical data was first coded and summarized and then confirmed and discussed by the practitioners. The focus group interviews were conducted more specific regarding a subject where the participants were asked a question that was answered individual in the group, by each of the respondents and then discussed within the group. The five focus group interviews were performed in accordance with the reference group meetings and one at another time.

Workshop

A workshop was performed with people representing the stakeholders of the construction project, see Table 1. The workshop consisted of two parts. The first was to present the results from the descriptive analysis of the construction project to implement the results back to construction industry. The second part was to develop a story line of the construction project based on the stakeholders' successful factors describing the success of the building.

Open coding – first level

From the data analysis based on the interviews a story of the building process emerged. This story was build by the respondents and confirmed by all respondents when summarized in a case study report (Laurell Stenlund, 2010). Within this story different activities were specifically mentioned by different actors due to their significant influence on the performance of the construction projects as well as on the effects of the final building according to the respondents. These activities were confirmed by archive data and found in the construction projects documentation. There are different views about how categories emerge from the analysis, e.g. let the data 'talk' or if the researcher is shaping the categories (Bryant and Charmaz, 2007). In this study no specific and objective theoretical frameworks were ready to pick. They were instead developed during analysis. Coding was in the first step based on a preliminary theoretical framework consisting of different phases of the building process. The activities were then categorised, based on their empirical characteristic, first in relation to the different stages in the construction project, e.g. communication during design between architect and library manager and secondly in themes due to their organisational belonging, i.e. the content of the activity, for example, communication regarding specific functional solutions within the library between the architect and the library manager: strategic briefing during the design phase. Results of value-adding activities are presented in Table 2.

Open coding – second level

The second analysis was based on a preliminary theoretical framework (Values surrounding the House of Culture, developed from Boyd and Chinyio, 2006:80) where the client's requirements were coded to different stakeholder groups, and stakeholders' value were coded in relation to project and product (Laurell Stenlund et al, 2009).

Coding into rich picture diagrams and general themes

The third categorisation was an analysis of the value-adding activities performed by actors within the construction project as well as by end-users in the final building. Here the general themes developed by Sutrisna and Barrett (2007) were applied when coding the data into the rich picture diagram for further analysis of developed intellectual capital. This analysis is presented in the following section.

Intellectual capital in rich picture diagrams

Sutrisna and Barrett (2007) found that the use of the multiple case study approach was in agreement with the principles of GTM, i.e. that it relies on multiple sources and constant comparison of empirical data for the purpose of theory building. However, when using multiple case studies and GTM, the cross-case analysis can be found overwhelming and difficult to grasp all at once, according to Sutrisna and Barrett (2007). Therefore the rich picture diagram is suggested by Sutrisna and Barrett (2007) as an analytical tool in data analysis and here applied when analysing the development of intellectual capital in construction projects.

Rich picture diagrams

Firstly the successful construction project, with its value-adding activities, was pictured into a rich picture diagram. The activities were coded in accordance with the general themes developed by Sutrisna and Barrett (2007). Secondly, the results from the workshop were pictured into the rich picture diagram.

During the workshop each stakeholder representative presented their three most important success factors, written on post-it-notes in four dimensions; strategic with external (market) perspective; strategic with internal (vision and financing) perspective; operational with external (customer) perspective and operational with internal (organisational and cost) perspective. The four dimensions were after the workshop related to the general themes developed by Sutrisna and Barrett (2007). The notes were then transformed into the same rich picture diagram as the story line of the construction project.

Intellectual capital

The intellectual capital model consists of identifying financial, human, social, customer and organisational value (Sveiby, 1997). Identifying and visualizing intellectual capital are problematic and discussed for many years. Research with focus on intellectual capital started intensively during the 90s within the field of accounting. The Balanced Scorecard, developed by Kaplan and Norton (1993), The Intangible Assets Monitor, developed by Sveiby (1997) and The Skandia IC model with the world's first public intellectual capital annual report, as a supplement to the financial report (Edvinsson and Malone, 1997), are examples of management models categorising, measuring and valuing companies' tangible and intangible resources and assets. Edvinsson and Malone (1997) describe the company's intangible assets as "those that have no physical existence but are still of value to the company. Typically they are long term, and just as typically they cannot accurately be valued until the company is sold." Measurement of intellectual capital is thus difficult. According to Mouritsen (2009) is it not possible for an organisation to copy its intangible properties in a number; yet it is necessary because it allows intervention to happen since it develops a wholly new set of dimensions to manage. Measuring size, value and effects of intellectual capital does not yield definitive measures, yet the measures are comforting because they help develop the actions that can be made in the name of intellectual capital (Mouritsen, 2009).

Analysing intellectual capital in rich picture diagrams

In the rich picture diagram value-adding activities in the building process together with stakeholders' value of the construction project and building in use are pictured in a story line of building a house of culture; see Figure 1.

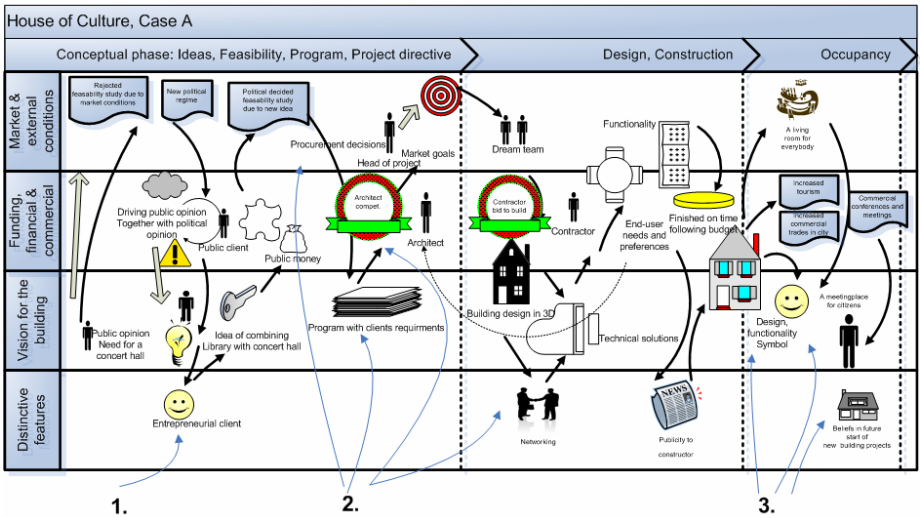


Figure 1: The story line of a successful construction project visualising created intellectual capital

In the figure, number 1 describes activities creating *human capital* in the municipality. Here the municipal commissioner played an important, entrepreneurial client role. This is seen as a distinctive feature in the case. Human capital was developed in a creative process of finding a new solution to an old demand, the need of a concert hall, and also driving the political process to a building decision of building a house of culture by combining the library, the hall of arts and the concert hall. The decision was a result of a more than 60-year-long discussion in the municipality, where special interest organisations argued for and against a new concert hall in the city. Human capital is measured in the individual's knowledge and experiences creating a capability within the organisation (Sveiby, 1997; Laurell Stenlund, 2004). The development of construction industry, with advanced technology put a pressure on actors' capabilities to adapt to these new technologies. However, construction industry also relays on actors' capabilities to create new ideas, new technologies and new types of buildings, as shown in this case were the public client was using his competence, based on political experience as well as on his skills from construction industry.

Number 2 in the figure describes the activities related to the development of the brief for architectural competition, based on the vision of the building together with the transformation of the public client's requirements into building programmes, e.g. functional and technical specifications. The public client's role during the development of the building programme was important. Different employees in the client's organisation were involved in the develop-

ment of the feasibility studies taking political decisions and developing the project directives with requirements regarding cost, time and responsibilities. In the brief for architectural competition, the public client formulated the overall vision and goals for the building and the end-users' functional requirements. People from the artistic organisations were partly involved in this strategic briefing process. The process, in the figure illustrated with dotted arrows, illustrates how the client's representatives, foremost the project manager together with the architect, worked together with actors responsible for art and library activities. This work should also be seen as a strategic briefing process performed in the project during the design phase. The public client's procurement decisions regarding the architectural competition made it possible for the architect to create a "dream-team" of consultants working together with designing the building. The bid-to-build procurement decision engaged a contractor, with the ambition to develop new knowledge within their own construction organisation concerning technical solutions in the building of concert halls. Here the municipality created *organisational capital* in measures of communication, trust and business relations (Sveiby, 1997) between actors in the local construction industry. The organisational capital belonging to the public client has created new construction projects in the community, even during recession, when normally no construction projects should have stated.

Finally number 3 in the figure describes how the public client's decisions had an impact on creating *social capital* in the community. This is closely related to the client's ambitions to create a building with symbolic value and also to the distinctive feature of having created future beliefs in the city. Social capital is described in terms of change in attitudes, but also in terms of economic value regarding new job opportunities, development of organisational and business activities. End-users participating at the workshop expressed their view of the building in use in terms of social value. They valued the multitude of cultural activities in the building as well as the building is easy accessibility, aesthetics, comfort, safe with a central location in the city. The social capital developed by building a house of culture in the community is described by the public client as valuable for the cities development in the future, not only because of its cultural activities, but also because of the buildings architecture and location.

Discussion

From the results from picturing value-added activities and stakeholders' value in a story line, the distinctive features for this specific construction project illustrates three key competencies generating human, organisational and social capital; firstly the human capital based on the public clients political and construction knowledge and skills in the pre-phase of the construction project; secondly the organisational capital based on the actors competencies of interacting when developing the strategic brief involving internal and external stakeholders goals and visions, during the construction project; and finally the social capital based on the building's multifunctional activities, its architectural design and its central location in the city, when building in use.

From the results one could determine certain success factors and key competencies that should be maximized. These success factors and key competencies could in turn be grouped into a number of distinct areas of focus such as financial, human, customer, process, renewal and development. Within each of these areas of focus, one could identify numerous key indicators to measure performance. Previous research studies have shown that companies and organisations have to identify their own relevant key indicators and success factors and relate them to their specific activities and resources when making the tools usable in management

decisions (Laurell Stenlund, 2004; Anumba *et al.*, 2005; Roos *et al*., 2005). Measuring size, value and effects of intellectual capital does not yield definitive measures, yet the measures are comforting because they help develop the actions that can be made in the name of intellectual capital (Mouritsen, 2009).

Conclusions

Stakeholder value is the key variable in this study with the purpose of visualising stakeholders' different value in the building process. From the results of the study, intellectual capital developed during the construction project has been visualised in terms of human, organisational and social capital. Houses of culture, public buildings for cultural activities, enable meeting places for citizens as well as they provide places for cultural events and spaces for creativity as well as they contribute to the development of new cultural activities.

The results are useful when implementing the results back to the studied client organisation and the actors in the project team as well as they can be used to generate hypothesis testable in future research. The strength of combining GTM and RPD is the ability to study complex organisational structures and relations between different actors, and specific as shown in this case, when analysing value creation in a construction project with many stakeholders with different interests and value.

References

Alvesson, M. & Sköldberg, K. (2000) Reflexive methodology: new vistas for qualitative research, London: Sage.

Anumba, C.J., Egbu, C. & Carrillo, P. (2005) Knowledge Management in Construction, Oxford: Blackwell Publishing Ltd.

Boyd, D and Chinyio, E (2006) Understanding the construction client, Oxford: Blackwell Publishing Ltd.

Bryant, A. and Charmaz, K. (2007) The SAGE handbook of Grounded Theory, London: SAGE Publications Ltd.

Bröchner, J. and Kadefors, A. (2010) Värden och värdekedjor inom samhällsbyggande, förstudie. [Values and value chains in building societies, prestudy], Stockholm: KK-stiftelsen.

Chronéer, D. & Laurell-Stenlund, K. (2006) Determinants of an effective product development process: Towards a conceptual framework for process industry. International journal of innovation management, 10(3), 237-269.

Dosi, G., Faillo, M. & Marengo, L. (2008) Organisational Capabilities, Patterns of Knowledge Accumulation and Governance Structures in Business Firms: An Introduction. Organization Studies, 29(08&09), 1165-1185.

Edvinsson, L. & Malone, M.S. (1997) Intellectual Capital, The proven way to establish your company's real value by measuring its hidden brainpower, London: Harper.

Egan, J. (1998) Rethinking Construction, Report of the Construction Task Force to the Deputy Prime Minister, John Prescott, on the Scope for Improving the Quality and Efficiency of UK Construction. Department of Trade and Industry, HMSO, London.

Eisenhardt, K.M. (1989) Building theories from case study research. Academy of Management Review, 14(4), 532-550.

Finch, P. (2000) Better public building, a proud legacy for the future, The Better Public Buildings Group. Department for culture, media and sport, London.

Galtung, J. (1967) Theory and methods of social research. Oslo: Universitetsförlaget.

Glaser, B.G. (1992) Basics of Grounded Theory Research. Sociology Press, Mill Valley, CA.
Glaser, B.G. & Strauss, A.L. (1967) The Discovery of Grounded Theory. Aldine, Chicago.
Grant, R. M. (1991) The resource based theory of competitive advantage: Implications for strategy formulation. California Management Review, 33(3), 114-135.
Gray, C. and Hughes, W. (2001) Building Design Management, Oxford: Elsevier Ltd.
Hägerstrand, T. (1985) Time-Geography. Man Society and Environment. The United Nations Newsletters, 8, 193-216
Hamel, G. & Prahalad C.K. (1994) Competing for the Future. Boston, Massachusetts: Harvard Business School Press.
Kaplan, R.S. & Norton, D.P. (1993) Putting the Balanced Scorecard on work, Harvard Business Review, (Sep-Oct), 134-147.
Laurell-Stenlund, K. (2004) Three perspectives on measuring and valuing losses of key competence. (Licentiate thesis in Swedish), Luleå: Luleå University of Technology.
Laurell Stenlund, K. (2010) Effekter av byggandet av Kulturens hus i Luleå, [The Matter of Culture], Research Report, Luleå: Luleå University of Technology.
Laurell Stenlund, K & Hörte, S-Å. (1999) Competence accounting – methods for measuring and valuing key-competencies. Managing Operations Networks, EurOMA Conference, Venice, Italy, June 7-8.
Laurell Stenlund, K., Ryd, N. and Vennström, A. (2009) Client's decisions in strategic briefs and their impact on user values. Proceedings 25th Annual ARCOM Conference. Nottingham: Association of Researchers in Construction Management, 361-370.
Miles, M.B. & Huberman, A.M. (1994) An Expanded Sourcebook, Qualitative Data Analysis (2nd ed.), California and London: Sage Publications. Inc.
Mouritsen, J. (2009) Classification, measurement and the ontology of intellectual capital entities. Journal of Human Resource Costing & Accounting, 13(2), 154-162.
Penrose, E. (1959/1995) The theory of the growth of the firm. Oxford: Oxford University Press.
Roos, G., Pike, S. & Fernström, L. (2005) Managing Intellectual Capital in Practice, Butterworth-Heinemann, Elsevier Ltd, Oxford.
Saxon, R. (2005) Be Valuable: A Guide to Creating value in the Built Environment Construction Excellence, London.
Segerstedt, A. and Olofsson, T. (2010) Supply chains in the construction industry. Supply Chain Management, 15(5), 347-353.
Shoemaker, P. & Amit, A.R. (1997) The Competitive Dynamics of Capabilities: Developing Strategic Assets for Multiple Futures. In Day, G.S. and Reibstein, D.J. with Gunther R.E.. Wharton on Dynamic Competitive Strategy, John Wiley & Sons, New York and Chichester, 368-394.
Short, C.A., Barrett, P., Dye, A. & Sutrisna, M. (2007) Impacts of value engineering on five Capital Arts projects. Building Research and Information, 35(3), 287-315.
Spencer, N. and Winch, G. (2002) How buildings Add Value for Clients, Construction Industry Council, London.
Sutrisna, M. & Barrett, P. (2007). Applying rich picture diagrams to model case studies of construction projects. Engineering, Construction and Architectural Management, 14(2), 164-179.
Sveiby, K.E. (1997) The Intangible Assets Monitor. Journal of Human Resource costing and accounting, 2(1), 73-97.
Winch. M.G. (2002) Managing Construction Projects, UK: Blackwell Science Ltd.
Yin, R. K. (1994) Case Study Research: Design and Methods, Newbury Press, California: Sage.

Table 1: Data collection the House of Culture

Semi-structured interviews, no 17	**Participants, Workshop 20090331**	**Secondary data**
Internal stakeholder/Public client-Municipality: Municipal commissioner (Cmc080401) Municipal employee (Cme070905) Project manager (Chp080117) Project leader (Cpl080220) *Internal stakeholder/Municipal and cultural organisations:* Cultural manager (CEcm070601,080117,080925) Library manager (Elm081006) Concert Hall manager (Echm081005) Art Hall manager (Eam081015) *External stakeholder/Contractor:* Manager construction company (Com071004) Project leader in construction company (Cop080930) *External stakeholder/Designer:* Architect (DA081002) *External stakeholder/ Commercial organisations :* Tourist manager (Etm081022) Business manager (Ebm081023) *End-user/Citizens, public and visitors:* Orchestra member (Epo070905) Public (Eci, 2090330)	Client: Municipal commissioner (Cmc) Client/End-user: Municipal Culture Chairman (CEcc) Client/End-user: Cultural manager (CEcm) Client/End-user: - Municipal Technical chairman (CEtc) Client: Project manager (Chp) Designer: Architect (DA) Constructor: Manager construction company (Com) Constructor: Project leader in construction company (Cop) Industry: The Swedish Construction Federation, Region North (BI) End-user: Concert Hall manager (Echm) End-user: Art Hall manager (Eam) End-user: Tourist manager (Etm2) End-user: 2 Peoples Parks and Community Centres (Eppc) End-user: Orchestra member (Epo) End-user: 2 citizens (Eci)	Feasibility study A 2002-08-15 Feasibility study B May 2003 Planning document 2003-12-22 Project directive 2003-10-20 Brief for architectural competition 2003-12-22

Table 2: Value-adding activities when building houses of culture

Activities in the briefing process related to strategic briefing
The feasibility study 2002 and 2003 a. the rejection of the first proposal consisting of private and public investors in the construction project b. the development of the second proposal of combining different cultural activities in one building
The political decisions 2003 a. political agreement on building a new house for the existing public library, the public art gallery and a new concert hall b. political initiatives of starting the construction project
The development of the project directives with requirement regarding a. cost b. time c. responsibilities
The development of the strategic brief a. overall vision and goals for the building and building performance b. end-users' functional requirements, needs and desires c. qualifying criteria for participating in the architectural competition d. order-winning **criteria** for the architect
The client's procurement decision a. design-bid-build based on a architectural competition b. architect creating a design team with client c. contractor's relation to client during construction

PAPER III

CLIENT'S DECISIONS IN STRATEGIC BRIEFS AND THEIR IMPACT ON USER VALUES

Kristina Laurell Stenlund[1], Nina Ryd[2] and Anders Vennström[1]

[1] *Department of Civil, Mining and Environmental Engineering, Luleå University of Technology, 971 87 Luleå, Sweden*

[2] *Department of Architecture, Chalmers University of Technology, 412 96 Gothenburg, Sweden*

The public client has in the early phase of a cultural construction project an important role of managing the strategic brief and delivering economic value and social benefits to the stakeholders and end-users. The purpose of this paper is to analyse how the public client's decisions have an impact on the community and its citizens by studying the requirements formulated in the strategic brief. A case study of building Houses of Culture has been accomplished where the public client's decisions in the briefing process and end-users estimations of the building performance have been analysed in terms of means and ends. The public client's decisions, including the clients' entrepreneurial role of combining different cultural activities in one building, together with the communication between construction professionals in the strategic brief, has been crucial to the development of end-user values.

Keywords: briefing process, culture, decisions, public client, user value.

INTRODUCTION

Famous theatre buildings, opera houses, concert halls, libraries and other public and monumental buildings create values to the visitors and to the actors performing or working in the building. Today people still tend to value buildings in their environment according to the classical Vitruvian formulation of the building performance of architectural design in terms of "commodity, firmness and delight" as an expression of the desired properties of utility, durability and aesthetics in the final building (Courtney 2008). Spencer and Winch (2002) have expressed the components of value in terms of the way that the arrangements of space within the building support the functions and its impact on the surrounding urban area. In the meantime the construction client has to consider the organisational objectives and needs when making decisions about a construction project (Atkin and Flanagan 1995).

Short et al. (2007) argue that the design and construction of arts buildings have been considered to be both very different to other building types and uniquely complex due to exacting technical demands and accommodation of various and sometimes conflicting stakeholder needs. Construction clients in the performing arts sector tend to be highly focused on the delivery of their original vision. Designing and delivering

[1] Kristina.Laurell-Stenlund@ltu.se; Anders Vennstrom@ltu.se

[2] Nina.Ryd@chalmers.se

Stenlund, K.L., Ryd, N. and Vennström, A. (2009) Client's decisions in strategic briefs and their impact on user values. In: Dainty, A. (Ed) Procs 25th Annual ARCOM Conference, 7-9 September 2009, Nottingham, UK, Association of Researchers in Construction Management, 361-70.

buildings for arts clients appears also to require additional commitment from construction professionals. Giving form to a coherent “artistic vision” and translating the “vision” into a building design is thus a cumbersome matter. Good design has often been associated with expensive buildings and high project costs. This may however not be true. Discussions during the last several years (Egan 1998; Finch 2000; Spencer and Winch 2002; Saxon 2005) has shown how integrating design and construction delivers better value for money as well as better buildings, particularly when attention is paid to the full costs of a building over its whole lifetime.

A cultural construction project combined with the public client’s vision and goals and end-users needs and desires creates a complex building project. The public clients' decisions including the rules for how the public client has managed to transform the requirements are of interest here. The purpose is to analyse how the public client's decisions have an impact on the community and its citizens. A case study of a house of culture has been accomplished by studying the end-users estimation of functionality and technical solutions related to the client's formulation of requirements in the strategic brief.

THEORETICAL FRAMEWORK

The context for the decision process in the early stage of the construction process is the briefing process. The aim with a briefing process is to define the operations demands and support the development of the business process. Briefing enables the communication of the end-users' needs and desires to the construction professionals (Spencer and Winch 2002). In managing a cultural construction project the client is responsible for the translation of the user's needs, expectations and desires into requirements and prerequisites for the construction project based on society's need for a sustainable built environment. Criteria for briefing, designing, and building new environments should be based on the evaluation of existing ones; however, these assessments are seldom done according to Preiser and Vischer (2005). In this section research within the field of briefing, client's role and decisions and values surrounding building will be discussed.

The brief

Research on construction briefing and construction performance encompasses several theoretical and methodological approaches from a variety of disciplines and seems to agree with two fundamental and sometimes contradictory issues (Barrett and Stanley 1999, Blyth and Worthington 2001, Green et al. 1999, Koskela 2000).

On the one hand briefings seem to be developed irrespective of the design process and are based on prescriptive measures that in detail describe the context in which the design will be carried out, identifying the specifications to be met per the demands of the construction sectors (Peña and Parshall 2001, Cherry 1999, Bertelsen et al. 2002).

On the other hand, briefings are considered integrated if the process runs throughout a construction project. An integrated briefing process should addresses the requirements of the client and other relevant stakeholders by capturing, interpreting, confirming, and communicating relevant data and issues to the design and construction team (Blyth and Worthington 2001, Barrett and Stanley 1999, Ryd 2004).

The construction client

Construction clients are the initiators of projects and those that contract with other parties for the supply of construction goods and services (Atkin and Flanagan 1995).

In Sweden the definition of a construction client is formulated in the Swedish Planning and Building Act PBL (1995) as "a party who carries out or assigns others to carry out construction, demolition or land work". The Swedish Construction Clients Forum (2006) has expanded this definition to include the following: "The construction client is also responsible for interpreting and translating the user's needs, expectations and desires into requirements and prerequisites for the construction project based on society's need for a sustainable built environment."

The construction client is thus not just the person who pays for the construction, the client is the bridge between the 'stakeholders' - all the people who have an interest in the final output from the project, as users, owners, financiers, 'the public' etc – and the people who will design and construct it – the architects, engineers, contractors, suppliers etc., according to Courtney (2008).

The client's role and decisions

The way construction clients' perceive their role will affect their decisions in the early stage of the building process (Courtney 2008). Briefly, the construction clients' can be divided into three main categories; the terms "user, manager and seller clients" are often used. A user client is a company, e.g. with a requirement for industrial or office space that uses buildings for purposes where great flexibility is necessary, but where ownership of the property is not required. The manager client is involved in a long-term operation, managing housing, office premises or various types of facilities. A seller client (or developer) has a business concept that involves selling off the property as soon as the construction is complete to another owner, e.g. a building society (Vennström 2008). Public construction clients' can be regarded as manager clients' whereby the main orientation is to develop facilities for public use, such as schools and libraries. Since the organisation that the client belongs to, creates the limits for how they think and proceed in the construction process, they relate their decisions in the construction process to their own organisations responsibility for the society (Vennström 2008).

The public construction client has an important role in the change and development of a community and society and thus a construction project can be seen as a national economic driver (Boyd and Chinyio 2006:2). The construction client needs to understand the entire quality chain covering all decisions and activities leading to customer satisfaction. This approach combines the "right project" (building, installation, function) with the "right process". "Right" meaning what the customer wants in every link in the chain. In managing the citizens' needs and desires, the public client has to take decisions about the citizens' opinions of how the municipality should invest the tax money and what kind of activities that are going to be performed in a new public building (Swedish Construction Clients Forum (2006). A cultural building project is thus also about the building itself.

The public culture building

Building a house of culture has been a popular investment for Swedish municipalities during the last years (SKL 2008). A new trend in the construction of these buildings is that the design and production phases include the development of different spaces and functionalities for different cultural activities, i.e. for example a concert hall is combined with a library and an art gallery in the same building complex. The construction of a house of culture combined with the client's vision and goals and end-users' needs and desires creates a complex building project. Technology development in light, sound and new art performances puts pressure on the design and

the technical solutions of new art, theatre and music halls. Even traditional art performances such as classical music performed by symphonic orchestras can today be experienced in halls created with specific acoustic solutions. The form and design of the building is also of importance to the city and its citizens. The building may create a value in itself to the community. Icon buildings symbolize urban revival as well as create a trademark for the city or country (Jencks 2005). However, it is impossible for a public client to satisfy all users and fulfil their requirements.

Stakeholders, strategic briefs and the client's means and ends

End-users functional and technical requirements are today much more technically advanced, putting a new kind of pressure on the client, designer, developer and contractor in the different construction phases of a cultural construction project. The development and formulation of end-users requirements is in general an activity performed by the architect with focus on the users' activities within the building and the buildings expression in the public environment. When building a public cultural house, the challenge is not only in satisfying the users working in the building. There are also end-users visiting the building as well as there are citizens that may have other interests in the building. With different stakeholders' aims and goals the project performance and the building performance may be different. A successful construction project is per se not a successful building. On the other hand an overdrawn construction project may be a loved and useful building in the long run for its end-users.

According to Lindahl and Ryd (2007) the strategic brief involves the identification of the different stakeholders' aims and goals. All the players in the strategic part of the briefing process are responsible for adopting the operation’s overall goals, developing them and realising them in the best possible way in the individual project. Olander (2007) discusses the impact of stakeholder influence on the construction project and according to Olander and Landin (2008) there is a natural tendency for stakeholder groups to try to influencing the implementation of construction projects in line with their individual concerns and needs. Stakeholders' aims and goals are thus important to identify.

Starting a construction project, the public construction client has a purpose or meaning with the building leading to a realised "end", i.e. the actual outcome of the adopted means may be quite different from the abstract end for which the means were adopted in the first place. Boyd and Chinyio (2006:77) argue that both means and ends connect to an organisational value system and that value today is not only identified with money in the industry, values are what clients and the industry use to make decisions and take actions. Values determine what we think of as good and bad and tend to have a bipolar character, i.e. every good value has an opposite bad value, which can change depending on circumstances. People and organisations determine their objectives on the basis of their values, search for suitable solutions, evaluate these solutions and finally make a choice (Boyd and Chinyio 2006:75-80). The Construction Clients' Group (2008) suggests that the best possible solution in terms of design, environmental performance and sustainable development is done by an integrated project team that collaborates together. An integrated perspective on construction briefings should create balanced and ongoing synergies between the construction sectors’ production demands and the clients’ and end-users’ operational demands (Spencer and Winch 2002).

METHODOLOGY

The methodology chosen in this study is based on the arguments of Yin (1994) that a case study with one or more cases and with different methods for data collection can be theorized and generalised. The case House of Culture is selected by its different stakeholders, special functional design and conditions of combining different cultural activities and involving art professionals with different goals. Previous studies (for example Short et al. 2007) have discussed how arts clients require additional commitment from construction professionals. Building a house of culture is in this sense an interesting cultural construction project to study.

Research design and data collection

The research design is based on an analytical research perspective (Miles and Huberman 1994). Data has been collected from a construction project, the House of Culture and project reports, the written brief, functional and technical documents and a survey to visitors of the building, Table 1.

Table 1: Data collection

Stakeholders	Semi-structured interviews	Secondary data
Investor/Initiator/ Developer	Municipal commissioner (Cmc080401) and	Feasibility study A
Building owner	Cultural manager (Ccm070601,080117)	2002-08-15
	Municipal employee (Cme070905)	Feasibility study B
Construction client	Head of project (Chp080117)	May 2003
	and Project leader (Cpl080220)	
Contractor	Manager construction company (Com071004)	Planning document
	Project leader in construction company (Cop080930)	2003-12-22
Designer	Architect (DA081002)	Project directive
The Swedish Construction Federation	CEO Region North (BI090330)	2003-10-20
Citizens	Public (Eci, 2090330)	Written brief
Municipal and cultural	Cultural manager (Ecm080925)	(Strategic brief)
organisations	Library manager (Elm081006)	Programme
	Concert Hall manager (Echm081005)	2003-12-22
	Art Hall manager (Eam081015)	
	Tourist manager (Etm081022)	
Commercial organisations	Business manager (Ebm081023)	
Public opinion	Orchestra member (Epo070905)	
Visitors	Visitors (survey 449 respondents, one question analysed, but not statistical) (Evi0903)	

The interviews have been semi-structured (focus on the actor's roles and activities, min 1 hour with each respondent during 2007-2008), recorded and transcribed. The transcriptions have been edited and sorted in chronological order. From interviews and secondary data, activities during the construction project are described and identified together with stakeholders' valuation of the project, relations between actors and the actors' views of the building performance. A survey has been accomplished by visitors of the building. 449 surveys have been collected during seven different occasions and places in the building. In this paper the result from one question regarding visitor's opinion about the building has been used in the data analyses.

DATA ANALYSES - THE HOUSE OF CULTURE CASE

A qualitative data analysis of the House of Culture case has been accomplished by using the model for values surrounding building, developed by Boyd and Chinyio (2006:80).

Analysing the values surrounding the House of Culture

The results from interviews and analyses of the secondary data (feasibility studies, planning document, project directive and written brief) concerning the clients requirements and the consequences of building a House of Culture for society and citizens are summarised in Figure 1. In the figure the results have been related to the values surrounding the House of Culture. The ends are described in terms of known and rational clients' decisions and in terms of evaluation and coping of end-user values. The means are expressed in terms of clients requirements formulated in the briefing process.

Means - Clients requirements

Based on the second feasibility study the municipal council decided to build a House of Culture, The client's arguments were based on the issues that a building combining the library, the hall of arts and a concert hall could create a new meeting place for the citizens in accordance with the culture policy of the municipality. However, the decision was not a fast upcoming idea. The decision was a result of a more than 50 year long discussion in the municipality, where special interest organisations argued for and against a new concert hall in the city. During this very long period, the public opinion was divided and the politicians did not come to any solution. In the end of the 90's the municipality got a new municipal commissioner with two main issues in his political programme; a) organising the infrastructure of public transportations in the city and b) giving the citizens a concert hall. However, the politicians had many tough discussions, based on the discrepancy between renovations of the library building and building a concert hall. The new municipal commissioner presented a new solution: building a House of Culture by combining the library, the hall of arts and the concert hall. The municipal council decided to build a House of Culture based on the idea from the new municipal commissioner. The budget for the investment was 320 MSEK which was decided in 2003 together with the formal political decision. This investment was based on calculations of costs for cultural activities already existing in the municipality and by adding the new activity, a concert hall to the project. After a new decision of also including the local music ensemble in the building, the public client invested 370 M SEK in the project.

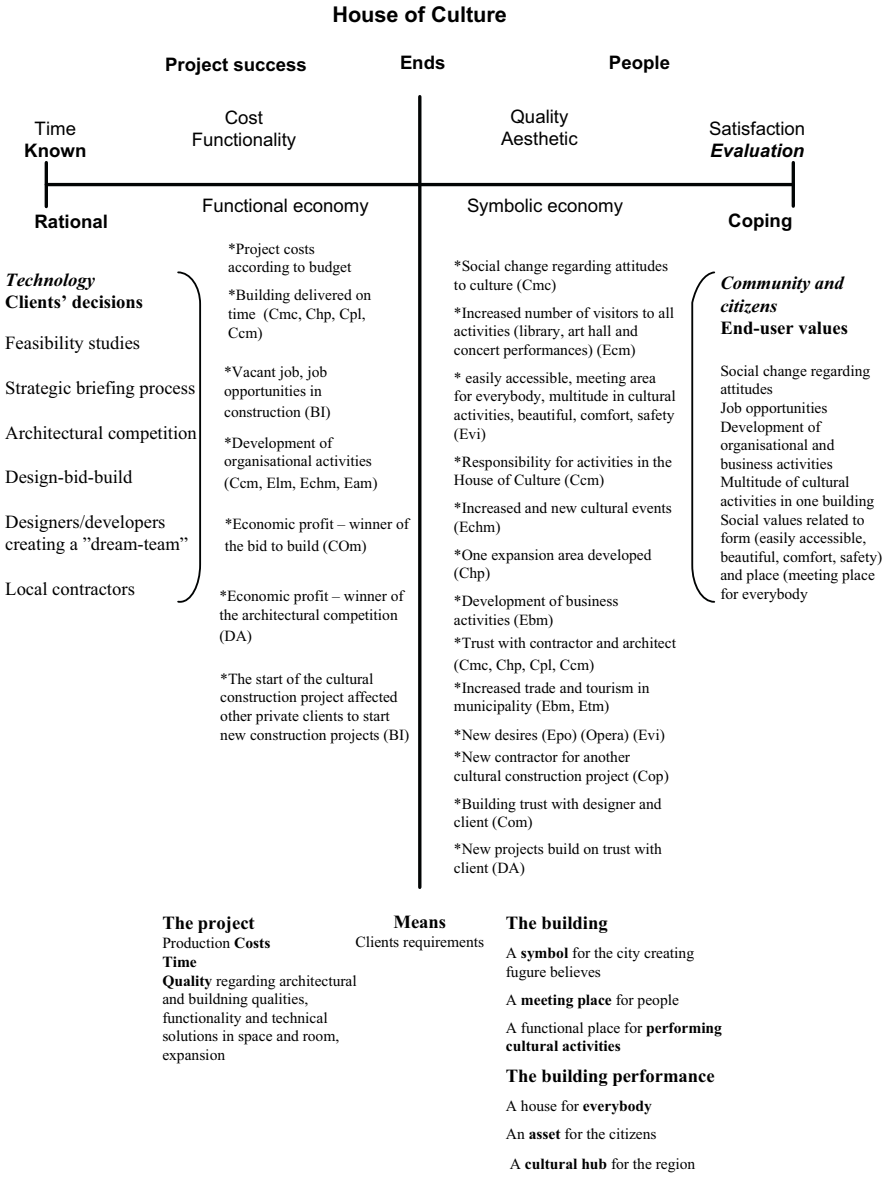


Figure 1: Values surrounding the House of Culture (developed from Boyd and Chinyio, 2006:80).

Ends - Clients' decision in the briefing process

In Figure 1, the clients' decisions in the briefing process has been analysed in the known rational dimension of the values surrounding the House of Culture. The activities performed in the briefing process, are based on the clients decisions

regarding a) the feasibility studies, b) development of a strategic brief by relating the goals and aims with the construction project (regarding costs, time and architectural and building qualities including functional and technical solutions in space and room as well as an expansion area), with the municipalities cultural organisations goals and aims, c) the procurement decisions concerning an architectural competition and design-bid-build agreements, d) the integrated brief (by the "dream-team" where the designer "architect" and developer "client" together with the conductor and sub-contractors worked in some aspects with developing the clients requirements with focus on end-users needs and desires during the production phase and e) the relation between the actors and the stakeholders due to the engagement of the local contractor.

Ends - End-user values

In Figure 1, the impact on the community and citizens have been analysed in the evaluation and coping dimension of the values surrounding the House of Culture. The end-user values have been categorised and estimated from interviews with representatives of the stakeholders regarding their valuation of the building in terms of value for the individual and value for the society as well as their evaluation of the building performance. The visitors positive opinions about the building have also been investigated (based on an open question about how the visitors evaluated the building, i.e. What do you think is the best with the House of Culture?). The purpose of analysing the question about the positive aspects was just to identify the characters of the good values to be able to relate them to the clients' formulations in the written brief and the terms developed during the strategic briefing process. In the survey the "bad" evaluations are also studied.

RESULTS

The public client's decisions regarding the activities and cultural functions of the House of Culture made it possible to finance the construction project. Due to political interests in building, both as monumental and functional, the House of Cultural has generated positive effects in the community.

The public client

The public client, the municipality, was the investor and developer of the project and is today also the owner and the facility manager of the building. The House of Culture has two concert halls, a public library and an art hall. These three cultural activities together with the Reception, Tourist information office and the Car parking are managed by the municipality. The municipality has also its administration for cultural activities, including conference management, within the building. The Restaurant and the Café are managed by private companies. The municipality has thus to manage different client roles and can be regarded as a manager client relating their decisions in the construction process to their own organisations responsibility for the society. The public client also acted as initiator of the building project, first by deciding and conducting the feasibility studies and then by the decision of starting the building project in 2003. Here the new municipal commissioner played an important, entrepreneurial client role.

The public client in the strategic briefing process

The public client's role during the strategic briefing process has been important. Different people in the client's organisation have been involved with the development of the feasibility studies, taking political decisions and developing the project directives with requirements regarding cost, time and responsibilities. In the strategic

brief the public client has formulated the overall vision and goals with the building and the end-users functional requirements. People from the artistic organisations have been involved, partly in the brief. The public clients' procurement decisions regarding the architectural competition made it possible for the architect to create a "dream-team" of consultants working together with the brief, design and planning of the project. The bid to build procurement decision engaged a contractor adept at developing new knowledge within the own construction organisation concerning technical solutions in the building of concert halls.

The public clients' decisions influencing end-user values

The public client's decisions had an impact on creating user value for the community in terms of social change in attitudes, in terms of economic value regarding new job opportunities, development of organisational and business activities and in multitude of cultural activities in one building and for the citizens in terms of social values related to form (in terms of easily accessible, beautiful, comfort, safety) and location (place and space).

CONCLUSIONS

The public client's decisions, including the clients' entrepreneurial role together with the communication between construction professionals in the strategic brief, has been crucial in the development of end-user values. The citizens have expressed that the House of Culture is easily accessible and creates a meeting area for everybody and that it is very positive with the variety of cultural activities in one and the same building. The building itself is characterized as beautiful, standing with an air of comfort and confidence by its end-users. The cultural organisations in the municipality have been given space for cultural activities.

REFERENCES

Atkin, B and Flanagan, R (1995) "Improving Value for Money in Construction". London: Royal Institution of Chartered Surveyors.

Barrett, P and Stanley, C (1999) "Better Construction Briefing". Oxford: Blackwell Science.

Bertelsen, S, Fuhr Petersen, K, and Davidsen, H (2002) "Bygherren som forandringsagent – på vej mod en ny byggekultur". (The Client as Agent for Changes – Towards a New Culture in Building). Denmark: Byggecentrum.

Blyth, A and Worthington, J (2001) "Managing the Brief for Better Design". London: Spon Press.

Boyd, D and Chinyio, E (2006) "Understanding the construction client". Oxford: Blackwell Publishing Ltd.

Cherry, E (1999) "Programming for design; from theory to practice". Canada: John Wiley & Sons Inc.

Construction Clients' Group (2008) Clients' commitments best practice guide. London: Constructing Excellence

Courtney, R (2008) Enabling clients to be professional. In:P. Brandon and S-L. Lu, (eds.) "Clients driving innovation". Chichester: Blackwell Publishing Ltd.

Egan, J (1998) "Rethinking Construction: Report of the Construction Task Force to the Deputy Prime Minister, John Prescott, on the Scope for Improving the Quality and Efficiency of UK Construction. Department of Trade and Industry, HMSO, London.

Finch, P (2000) Better public building, a proud legacy for the future. "The Better Public Buildings Group". London: Department for culture, media and sport.

Green, S D and Simister, S J (1999) Modelling client business processes as an aid to strategic briefing. "Construction Management and Economics", 17(1), 63-76.

Jencks, C (2005) "The Iconic Building". London: Frances Lincoln Ltd.

Lindahl, G and Ryd, N (2007) Clients' goals and the construction project management process. "Facilities", 25(3/4), 147-156.

Koskela, L (2000) "An exploration towards a production theory and its application to construction". VVT Technical Research Centre of Finland.

Miles, M B and Huberman, A M (1994) "An Expanded Sourcebook, Qualitative Data Analysis". 2ed. California, London: Sage Publications Inc.

Olander, S (2007) Stakeholder impact analysis in construction project management. "Construction Management and Economics", 25(3), 277-287.

Olander, S and Landin, A (2008) A comparative study of factors affecting the external stakeholder management process. "Construction Management and Economics", 26(6), 553-561.

Peña, W and Parshall S A (2001) "Problem Seeking; An Architectural Programming Primer". 4ed. New York: AIA Press.

Preiser, W F E and Vischer, P (2005) "Assessing Building Performance". Oxford: Elsevier Butterworth-Heinemann.

Ryd, N (2004) The design brief as carrier of client information during the construction process. "Design Studies", 25, 231-249.

SKL (2008) Nytt om kultur [News about culture]. "Sveriges Kommuner och Landsting", 1(4).

Saxon, R (2005) "Be Valuable: A Guide to Creating value in the Built Environment". London: Construction Excellence.

Short, C A, Barrett, P, Dye, A and Sutrisna, M (2007) Impacts of value engineering on five Capital Arts projects. "Building Research and Information", 35(3), 287-315.

Spencer, N and Winch, G (2002) "How buildings add value for clients". Construction Industry Council. London: Thomas Telford Ltd.

Swedish Planning and Building Act PBL (1995) Plan- och bygglag (1987:10) 9 kap. Byggnadsarbeten, tillsyn och kontroll §1 Lag 1995:1197. "Svensk författningssamling". Stockholm: Miljödepartementet.

Swedish Construction Clients Forum (2006) "The Role and Mission of the Construction Client". Stockholm: Byggherrarna.

Vennström, A (2008) "The construction client as a change agent - contextual support and obstacles", Thesis, Environmental Engineering, Construction Management, Luleå University of Technology, ISSN:1402-1544

Will Boston's new Institute of Contemporary Art be its "Bilbao on the Harbor"? (2007) "Architectural Record", 195(3), 14.

Yin, R K (1994) "Case Study Research: Design and Methods". California: Newbury Press, Sage.

PAPER IV

reSubmitted to Building Research & Information 2010-07-15

A time-geographical perspective on stakeholders articulating end-user needs when building houses of culture

Kristina Laurell Stenlund[1] and Elin Wihlborg[2]

Abstract

Public clients have a responsibility to consider citizens' desires and demands in many cases represented by interest groups. Expressing end-user needs and including them into the public building process is crucial to the public client when making an informed and legitimate decision and implementation of the construction project. The aim of this article is to show how end-user needs are articulated and taken up differently by stakeholders through the early phases of the public building process. A case study of a House of Culture in Sweden, with a time-geography approaches has resulted in an analysis of how stakeholders moved between phases until the construction project and procurement forms were settled with the contractors. The temporal perspective on the early phases gives a new understanding of how and when different stakeholders express end-user needs differently. By opening up the processes through a time-geographical perspective theses can be visualized and integrated and thereby show the complexity of end-user needs in public building processes. The public client has to create openings for all types of stakeholders to contribute as early as possible to the public building process. Stakeholders, also those who are not in the position of holding a stake, should be promoted to articulate their needs.

Keywords

Briefing, Culture, End-user needs, Political decisions, Stakeholder, Time-geography

[1] Phd-student, Luleå University of Technology, Construction Engineering and Management, Department of Civil, Mining and Environmental Engineering
[2] Assistant Professor, University of Linköping, Unit of Political Science, Department of Engineering and Management

1. Introduction

Public buildings have several aims and they are built in general interests to meet end-users needs. Thus the briefing process regarding public buildings is a form of democratic public policy process. Public buildings for art performance, sports events and other cultural activities are in some cases landmarks, icon or monumental buildings with a special impact on their cities (Jencks, 2005). Such buildings signal innate qualities of cities, devised to attract temporary visitors or more permanent settling of firms and individuals (Bröchner, 2009, p. 21).

End-users' needs are expressed through the policy making process and realized through the building process. Buildings are located and policies are just legitimate in a specific territory at a specific time. The focus of this article is to open up the time and space dimension of planning and policy making in the early phase of the building process by a time-geographical approach. Time-geography builds on a holistic approach to analysing how projects are fulfilled by the resources that the actors have access to and constraints they experience (Hägerstrand, 1985; Thrift, 2005). This analysis emerges from a case study of the briefing of end-users' needs for a public building with cultural content. End-user needs are crucial in the briefing process to make sure that these needs are met (Barrett and Stanley, 1999). In this case evaluating focus group interviews indicated that the citizens seem satisfied. One visitor to the house even asked:

> "How could the municipality understand that this House of Culture is what we needed and how good it is today?" (*End-user participating in a focus group, 090331*)

During briefing the public clients' demands – both end-users' and tax-payers' – are identified, expressed and clarified (Barrett and Stanley, 1999; Blyth and Worthington, 2001; Ryd, 2004). In this paper we define the briefing process as:

> "a dialogue between the client and the construction professionals, normally carried out by the architect, where the client's aspirations, desires and needs as well as end-user needs are captured and presented in a written form called the 'brief'" (Boyd and Chinyio, 2006, p. 11)

Such a written 'brief' is for public buildings indeed a political statement. It is the result of a policy processing of citizens' different demands and needs as tax-payers, democratic participants, caretakers and culture consumers etc. The views of the elected politicians, when acting as public clients, cannot directly transform values of the citizens (see for ex Hajer and Waagner, 2003). This gives stakeholders an opportunity to participate in the briefing and early phases of the building process.

Research has often focused on how clients manage stakeholder values during design and construction (Spencer and Winch, 2002; Saxon, 2005; Macmillan, 2006). But there is a need for new valuation methods and articulations to make end-users' needs visual in building processes. There are also demands for developing research on how buildings add value for clients by stakeholder management (Winch, 2006). We attempt here to meet these demands through a time-geographical approach and including the policy making into the building processes.

This article analyses a case study of a public House of Culture to show the potential of time-geographical tools when analysing stakeholders' participation and expression of end-users' needs in the early phases of the building process. We apply a combined theoretical and methodological inductive approach to an in-depth case study.

The article proceeds in five steps. Firstly, our conceptual framework is outlined based on time-geography and stakeholders' participation. Secondly, the methods and data of the case study are presented. Thereafter the case study of different stakeholders' articulations of end-users' needs is analysed in a time-geographical perspective. Finally, some general conclusions are drawn.

2. Briefing in public building processes with a time-geographical perspective

We start from the notion that democratic public clients have a vision to create a good life for citizens when investing in a public building. Firstly, the briefing process is in focus before turning into theories on time-geographical processes and stakeholder analysis. This theoretical framework is developed through the reflexive case analysis by an abductive approach (Alvesson and Sköldberg, 2000).

2.1 The briefing stage of the construction process

Research on briefing seems to agree with two fundamental and sometimes contradictory issues (Barret and Stanley, 1999; Blyth and Worthington, 2001; Green and Simister, 1999; Koskela, 2000). On the one hand briefing seems to be developed irrespective of the design process (Peña and Parshall, 2001; Cherry, 1999 and Bertelsen *et al.*, 2002). On the other hand, briefing is considered to be integrated with the design process (Barrett and Stanley, 1999; Blyth and Worthington, 2001; Ryd, 2004). Briefing is thus seen as a process where data and issues regarding clients' values and requirements and other relevant stakeholders' values are captured, interpreted, confirmed and communicated between the client and the construction professionals during the building processes' different stages. With this perspective briefing should create balanced and ongoing synergies between the construction sector's production demands and the client's and end-users' demands (Spencer and Winch, 2002).

Green and Simister (1999) argue that the briefing process can be divided into two stages. The first is referred to as strategic briefing and is concerned with understanding the client's business processes. The second stage comprises the conceptualization of built solutions and issues of performance specification. The public client thus has to consider both end-user needs and the political agenda when initiating and planning for a new public construction project.

In public building processes we argue that briefing is much more complex, since public values have to be translated and compromised through policy processes. Thus the ideas, planning and formal political decision making are all parts of the strategic briefing process when the public client forms and expresses its values and goals (Lindahl and Ryd, 2007).

2.2 The time-geographical process perspective

The briefing and public building are processes and all processes take place somewhere and take time to fulfil. This basic assumption forms the theoretical grounds of time-geography (Hägerstrand, 1985). Time-geography is a perspective mainly grounded in a specific ontological mode, but indeed with a clear methodological approach to mapping processes in time-space. Time and space are considered inseparable parts of the time-space. The time-geographical view of the world combines the view of objectivity in natural science with the social science view of subjectivity (Hägerstrand, 1976). The approach has become a foundation of different forms of analysis such as innovation diffusion studies (Rogers, 1962/2003) as well as everyday life in households (Ellegård and Wihlborg, 2001).

The time-geographical analysis focuses on the actors' arrangement of resources and constraints in time-space to fulfil their projects. The use of time and space is fundamental for all social and natural processes, but still not commonly integrated as an explicit precondition for scientific analysis. Hägerstrand's ambition was to create a notation system for making processes (irrespective of whether they were human or non-human) visible in the time-space. As a geographer his starting point was the map as a horizontal illustration with time added as a dimension emerging vertically above the map, and he thereby developed the now classical illustration of time and place (Figure 1).

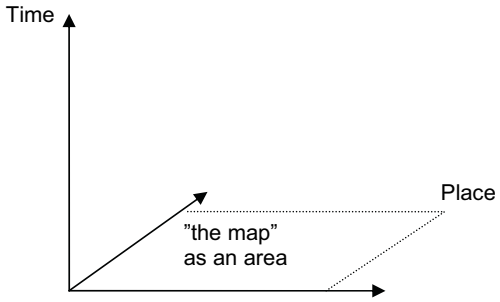


Figure 1 The traditional time-space illustration (Hägerstrand, 1953)

The time-space notation system (Figure 1) can be used to visualize processes in time and space. In the time-space trajectories, different actors' movements can be illustrated. By identifying stations in time-place, location for specific activities and the relation between them can be illustrated. In Figure 2 there are two stations indicated by **S**, which may be for example a home and a school. The thick line **f** is a trajectory of an actor, leaving S1, visiting S2 and returning to S1.

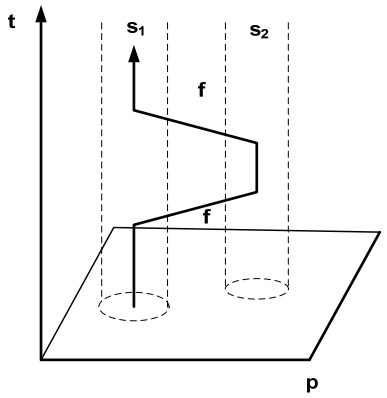


Figure 2 Stations in time-space, Hägerstrand (1970)

The time-geographical notation system visualizes the use of time by "mapping" what has happened. There may be many reasons for the outcome in time-space, but they all fall back on the basic issue of who was actually in possession of the time-space when a specific process took place. Here timing and placing of stakeholders are crucial for the activities and progress of the briefing process.

2.3 To hold one's 'stake' – stakeholders in processes

In the public briefing process stakeholders articulate different values and influence the public decision-making. Stakeholders are individuals or organisations that are actively involved in the construction project and those interests may be positively or negatively affected as a result of the project (Olander, 2007). Design and construction of art and culture buildings have been considered to be both very different from other building types and uniquely complex due to exacting technical demands and accommodation of various and sometimes conflicting needs of stakeholders (Short *et al.*, 2007).

Stakeholder theory has re-emerged in a more prominent role in the strategy/performance discussion even if it has a longer history (Harrison *et al.*, 2010). Stakeholder theory originally laid emphasis on effective management of a broad group of stakeholders affecting the firm (Freeman, 1984). Management studies demonstrated a positive relationship between integration of stakeholders and project performance (Mitchell *et al*., 1997). The balancing of different stakeholder values is central for the construction process (Barrett, 2007).

Olander (2007) identified two main categories of stakeholders in construction projects: *internal* stakeholders, those actively involved in project executions; and *external* stakeholders, those affected by the construction project. Translated into the public briefing process, policy making authorities and public administrations are seen as in-

ternal stakeholders. Other stakeholders, such as interest groups including trade and industries, using their democratic opportunity to articulate their needs, are seen as external stakeholders. The decision-making in public construction processes is based on a democratic rationality incorporating different rationalities, knowledge and information (Cairns, 2008).

Stakeholder theories in management perspectives point to the importance of legitimacy, power and urgency to make an agent into a stakeholder (Mitchell *et al*., 1997). *Legitimacy* in public processes is gained through legal arrangements, territorially localized and discursive interpretations. Thus stakeholders have to act legally, in the given territory and in accordance with the discourse then and there. *Power* is about the stakeholders' capacity to make a difference. In the most classical and simple definition, power is to make someone do what s/he would not have done otherwise. *Urgency* is about the timing of the process so that the issue is on the agenda and the stakeholder is forced to act in the situation. These three components of stakeholder theory (Mitchell *et al*., 1997) can thereby be integrated into the time-geographical analysis. A legitimate stakeholder has power to make a difference when the timing is right and when it is urgent.

2.4 Stakeholders in the public building process

Briefing in a public building process can invite all stakeholders. Policy makers may follow the local opinion but they may also influence the scope and nature of the political activities (Kingdon, 2003); thus they compromise the use and negotiate different demands. When policy makers and professionals in the public administration act as public clients, they become central legitimate stakeholders with power resources, obliged to consider end-user needs to maintain democratic legitimacy and political power.

Stakeholders can take on different roles and interest throughout a process. Thus a time-geographical analysis can open up the many roles of stakeholders and they shift in different phases of the process.

3. An inductive case study of stakeholders – Methodology

The qualitative case study underpinning this analysis is based on the complex methodology where different forms of data are collected and analysed in several steps (Eisenhardt, 1989). By starting from the case the interpretations are built through an inductive process in relation to the analyst's theoretical pre-understanding as inspired by grounded theory (Geertz, 1993) and reflective abduction (Alvesson and Sköldberg, 2000). A single case study makes it possible to capture different angles and perspectives in depth based on an inductive research strategy open for analytical generalisation and implications from a theoretical perspective rather than comparison with other cases (Eisenhardt, 1989; Yin, 1994).

3.1 Selection of the case

Our case study started with a pre-study in 2008 where the concept of houses of culture was defined. This case was chosen since it is an uncommon process to make such large investments in public buildings with cultural content in peripheral areas such as northern Sweden, even if houses of culture have been popular investments for Swedish municipalities (SKL, 2008). An in-depth study of the early phases of the building process was conducted. The analysis presented here is one of several analyses.

Houses of culture consist of varying venues combining different cultural activities, e.g. a concert hall with a library and an art gallery in the same building. The House of Culture in Luleå combines these cultural activities. The case was selected because of its special functional design and conditions of combining different cultural activities involving art professionals with different goals. Thus the arguments for the design and building had to be explicitly stated by the stakeholders. In addition this process had a long history and the arguments had been expressed throughout it, as will be shown in the analysis below.

3.2 Data collection

Data was collected by interviews, observations, a survey with external end-users (that is, visitors to the building) and by analysing archives, such as feasibility studies, political decision documents, architecture programme, briefing documents etc. (Miles and Huberman, 1994; Barrett and Sutrisna, 2009). According to the Swedish principle of free access to public records all archive data from the construction project has been available and analysed. Semi-structured interviews with key stakeholders were based on the archive records.

The semi-structured interviews are the main source of the specific analysis presented here. The interviews focused on the actor's role and activities in the process. Each interview lasted for at least one hour, several for two. The interviews were conducted during a time period of two years (second half of 2007 until first half of 2009). The first key-interview was with the cultural manager (interviewed three times). He also opened up the network of relevant informants around the project. The interviews were recorded and transcribed. When the stories became similar a closure was reached (Alvesson and Sköldberg, 2000).

3.3 Questioning a process –construction of questioner

Since the research process had several phases and the actors participated in one or more interviews, the interview guides with questions were developed for the specific actor and interview occasion. In Table 1 a summary of the content of the semi-structured interviews is presented.

Table 1 Categories and focus of questions in semi-structured interviews

Key areas of personal in-depth interviewees	**Focusing on ...**	**Respondent**
Participation in building project	Describing activities	All internal stakeholders
Knowledge of the project before and during participation	Stakeholders and end-user needs	All internal and external stakeholders
Decisions of participating in project	Procurement	All internal stakeholders
Possibilities and problems with briefing	Development for architectural competition	Public client
Possibilities and problems with briefing	Transforming end-user needs; communication with design and construction team	Architect
Possibilities and problems with briefing	Understanding clients needs	Contractors
Briefing	Formulation and priorities	Client and Architect
Vision and goals of participating in the project	Project goals in terms of quality, time and cost	All internal stakeholders
Requirements of building	For stakeholders and end-users in terms of functionality and technical solutions	Client
Effects of project	For stakeholders	All internal stakeholders
Effects of public building	For stakeholder and end-users	All internal and external stakeholders

3.4 The process of analysing

The compilation was first sent back to the respondents for their confirmation and then also presented during a workshop with actors from the construction project as well as internal and external end-users of the building. In addition six focus group interviews were arranged as reference group meetings as well as a final workshop concluding and confirming the description of the process.

The data collection regarding the building process was performed when the building was in use. This might influence the validity of the study because the respondents told their stories based on their memories and the final result of the process. However, our broad material and solid description of it provide qualitative validity (Laurell Stenlund, 2010).

The analyses in this paper are based on transcriptions coded by time, stakeholder type, stakeholder role (Olander, 2007; Cairns, 2008) and phases identified during data analysis (Table 2).

Table 2 Interview persons categorised in stakeholder type, role and phase

Respondents in semi-structured interviews Code=date	Stakeholder type	Internal or External stakeholder	Mainly active in phase...
Chair of the Municipal Executive Committee (080401, 080919, 081204)	Policy maker Decision maker	Internal	Idea Planning
Cultural manager (070601,080117, 080925)	Public administration	Internal	Idea Planning Design
Library manager (081006)	Public administration	Internal	Idea Planning Design
Art Hall manager (081015)	Public administration	Internal	Planning Design
Concert Hall manager (081005)	Public administration	Internal	Use-internal
Orchestra member (070905)	Interest group	External	Idea
Municipal administrative manager (070905)	Public administration	External	Idea Design
Head of project (080117)	Construction professional	Internal	Planning Design Construction
Project leader (080220)	Construction professional	Internal	Planning Design
Manager construction company (071004)	Construction professional	Internal	Construction
Project leader construction company (080930)	Construction professional	Internal	Construction
Architect (081002)	Construction professional	Internal	Idea Planning Design Construction
Representative for trade & Industry (081023)	Interest group	External	Idea
Tourist manager (081022)	Interest group	External	Idea
Public (090330) (two people)	Interest group	External	Idea

3.5 The House of Culture in Luleå

The case study describes a successful construction project with positive effects for the public client, construction professionals and end-users. The end-users were: citizens, visitors, cultural and commercial organizations and the public opinion.

The public client, the municipality, was the investor and developer of the project and is today also the owner and the facility manager of the building. The construction project was initiated by the public client starting on September 29, 2003 and finished on January 12, 2007 when the building was opened to the public. The facts about the project are presented in Table 3.

Table 3 Facts of construction project, House of Culture

Case description	House of Culture in Luleå
Building period	2004-2006
Investor in project and owner of building	Public client – Municipality
Opening date	12 January 2007
Architects	Tirsén & Aili Arkitekter
Contractors	Skanska, Strängbetong, Nåiden Bygg AB
Total area	14 000 m^2 and 6500 m^2 parking area
Construction cost	370 MSEK (33 Million Euro)
Public Library	3400 m^2
Concert Hall A	950 m^2, 1000 seats for audience
Concert Hall B	300 m^2, 300 seats for audience (450 standing)
Art Hall	500 m^2 exhibition area
Conference rooms	7 rooms with seating for 2-80 people
Other facilities	Tourist information office, Restaurant, Café, Reception, Local music ensemble, Administration, Parking area

The project was finished on time, according to the time schedule. The costs followed the budget and quality goals were achieved. Managers and staff working with concert arrangements, in the library and in the art hall have expressed that the building is functional for the visitors and public activities. However, some working spaces for the employees could be improved. Trade and industry have described how the building has given effects on new job opportunities, developed organisational and business activities as well as an increasing amount of temporary conference visitors and tourist to the city. A survey of visitors' evaluation of the building showed that the visitors appreciate the combination of multiple cultural activities, a central location and that the building is easily accessible, beautiful, comfort, safe as well as place for everybody (Laurell Stenlund, 2009, 2010).

3.6 The spatial location

The House of Culture studied here is located in a region traditionally dominated by heavy industry especially within steel and mining. The city of Luleå has approximately 74,000 inhabitants (2009) and the region, Northern Sweden, 250,000 people. Luleå is the main city in the region. During the last decades the city profile of Luleå has changed from the dominance of heavy industry to more knowledge-based companies and Luleå University of Technology.

Figure 3 is a map of central Luleå indicating different positions of the location of the buildings hosting the cultural activities before the House of Culture became available. The Cathedral and an old former church were used for concerts and other cultural arrangements. The City Hall was once suggested to include a concert hall, but this was rejected by the public opinion. The House of Culture is marked with a black thick circle situated close to the northern harbour. The previous building used for the city library is situated close to the northern harbour, and the house for art exhibitions was in rented space close to the southern harbour.

House of Culture 2007-

Old library 1965 – 2007

Old Art Hall 1993 – 2007

Old former church used for cultural performances - 2007

Cathedral

City Hall

Figure 3 Changes of place for cultural activities in the city

The public building process has thus changed the built environment. The city has got a new house for cultural activities. The public client has described this change in terms of changed attitudes among the citizens towards culture including art performances and library visits as well as to knowledge based industries (Laurell Stenlund, 2010).

By illustrating processes of change in a map, the timing is not made visible and it is not possible to see when different changes take place. However, by a time-geographical illustration this will be possible, as the analysis below will show.

4. Analysis through a time-geographical lens

From the case analyses three phases were identified where end-user needs were articulated: idea, planning and design. These three phases may be compared with the chronological nature of the construction project: pre-design, design, construction and occupation (Barrett and Sutrisna, 2009). In Figure 4 we show how this developed over time and what activities took place in the different phases.

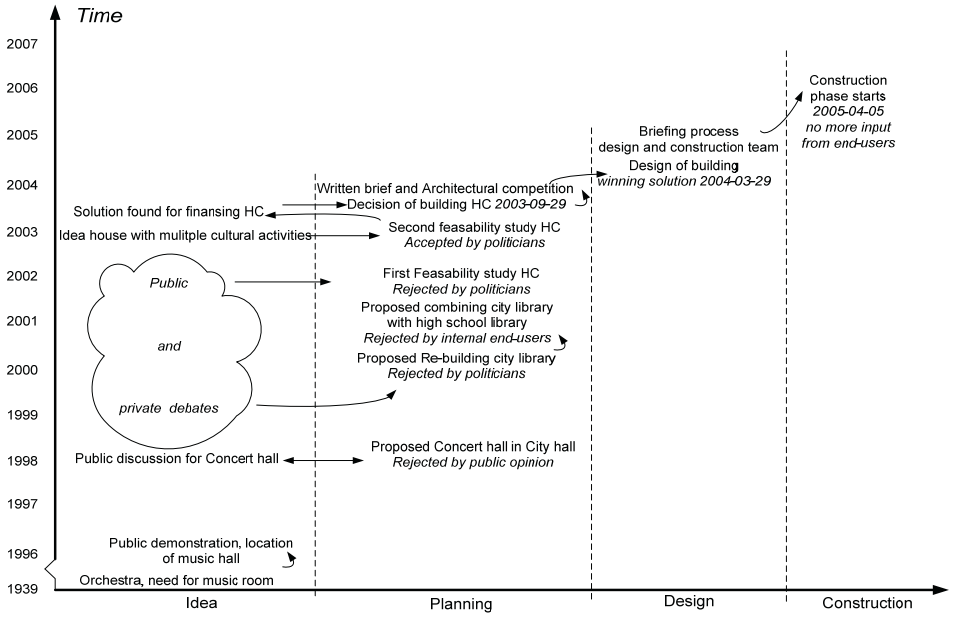


Figure 4 Time-phase illustration of activities in early phases of the building process

These phases are spread over the early phases of the building process including the first needs of a new building for music in the city in 1939. The public debate was on-going for 60 years in the city, in local press as well as in private circles. The planning phase became really intense in the decision making period 2002 to 2003. The idea and planning phase resulted in the development of the client's requirements in the written brief and in an architectural competition at the end of 2003. The design phase started after the winning solution was selected on March 29, 2004 and the construction phase started on April 5, 2005.

4.1 Stakeholder trajectories

Four groups of stakeholders articulating end-user needs appeared through the analysis. These were: interest groups, local policy makers, professionals in public administration, and construction professionals represented by the architect. The stakeholders are grouped together into one trajectory for each group in the time-geographical figure (Figure 5).

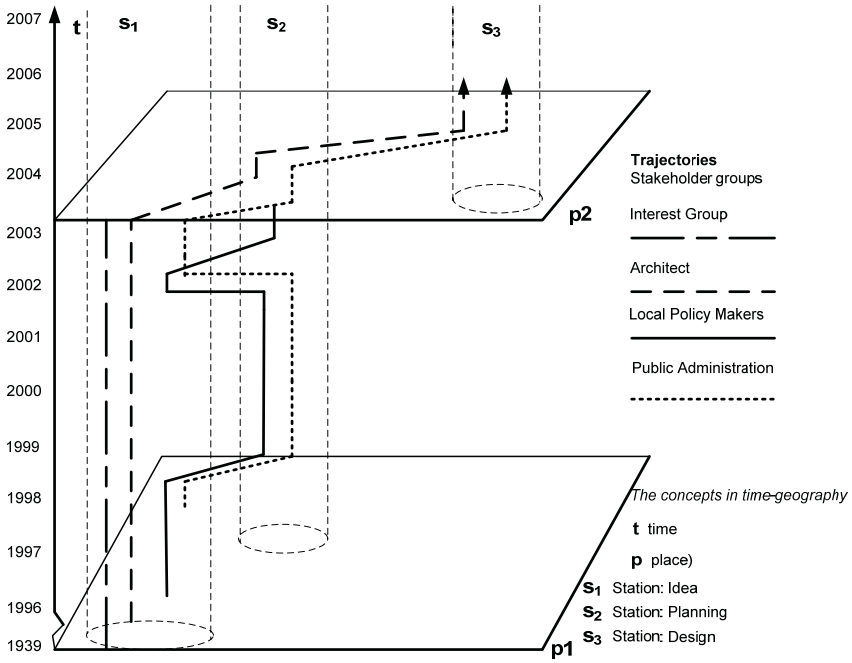


Figure 5 Stakeholder trajectories articulating end-user needs during early phases of the public building process based on the concepts in time-geography

4.1.1 Interest groups – A space for music and a place and benefits for local industry
The interest groups firstly articulated their need for a place for music performances. Later in the idea phase, they also expressed their interest in the activities performed in the building.

The musicians as an interest group expressed their need for not just having a concert hall for performances but also for rehearsals as well as for visualising the importance of art performances in the city. Already in 1939 the first announcement of a need for a better concert hall came from the Orchestra Society. The Cathedral was not perfect for orchestra performances.

During the 1980s a new, larger public and private opinion started. When the politicians finally responded to the orchestra's demands in 1986, the question of a new building in the city was expressed by the former leader of the local orchestra

> "Music is a must in the city, as a part of living in the city as well as a part of human life." *Orchestra member (070905)*

After the decision of building a house of culture in 2003, the trade and industry – another interest group – discussed how the building could meet their needs. During meetings with representatives from different companies within trade, industry, tourism, education etc., the use of the concert hall for commercial purposes, such as conferences, was discussed together with the effects on the industry of temporary visitors

in the city *(Representative for trade & Industry, 081023)*. Their needs were mainly economic as benefits to local trade and industry, as expressed by the tourist manager:

> ”Every visitor to the house of culture is important for the tourist sector and its development.” *Tourist manager (081022)*

4.1.2 The architect - understanding end-users' tacit needs
The architect, who later on won the architectural design contest in 2004, got engaged early in the public discussion of building a concert hall in the city during the 1980s. He became a “spider” in the network formulating and consolidating the ideas of the new House of Culture and he used his special competences to build and tighten up this network of interests and actors. The architect expressed the citizens needs with to perspectives, the first one regarding the location and the second regarding the cultural activities and its functionality.

He recapitulated the story of the location by highlighting the strong local opinion among the citizens against the proposed location in 1996. He said:

> “This solution should be stopped. The concert hall should be somewhere else, preferably close to the northern harbour. More people attended than on May first [Labour Day].” *Architect (081002)*

After the architect had read the programme and as a participant in the architectural competition, he understood the end-users' needs as follows:

> “One primary condition was the entrance and that the visitors should see the cultural content, with the library, art hall, café and concert halls directly when coming in. The house should invite its visitors and make it easy for them to find things” *Architect (081002)*

The architects' translation of the public clients' requirements into the winning proposal was given and simple due to his knowledge of the city and inhabitants. After winning the architectural competition, during the design phase (2004-2005; also integrated during construction 2005-2007 but not included in this study) the architect together with the public client and contractors developed the written brief into building documents.

The time-geographical analysis shows that the architect had the capacity to transform his role during the idea, planning, design and construction process. As a stakeholder he used the time-geographical stations where expressions of end-users' needs were briefed.

4.1.3 Local Policy Makers – Following the local opinion as well as forming it
Local policy makers are driven by democratic processes with an aim to fulfil citizens' needs expressed in policies. In Luleå there had been long discussions of investments in a new concert hall (first in 1939), but the ideas had been steadily rejected by the political majority until 1996, when the municipality presented a possible solution to meeting the citizens' desires by building a concert hall in the City Hall. However, this solution was not positively received by the orchestra society and their supporters. This response invited a reaction by the public demonstration in 1996.

The local political parties reacted differently in their manifestos for the upcoming municipal election in 1998, when the non-socialist minority put the need for a new concert hall on their political agenda. The Social Democratic Party had been in office for a long time, but at the time they had to form a majority together with the Left Party and the Green Party. The Social democratic Chair of the Municipal Executive Committee related to these different opinions among the parties in office, when highlighting that:

> "…the Left Party and the Green Party were not enthusiastic, but the Social Democrats had the question on their program, but they considered that education and elderly care should be given priority…" *Chair of the Municipal Executive Committee (080401)*

The Social Democrats did not give the question any priority in the election campaign of 1998 due to what they saw as lack of resources:

> "...based on financial reasons, we had to postpone the investment into the future. This decision was received with great disappointment among the supporters of the concert hall." *Chair of the Municipal Executive Committee (080401)*

For nearly 60 years the policy maker acted both as a stakeholder representing different cultural organisations' interests and at the same time as a stakeholder responsible for the municipal organisation and its budget. Four years later, before the municipal election in 2002, the policy-making stakeholder changed its focus by articulating the needs of the city, in contrast to before and to other stakeholders having a focus on specific end-user needs:

> "The Municipal Executive Committee considered that a House of Culture is a matter for the municipality and not only something for the cultural committee. " *Cultural manager (080117)*

From 2002, the building was not just a concert hall. The Chair of the Municipal Executive Committee raised the idea of combining different cultural activities in a house of culture. The building was thus no longer only a matter for the visitors and the cultural organisations, but also a matter for the city and region. The house of culture was to provide a centrally located arena for dialogue and positive experiences through a combination of different cultural activities such as concerts, library activities and art exhibitions.

When the decision of building a house of culture was taken on September 29, 2003 by the Municipal Executive Committee, the construction project was initiated and a construction team was constituted by the public client (the municipality). The construction professionals within the municipality, including the public administration, were responsible for the construction project. The policy maker was represented in the construction project by the construction professionals. In Figure 5 the trajectory for the policy maker ends up in the trajectory for the public administration in 2003. At the same time a new map is developed with a new place for a new building in the city.

4.1.4 Public Administration – As stakeholders rather than loyal servants
A parallel issue on the political agenda (2000-2002) was the expressed need for more space in the city library, and a decision to rebuild the library was made by the Municipal Executive Committee. The culture committee did not agree to the plan of rebuilding the old library. They argued instead for a new library. During this phase, employees working at the library also discussed the possibilities of combining the library and the concert hall in one building:

> "The natural way should be to have the library in a house of culture close to a concert hall. The library is open all days, everybody goes there and it is free for the citizens." *Library manager (081006)*

The need for a new library was included into the policy process of the House of Culture in 2003, when the public administration found a new solution for the municipality to finance the construction project. During the idea phase the public administration also integrated the interest groups in getting benefits from the building and its activities.

In theory public administration should act as loyal servants implementing what policy makers decide. But they also have to prepare decisions. First the public administration conducted two feasibility studies, the second of which was accepted by the politicians. In these studies end-user needs were transformed into useful concepts. The public administration team formulated and clarified several pre-requisites that can be seen as an aggregation of end-user needs.

The public administration stakeholder group moved to the design phase when working as construction professionals explaining and transforming the public client's requirements into functional and technical descriptions.

In accordance with Green and Simister (1999) the briefing process was developed in two stages. The formulation of the strategic brief was presented in words in the architectural programme and then transformed by the architect in his solution of the building. In this stage the public client's requirements were established by involving the identification of different stakeholders' aims and goals (Lindahl and Ryd, 2007). The formulations of the clients' requirements in the written brief were based on the second feasibility study and the requirements formulated in the project directive. This is also an important part of the strategic brief when communicating the operations overall goals according to Ryd and Fristedt (2007). The second stage was the conceptualization of built solutions and issues of performance specification (Green and Simister, 1999) transformed from the programme by the architect and the construction team in building documents during the design and construction phase.

4.2 Different stakeholders articulating different end-user needs
The above analysis shows how different stakeholders express different end-user needs. The interest groups represented by the orchestra society expressed the need for a concert hall. Trade and industries expressed a need for a conference centre. The architect articulated end-user needs in terms of location, cultural activities and functionality. The local policy makers firstly articulated end-user needs in relation to the need for different end-users, but then changed their focus by articulating the need for a building

for developing the city as well as the region. The House of Culture was intended to become a creative space for the public. The public administration also articulated their specific needs in their cultural organisations such as more space in the public library. Professional managers in public administration appear to act as stakeholders rather than loyal servants, as Sehested (2009) concludes when pointing to the reflexive capacity among public administration managers with professional/technical competences. Hereby the public administration became an internal stakeholder by using their professional competence as a power resource when the issues for funding became urgent (Mitchell *et al*., 1997).

5. Conclusions

Construction of a public building relies on a political briefing process giving stakeholders more opportunities to participate in democratic policy making. Formulations of public clients' requirements based on end-user needs are thus a cumbersome political process important to understand and manage for construction professionals.

5.1 Stakeholders in time-space contexts

The case study shows that different stakeholders articulated end-user needs differently. The temporal perspective on the phases gives a new understanding of how and when different stakeholders express end-user needs differently. We conclude that stakeholders moved between phases until the construction project and procurement forms were settled with the contractors. By opening up the processes through a time-geographical perspective, theses can be visualized and integrated and thereby show the complexity of end-user needs in public building processes.

During the idea phase, local policy makers first articulated end-user needs for two new buildings, one for concerts and one for the city library. Moving to the planning phase, the first feasibility studies were accomplished but rejected. After processing new ideas, developing them during the planning phase and going back to the idea phase, local policy makers found a consensus solution of "a cultural house with different cultural activities". This indeed indicates that the policy makers follow local opinion as well as shape it (Kingdon, 2003). In relation to the end-users' needs it becomes obvious that the stakeholder groups have different capacities for, and interests in. expression these. Thus the general perspective on power, as highlighted by Mitchell *et al*., (1997), here becomes defined as the power resources to express someone's interests. Legitimacy has in this perspective to be gained both from those whose interest they try to express and among other stakeholders as well as the structural setting of the building process. However, the stakeholders considered the issue of the House of Culture variously urgent during the stages of the process over time, and thus their participation in the process can be illustrated in a time-space.

Public clients have a unique role compared to private market clients when encouraging stakeholders to express needs not yet formulated, i.e. to identify stakeholders who are not in the position of holding a stake and then promote their articulation of it. They are supposed to speak for others, to be altruistic and express not yet foreseen needs and interests.

5.2 Final remarks

By opening the time-spatial dimension of the briefing process there is a potential to open up a new analytical framework. The briefing process in its early phases can be considered as a policy-making process with potentials to include deliberation methods for participants and stakeholders.

Acknowledgements

We gratefully acknowledge the financial support of SBUF (Development Fund of the Swedish Construction Industry) and Formas/BIC (The Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning). We also thank Professor Thomas Olofsson at Luleå University of Technology and Senior Researcher, PhD Nina Ryd at Chalmers University of Technology for their assistance with this research.

References

Alvesson, M. and Sköldberg, K. (2000) *Reflexive methodology: new vistas for qualitative research*, Sage, London.

Barrett, P. (2007) Revaluing Construction: a holistic model. *Building Research & Information*, **35**(3), 268-286.

Barrett, P. and Stanley, C. (1999) *Better Construction Briefing*, Blackwell Science Ltd, Oxford.

Barrett, P. and Sutrisna, M. (2009) Methodological strategies to gain insights into informality and emergence in construction project case studies. *Construction Management and Economics,* **27**(10), 935-948.

Bertelsen, S., Fuhr Petersen, K., and Davidsen, H. (2002) *Bygherren som forandringsagent – på vej mod en ny byggekultur, (The Client as Agent for Changes – Towards a New Culture in Building)*, Byggecentrum, Denmark.

Blyth, A. and Worthington, J. (2001) *Managing the Brief for Better Design*, Spon Press, London.

Boyd, D. and Chinyio, E. (2006) *Understanding the Construction Client,* Blackwell Publishing Ltd, Oxford.

Bröchner, J. (2009) The changing nature of the built environment, an economic perspective, in Ruddock, L. (ed.), *Economics for the modern built environment,* London: Taylor and Francis, 11-33.

Cairns, G. (2008) Advocating an ambivalent approach to theorizing the built environment. *Building Research & Information*, **36**(3), 280-289.

Cherry, E. (1999) *Programming for design; from theory to practice*, John Wiley & Sons Inc; Canada.

Eisenhardt, K.M. (1989) Building theories from case study research, Academy of Management Review, **14**(4), 532-550.

Ellegård, K and Wihlborg, E (2001) Fånga vardagen: ett tvärvetenskapligt perspektiv [Sees the everyday], Studentlitteratur, Lund.

Freeman, R.E. (1984) *Strategic Management: A Stakeholder Approach*, Pitman Publishing: Boston, MA.

Geertz, C. (1993) *The interpretation of cultures: selected essays*, Fontana, London.

Green, S. D. and Simister, S. J. (1999) Modelling client business processes as an aid to strategic briefing. *Construction Management and Economics,* **17**(1), 63-76.

Hägerstrand, T. (1953) *Innovationsförlopp ur korologisk synpunkt.* PhD-Thesis. Lund University. Translated into English by Allan Pred in 1957: *Innovation diffusion as a spatial process.* Chicago: Chicago UP.
Hägerstrand, T. (1970) What about People in Regional Science. *Regional Science Association Papers,* **24**, 7-21.
Hägerstrand, T. (1976) Geography and the Study of Interaction between Nature and Society. *Geoforum*, **7**, 329-344.
Hägerstrand, T. (1985) Time-Geography. Man Society and Environment. *The United Nations Newsletters*, **8**, 193-216.
Hajer, M.A. and Wagenaar, H. (2003) Deliberative policy analysis : understanding governance in the network society. Cambridge: Cambridge University Press.
Harrison, J.S., Bosse, D.A. and Phillips, R.A. (2010) Managing for stakeholders, stakeholder utility functions, and competitive advantage. *Strategic Management Journal,* **31**, 58-74.
Jencks, C. (2005) *The Iconic Building*, Frances Lincoln Ltd, London.
Kingdon, J.v. (2003) *Agendas, Alternatives and Public Policies*, Longman.
Koskela, L. (2000) *An exploration towards a production theory and its application to construction,* VVT Technical Research Centre of Finland.
Laurell Stenlund, K. (2009) Value creation in the House of Culture: values for clients, construction professionals and users. *Proceedings of 5th Nordic Conference on Construction Economics and Organisation.* University of Reykjavik, Reykjavik. 32-43.
Laurell Stenlund, K. (2010) Effekter av byggandet av Kulturens hus i Luleå, [The Matter of Culture, a case study of the House of Culture in Luleå], Research Report, Luleå University of Technology, Luleå, Sweden
Lindahl, G and Ryd, N (2007) Clients' goals and the construction project management process. *Facilities*, **25**(3/4), 147-156.
Macmillan, S. (2006) Added value of good design. *Building Research & Information,* **34**(3), 257-271.
Miles, M.B. and Huberman, A.M. (1994) *An Expanded Sourcebook, Qualitative Data Analysis (2nd ed.),* Sage Publications Inc., California, London.
Mitchell, R.K., Agle, B.R. and Wood, D.J. (1997) Toward a Theory of Stakeholder Identification and Salience: Defining the principle of who and what really counts. *Academy of Management Review*, **22**, 853-886.
Olander, S. (2007) Stakeholder impact analysis in construction project management. *Construction Management and Economics,* **25**(3), 277-287.
Peña, W. and Parshall S. A. (2001) Problem Seeking; An Architectural Programming Primer, 4:th edition, AIA Press, New York.
Ryd, N. (2004) The design brief as carrier of client information during the construction process. *Design Studies,* **25**, 231-249.
Ryd, N. and Fristed, S. (2007), Transforming strategic briefing into project briefs, *Facilities*, **25**(5/6), 185-202.
Rogers, E. (1962/2003) *Diffusion of Innovation.* New York: Free Press
Saxon, R. (2005) *Be Valuable: A Guide to Creating value in the Built Environment.* Construction Excellence, London.
Sehested, K. (2009) Role diversity in the management of local service institutions, in Gjelstrup, G. and Sorensen, E. (ed.), *Public Administration in Transition,* DJOF Publishing, Copenhagen. 215-231.

Short, C.A., Barrett, P., Dye, A. and Sutrisna, M. (2007) Impacts of value engineering on five Capital Arts projects. *Building Research and Information*, **35**(3), 287-315.

SKL (2008) Nytt om kultur, [News about culture], *The Swedish Association of Local Authorities and Regions. Sveriges Kommuner och Landsting*. **1**(4).

Spencer, N. and Winch, G. (2002) *How buildings add value for clients,* Construction Industry Council, London.

Thrift, N. (2005) Torsten Hägerstrand and social theory *Progress in Human Geography,* **29**, 337-340.

Winch, G. (2006) Towards a theory of construction as production by projects, *Building Research & Information,* **34**(2), 154-163.

Yin, R. K. (1994) *Case Study Research: Design and Methods*, Newbury Press, Sage, California.

PAPER V

Submitted to
Construction Management and Economics

Creating stakeholder value in strategic briefing when building Houses of Culture

Kristina Laurell Stenlund[1], Nina Ryd[2] and Thomas Olofsson[3]

Abstract

In the early phase of the construction project, briefing is critical to deliver a successful project. However, the challenge is thus not only to conduct a successful project in terms of productivity and efficiency and not to exceed a budget appropriation, but also to follow policies and improve stakeholder value in the built environment. Based on a case study the creation of stakeholder value is investigated by studying how culture construction professionals transformed public clients' requirements and end-user needs during a briefing process that ran throughout the construction project. Data was collected by means of interviews, archives and documents as well as by a survey. The result from the study shows how stakeholder value is created during the strategic briefing process by communication and teamwork between the client and the design and construction teams; from the public client's requirements into construction project goals in terms of time, cost and quality. In the case of the house of culture strategic briefing created different solutions to the building's final performance evaluated by the visitors of the house of culture expressed in use value: Form & Shape, Activities and Place & Space.

Keywords: Briefing, construction professionals, public client, stakeholder values, value management

[1] Phd-student, Construction Engineering and Management, Dept. of Civil, Mining and Environmental Engineering, Luleå University of Technology, Sweden. Kristina.Stenlund@ltu.se
[2] Assistant Professor, Department of Architecture, Chalmers University of Technology, Sweden. Nina.Ryd@chalmers.se
[3] Professor and Head of Construction Engineering and Management, Dept. of Civil, Mining and Environmental Engineering, Luleå University of Technology, Sweden. Thomas.Olofsson@ltu.se

Introduction

Research during the last few years (Egan, 1998; Finch, 2000; Spencer and Winch, 2002; Saxon, 2005) has shown that integrating design and construction delivers better value for money as well as better buildings, particularly when attention is paid to the full costs of a building over its whole lifetime. However, not only a focus on the full costs influences the delivery of better value. All the players in the strategic part of the briefing process should be responsible for adopting the operation's overall goals and developing them and realising them in the best possible way in the individual project (Boyd and Chinyio, 2006; Lindahl and Ryd, 2007).

Design and construction of arts buildings have been considered to be both very different from other building types and uniquely complex due to exacting technical demands and various and sometimes conflicting needs of the many stakeholders involved (Short et al., 2007). Briefing/architectural programming are described as a dynamic process in the literature due to the complexities in identifying and conveying the client's actual needs and requirements accurately to the project team and the immense magnitude of project information that needs to be considered during the process (Yu et al., 2006; 2008). But how do we know that the user's needs and expectations will be fulfilled?

A problem today in the construction industry is that public clients and construction professionals have different tools for following up effects of construction projects. Or rather, construction professionals follow up the results from the construction project and public clients have to "wait and see" what effects their investments had after a couple of years.

> "A successful project is on time, below cost and conforms to specification" (Winch, 2002, p. 185).

A construction project may thus be successful in costs and time as well as in delivering a building according to the written brief and the client's requirements, but fail in quality value in relation the end-users' needs. This failure indicates a briefing problem (Winch, 2002, p. 183).

> "To encourage quality in a building is to obtain a clear statement about what constitutes high quality for a particular client, and to have that statement embodied within the employer's requirements" (Murdoch and Hughes, 2008, p.57).

Yu et al. (2006; 2008) argue that the success of the construction project depends on how well the project is managed, the kind of actors involved in briefing, the structure of the project and finally how the processes are performed during construction. In the early phase of the construction project, Shen et al. (2004) argue that briefing is the critical part when delivering a successful project.

The challenge is thus not only to conduct a successful project in terms of productivity and efficiency and not to exceed a budget appropriation, but also to improve the communication of stakeholder value among actors in the early phases of the building process and then transform them into the client's requirements in briefing (Green and Simister, 1999; Gray and Hughes, 2001; Kamara and Anaumba, 2001; Winch, 2002; Ryd, 2003, 2004).

This research aims to investigate how construction professionals transformed the public client's requirements and end-user needs during briefing. A case study of building a house of culture was accomplished by means of interviews with project actors, a survey to end-users and analyses of archive data and documents. The discussion in the paper begins with a review

of the concept of briefing followed by the research methodology and the results from the case study. These are discussed and concluded in the final section.

The Concept of Briefing

According to Blyth and Worthington (2001), Barrett and Stanley (1999) and Ryd (2003), briefing is addressing the client's and other relevant stakeholders' requirements by capturing, interpreting, confirming, and communicating relevant data and issues to the design and construction team. With this perspective construction briefing should create balanced and ongoing synergies between the client's and end-users' operational demands and construction sector's production demands (Spencer and Winch, 2002).

Briefing can be divided into two stages (Green and Simister, 1999). The first is referred to as strategic briefing and is concerned with understanding the client's business processes. The second stage comprises the conceptualization of built solutions and issues of performance specification. The second stage is referred as operational briefing. According to Green and Simister (1999), it is the first of these two stages which often is the most problematic to manage in the early phases of the construction project.

During the briefing process the client's appropriate intention is defined together with the project's vision. Managing the process of realising that mission through planning and execution on site are important design and construction activities (Winch, 2002, p. 186). The construction project should consequently make sense to its owners and users and above all to its investors when realized. Strategic briefing (Green and Simister, 1999) by implementing the client's visions and overall goals is consequently important (Ryd 2004; Ryd and Fristedt, 2007). In the case of a design-bid-build project the professional client acts as system integrator in the supply chain (London and Kenley, 2000; Segerstedt and Olofsson, 2010). The professional client thus needs to consider both his own interests and those of other stakeholders related to the project. According to Winch (2002, p. 67) "the project stakeholders are those actors which will incur a direct benefit or loss as a result of the project". However value may also be destroyed in construction projects as described as follows

> "Construction projects create new value, but they can also destroy value – noise and dust disturb local residents during construction: amenity (here defined as social utility) is permanently lost as a result of construction as symbolically important buildings are demolished and the landscape is changed. Moreover, where existing facilities are replaced, stakeholders in those facilities may not share in the value generated by the new one – jobs may be lost and profit opportunities move out of reach." (Winch, 2002, p. 67)

When initiating construction projects, for example when building houses for cultural activities, the client is commonly a public professional client. The public professional client has thus to manage internal stakeholders' value from the demand side, e.g. the client's employees, customers, tenants and suppliers from the supply side, e.g. architects, engineers, principal contractors, trade contractors and material suppliers. The public client also has to manage external stakeholders' value, both private and public, e.g. local residents and local government.

However, there is a difference between value and values (Wandahl et al., 2007). According to Wandahl et al. (2007), values are principles by which we live whereas Saxon (2005) defines value as what you give in relation to what you get and it is personal and not an objective fact. Value management literature emphasizes the benefits of building performance to clients

where benefits are quantified in business terms: relationships among costs, time, and quality where quality includes esteem, exchange, and use value (Kelly and Male, 1993; Kelly et al., 2003). Stakeholder values and stakeholders' value are consequently different due to various and sometimes conflicting needs of the many stakeholders. Stakeholder groups also have different organizational belongings and different positions in society. Some stakeholder groups have a strong influence on society, i.e. legitimate demands and power to use their values when putting pressure on politicians and private and public organizations (Freeman, 1984; Mitchell et al., 1997). According to Macmillan (2007), there are different types of value created in the built environment, e.g. exchange value, use value, image value, social value, environmental value and cultural value.

Consequently the public professional client has to manage both internal and external stakeholder values. The citizens' different valuation of the public building and the public opinions of how the municipality actually should invest local revenues need to be managed together with the client's business needs in terms of end-user needs, e.g. a public building's usability for employees working in the building and inhabitants visiting the building.

Feedback systems from earlier construction projects are suggested to support the construction professional in defining end-user needs in the briefing process (Barrett and Stanley, 1999; Green and Simister, 1999; Kamara and Anumba, 2001; Gray and Hughes, 2001; Ryd, 2003; Preiser and Vischer, 2005). A systematic feedback and evaluation during every phase of building delivery, ranging from strategic planning to occupancy, throughout the building's life cycle are suggested by Preiser and Vischer (2005).

The client requirements processing model (CRPM), developed by Kamara and Anumba (2001) was designed to serve as the interface between the client's business needs and design requirements. The model was developed by an iterative process involving academics and practitioners from the construction industry, and by incorporating techniques and standards already in use in the construction industry (e.g. value management). The CRPM model identifies the need for feedback from the use and operation of the building, described as evaluation of end-user needs.

In briefing of commercial and public buildings, Ryd (2008) argues that the first step to understand the client's requirements in briefing is to analyse the business concept, i.e. identifying stakeholder values. The second step is to define the worth of the project by identifying the project goal that is common for all actors involved in the project. The last step is to evaluate the value contribution in terms of benefits, resources and frames, i.e. stakeholder value (Ryd 2008).

Theoretical framework

From the above discussion and previous research an analytical model was developed. This framework was applied when analysing a case study of a public building with cultural content, i.e. building a house of culture. Figure 1 describes the process of creating and developing stakeholder value in the building process by briefing activities. The figure is developed from the context for implementing the CRPM, the different phases of the building process and its relation to processing the client's requirements developed by Kamara and Anumba, (2001, p. 143). The figure has been complemented with the value management approach to evaluating use value (Kelly and Male, 1993) related to briefing activities (Connaughton and Green, 1996; Green and Simister, 1999; Lindahl and Ryd, 2007) illustrating how stakeholder value delivers new end-user needs to the early phases of the building process. In the figure the early phase (conceive project), with feasibility studies results in the development of the client's

statement of need and decision to build. The design and construction phases are based on the client's requirements and finally, the facility management phase consists of the use and operation of the facility giving feedback to the client. The results from the use of the building also influence value creation in the built environment (Winch, 1998).

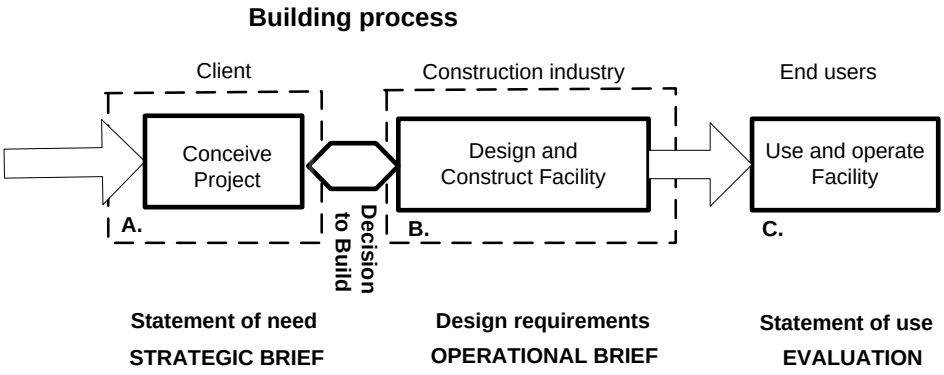


Figure 1 Value based briefing process (developed from Kamara and Anumba, 2001, p. 143)

The briefing process in the selected case study was analysed in three stages:

A. Firstly stakeholder values including end-user needs were evaluated by interviews and by analysing the feasibility studies and the strategic brief for the architectural competition. Also, the development of the strategic brief was described by analysing the public professional client's retelling their story of building the house of culture.
B. The operational brief, i.e. the transformation of the client's requirements into design documents including functional and technical specifications, was described by analysing the construction professionals retelling their story of building the house of culture.
C. Finally end-users' evaluation of the building and their perceived value from the building in use were analysed.

Case study

The complexity of investigating the early phases of a construction projects, with actors from different organisations, led to the decision of conducting a qualitative case study with different data collection methods (Yin, 1994). The case study underpinning this analysis is based on the methodology where different forms of data are collected and analysed in several steps (Eisenhardt, 1989). By starting from the case the interpretations are built through an inductive process in relation to the analyst's theoretical pre-understanding, as inspired by grounded theory (Geertz, 1993; Bryant and Charmaz, 2007) and reflective abduction (Alvesson and Sköldberg, 2000). A single case study makes it possible to capture different angles and perspectives in depth based on an inductive research strategy open for analytical generalisation and implications from a theoretical perspective rather than comparison with other cases (Eisenhardt, 1989; Yin, 1994). The analysis presented here combines several analyses into a common theoretical framework explaining how stakeholder value is developed during the briefing process.

Selection of the case

The House of Culture in Luleå was selected due to the researcher's access to data as well as to the interest from the public client and the construction professionals. The public client and the

construction professionals participated in the process of evaluating the effects of the development and construction of the building. Houses of culture consist of varying venues combining different cultural activities, e.g. a concert hall with a library and an art gallery in the same building (Laurell Stenlund, 2008). The combination of rooms for diverse cultural activities involves many different internal stakeholders and a public building has also many different external stakeholders. The public client, the municipality, was the investor and developer of the project and is today also the owner and the facility manager of the building. The construction project was initiated by the public client starting on September 29, 2003 and finished on January 12, 2007 when the building was opened to the public. The facts about the project are presented in Table 1.

Table 1 Case description

Case description	**House of Culture in Luleå**
Building period	2004-2006
Investor in project and owner of building	Public client - Municipality
Opening date	13 January 2007
Architects	Tirsén & Aili Arkitekter
Contractors	Skanska, Strängbetong, Nåiden Bygg AB
Total area	14,000 m^2 and 6,500 m^2 parking area
Construction cost	370 MSEK (33 Million Euro)
Public Library	3,400 m^2
Concert Hall A	950 m^2, 1000 seats for audience
Concert Hall B	300 m^2, 300 seats for audience (450 standing)
Art Hall	500 m^2 exhibition area
Conference rooms	7 rooms with seating for 2-80 people
Other facilities	Tourist information office, Restaurant, Café, Reception, Local music ensemble, Administration, Parking area

A qualitative and quantitative approach

Data was collected by interviews, by analysing archives, such as feasibility studies, political decision documents, architecture programme, briefing documents etc. and by a survey to end-users (Yin, 1994; Miles and Huberman, 1994).

In accordance with the Swedish principle of free access to public records, all archive data from the construction project was available and could be analysed. Data analysis was performed by open coding methods (Bryant and Charmaz, 2007) structuring the data in chronological order and in coded activities performed during the briefing process.

A total of 19 semi-structured interviews with actors and other representatives from different stakeholder groups were performed between June 2007 and March 2009. The analyses of the interviews in this paper are based on transcriptions coded by time, role in project, representing stakeholder type, stakeholder role (Olander, 2007; Cairns, 2008) and phases identified during data analysis (Table 2). Interview data was open coded in the same manner as the archive and document data.

Table 2 Interview persons categorised in stakeholder type, role and phase

Respondents in semi-structured interviews Code=date	**Representing Stakeholder type**	**Internal or External stake-holder**	**Mainly active in phase...**
Chair of the Municipal Executive Committee (080401, 080919, 081204)	Policy maker Decision maker	Internal	Idea Planning
Cultural manager (070601,080117, 080925)	Public administration	Internal	Idea Planning Design
Library manager (081006)	Public administration	Internal	Idea Planning Design
Art Hall manager (081015)	Public administration	Internal	Planning Design
Concert Hall manager (081005)	Public administration	Internal	Use – internal
Orchestra member (070905)	Interest group	External	Idea
Municipal administrative manager (070905)	Public administration	External	Idea Design
Project manager (080117)	Construction professional	Internal	Planning Design Construction
Project leader (080220)	Construction professional	Internal	Planning Design Construction
Manager construction company (071004)	Construction professional	Internal	Construction
Project leader construction company (080930)	Construction professional	Internal	Construction
Architect (081002)	Construction professional	Internal	Idea Planning Design Construction
Representative of trade & Industry (081023)	Interest group	External	Idea
Tourist manager (081022)	Interest group	External	Idea
Public (090330) (two people)	Interest group	External	Idea

The interviews were conducted at the respondents' offices. Each interview lasted for at least one hour, several for two. The first key-interview was with the cultural manager (interviewed three times). He also opened up the network of relevant informants around the project. When the stories became similar a closure was reached (Alvesson and Sköldberg, 2000).

The compilation was first sent back to the respondents for their confirmation. Since the research process had several phases and the actors participated in one or more interviews, the interview guides with questions were developed for the specific actor and interview occasion. In Table 3 a summary of the content of the semi-structured interviews is presented.

Table 3 Categories and focus of questions in semi-structured interviews

Key areas of personal in-depth interviewees	Focusing on ...	Respondent
Participation in building project	Describing activities	All internal stakeholders
Knowledge of the project before and during participation	Stakeholders' and end-user needs	All internal and external stakeholders
Decisions of participating in project	Procurement	All internal stakeholders
Possibilities and problems with briefing	Development for architectural competition	Public client
Possibilities and problems with briefing	Transforming end-user needs; communication with design and construction team	Architect
Possibilities and problems with briefing	Understanding client's needs	Contractors
Briefing	Formulation and priorities	Client and Architect
Vision and goals of participating in the project	Project goals in terms of quality, time and cost	All internal stakeholders
Requirements of building	For stakeholders and end-users in terms of functionality and technical solutions	Client
Effects of project	For stakeholders	All internal stakeholders
Effects of public building	For stakeholder and end-users	All internal and external stakeholders

Feedback to stakeholders

In addition six focus group interviews were arranged as reference group meetings with representatives from academia and the construction industry as well as a final workshop with actors from the construction project and internal and external end-users of the building, concluding and confirming the description of the process (Laurell Stenlund, 2010).

Result

Strategic brief

The public client, Luleå municipality, decided to build a house of culture for its city library, the art hall, and for a new concert hall. The decision of building a house of culture was expressed by the intention to create a meeting place for its inhabitants as well as develop a place for young people.

Commissioned by the Chair of the Municipal Executive Committee, the construction project started directly after the political decision. The project directive included the first goal of the construction project, the architectural competition. The winning architectural office would also be offered to act as general planners responsible for the design and coordination of the design team consisting of consultants and engineers. The design phase was followed by the construction phase. The design team was responsible for transforming the public client's requirements into built documents. Due to the design-bid-build project the public client was, on the other hand, responsible for settling the contracts with the contractors. The budget for the investment was 320 MSEK, which was decided in 2003 together with the formal political decision. This investment was based on calculations of costs for cultural activities already existing in the municipality and by adding the new activity, a concert hall to the project. After

a new decision of also including the local music ensemble in the building, the public client invested 370 MSEK in the project.

The public client expressed their values regarding building a house of culture as follows:

> "…the reason for connecting all three functions is to create a place which is open and alive all day and year long. The three parts often attract different categories of people and have varying opening times and they should function individually and together". *(Brief for architectural competition, 2003-12-22)*

The results from the interviews show that the public client's requirements presented in the second feasibility study were first communicated within the public client's management group. The team consisted of the head of cultural administration, the project manager and representatives from the cultural administration, the city planning office, the economy office and the technical department. This group has been described as the public client's management group for the construction project. Within the management group the cultural policy was discussed in relation to the public client's requirements and end-user needs, which were to be compared with a private organization's business concept (Ryd, 2008).

During three months the brief for architectural competition was developed. The team members visited various buildings with cultural content; libraries, concert halls, opera houses, similar houses of culture and so on. These study visits were documented. The feasibility studies together with the study visits developed the knowledge of articulating specific requirements of the house of culture.

Within the building spaces for a café, a restaurant, and a reception for ticket sales were to be included. Furthermore, the cultural administration also needed to be housed in the building. The municipality also knew from the beginning that they needed better locations for the local music ensemble, 'Norrbottensmusiken', and its administration and rehearsal rooms. Even though the decision of including the ensemble in the building came after the architectural competition, the space was already mentioned. In the brief for the architectural competition the need was articulated in terms of a 2000 m^2 expansion area. Before the building was opened, a room for the city tourist office was also designed.

The house of culture was to be a place for cultural activities for all inhabitants in the region. It was supposed to create a sense of community both inside the building and as a part of the city when looking at the architecture, expressed here by the public client as follows:

> "… a space for a concert hall, an art hall and a library. These are separate activities, but as far as possible certain facilities will be combined e.g. entrance, foyer, restaurant/café, offloading and certain personnel facilities…… in the future a cohesive city character and the central parts of the city will be bound together with the water and the beaches … to be a symbolic building, part of the city's silhouette and a landscape surrounding the northern harbour…" (*Brief for architectural competition, 2003-12-22)*

The public client also expressed their vision of the building's architectural expression as follows:

> "The building should send a signal of hope for the future and the people, this is an important prerequisite for the development of all of Luleå, not just the cultural life" *(Brief for architectural competition, 2003-12-22)*

The above selected quotations, with the public client's visionary expressions, were developed into more specifically articulated end-user needs expressed in the Brief for architectural competition as follows:

- *Visitors'* needs were expressed in terms of the concert hall offering a comprehensive range of varying high-quality music, flexible solutions with acoustics adapted to different music genres …; the library focusing on the visitor, creating a meeting place, feeling open, light and "giving the whole picture"… being accessible to everybody…; the art hall having a generous entrance… .
- *Municipal and cultural organisations'* needs (administrators, musicians, artists, library staff, etc.) should focus on specific functional requirements for the concert hall, library, and art hall, the parking area and the area for development and expansion in the future. Even before the house of culture was decided to be built, the employees in the library had expressed their needs for rooms suitable for librarian activities. The library also needed to be adapted to visitors using new technology in it (computers, audio books etc.). New information technology had put pressure on the librarians to develop the library in accordance with the public's use of modern technology. These needs were further described during the design and construction phase, by the architectural design team.
- *Commercial organizations'* needs (shops, hotels, restaurants etc.) were expressed in terms of the need for a space for large conferences and congresses and for more parking areas. The place had been used as a car park before the politicians decided to use the land for the house of culture.

The first part of the strategic briefing process was performed by the public client's management group. The public client's requirements including end-user needs of the house of cultures developed by the public clients management group are summarized as follows:

> The House of culture should be
> a symbol for the city creating future beliefs
> a meeting place for people and
> a functional place for performing cultural activities
> with effects on the region, city and citizens by creating
> a house for everybody
> a cultural hub for the region and
> an asset for the citizens.

(Feasibility study Concert House/House of Culture, May, 2003; Brief for architectural competition, 2003-12-22)

The architectural competition was announced within the European Union in accordance with the policies of the Swedish Association of Architects. A total of 61 architects registered to participate in the competition. Nine architect offices qualified and they received approximately 20,000 Euro each for developing a contribution to the competition. The jury consisted of ten members from different organisations as described as follows:

> "… we selected employees from the municipality together with representatives from the Swedish Association of Architects with the commission of selecting the contribution. Our preferences including employees from the cultural municipal organisations were based on our requirements of the building: we wanted a natural, brilliant house;

> still, it should foremost be a functional house useful for library activities, art performances, concerts and conferences." *(Cultural manager, 080117)*

Within the brief for architectural competition the criteria for the competition were settled. The competition went on for two months. The jury decided that the contribution Lady in Red was the one that best fulfilled the brief's intentions, developed by the local Architect office Tirsén and Aili. In the meantime, the decision was not uniform among the jury members. The two representatives from the Swedish Association of Architects and the city architect from Luleå Municipality registered a dissenting opinion against the decision. At first it was not publicly announced, but when local media heard of it, the debate gathered momentum. In the media one of the architects claimed

> "The jury process was ended by a decision made by five employees representing the municipal organisations. It couldn't be worse." (*One jury member, Architect, in the journal 'Arkitekten', April 2004, written by Annika Jensfelt*).

One of the five employees was the manager of the art hall and moreover an architect SAR/MSA. He voted for Lady in Red and expressed his opinion as follows:

> "It was the best solution when you combine all the parameters: the architectural design, the contents, functionality and economy. The architecture is not outstanding but it is good. In the media some have stated that the architecture is similar to a Statoil petrol station, but there is no similarity, only vulgar arguments" *(Art hall manager, 081015)*

The architect was a part of the public opinion articulating the need for a concert hall in the city before the political decision was made. The architect knew the city and its inhabitants before the architectural competition was announced, he knew the local conditions of the city, the climate, the mentality as well as the attitude towards cultural activities in the region. He expressed his idea of the building (retrospectively) as follows:

> "It is important to create an artistic building with a functional perspective. I easily start from the functionality and then I try to get something more. I usually start with a study of the activities investigating if my solutions will work out, but it must also be nice… a kind of prosaic beauty. … I think that the house of culture in Luleå articulates an expressionistic functionalism." *(Architect, 081002)*

Operational brief - detailed design and construction

The second part of the briefing process, the internal users' requirements, were communicated and documented in functional and technical specifications during the design phase as well as during the three steps in construction. Desires from the administrators, musicians, artists, library staff and other internal users were continuously developed during the design process, performed by the winning architectural office. The final brief was settled in March 2005 by the building documents. After that, the functional and technical specifications were modified during the construction period until the opening night. During this period, decisions regarding specific materials and technical equipment were communicated by the internal users and their desires and the head of the project and his budget. The public client's budget controlled the decisions of the internal users. The design-bid-build procurement decision allows in general no changes without new negotiations between the client and the contractor. In this case several changes needed to be made.

The organisation of the construction project, with the project manager acting on behalf of the client coordinating the actors of the construction project created trustful open relations among the actors.

> "I was the glue between the three groups: activity, consultant and suppliers" (*Project manager, 080117*)

Building trust between the contractor and the client was important when functional and technical specifications needed to be changed. However, the critical time schedule of the construction project did not allow any time delays. The construction phase was decided to be in three parts, the ground and the frame in phases 1 and 2 and the building where the users' requirements regarding functional solutions are modified in accordance with the users. When the third construction phase was started, the project manager developed a time schedule for the last one and half years of the construction phase. From the public client's perspective it was crucial that the construction project was completed on time:

> "It was extremely important for us to know when we would be able to open the doors. We had to book artists and market our programmes before we were even finished with the venue." (*Cultural manager, 080117*)

> "It's great, I never had to change anything [in the time schedule], and we managed to stick to the plan even if we were away for three weeks or something sometimes." (*Project manager, 080117*)

Evaluation of use - Visitors' evaluation of the house of culture

The survey was conducted in March 2009, two years after the building opened to the public. The survey had a focus on evaluating end-users' (visitors') experience of the building, its functionality and technical solutions. The development of the questionnaire was based on the theoretical argument that buildings with an artistic design, where functionality and technical solutions signal innate qualities of the cities, attract temporary visitors or more permanently settling firms and individuals (Jencks, 2005; Bröchner, 2009, p. 21). Questions were initially tested on a few visitors, as a pilot. After the pilot test the questionnaire was further developed and handed out to 565 visitors on seven different occasions (activities) over a period of two weeks. The questionnaire was handed out randomly to visitors, carefully selected from the predicted total population. The researcher stayed close to the respondents answering the questionnaire and then went back to the visitors to collect them. Activities were performed in different rooms and halls within the building and were selected to obtain a broad picture of the visitors to different cultural activities. The response rate was 80 %, equalling 452 respondents in seven groups (Table 4).

Table 4 Survey to visitors, sample profile (n=452)

Visitors' activities = Visiting groups	Handed in No	Handed in %	Handed out to visitors No	Response rate %	Age participant Mean value	Female %	Man %	Residence in city %
Youth festival	155	34	177	88	22	33	30	55
Orchestra performance	61	13	70	87	62	66	25	97
Library visit	43	9	80	53	36	58	35	93
Jazz performance	26	6	43	60	66	73	27	100
After work	87	19	94	92	54	55	33	77
Visiting building	59	13	80	73	52	54	44	68
Art exhibition	21	5	21	100	45	48	52	81
Total	452	100	565	80	43	60	40	75

The results of the survey and how the questions in the enquiry were measured and analysed are described in the case study (Laurell Stenlund, 2010) and in a quantitative analysis of design factors influencing value creation when building houses of culture (Laurell Stenlund and Eriksson, 2010).

From the survey to visitors of the house of culture, with 453 respondents, 335 respondents answered the question: What do you find is the best about the House of Culture?

The respondents answered the question in their own words giving a single answer, for example: Jill Johnson (a Swedish artist), easy to visit, the library, the music performances, the beautiful house, that we have got the house of culture/finally, hard rock music, the restaurant, drinking coffee, meeting friends, open for everybody, and so on. Firstly the answers were put together in an excel document. The qualitative analysis tool, N5, was used in a preliminary qualitative content analysis of the interviews. However, in this analysis the excel document enabled easier open coding methods by moving the answers into similar categories, and then being able to move them again, when creating new categories. The coding was performed within the different visiting groups, seven cases within the case study. When categories were developed, the data was moved into a word document. The answers within the categories related to each of the seven cases were coloured. A further analysis with an axial coding procedure was then performed among the visiting groups, a cross-case analysis. The first analysis now showed among the groups; thus the visitors in the different groups had different background variables, such as different ages, different gender composition as the composition of the residence rate was different among the groups. These analyses are based both on the grounded theory methodology where the open coded analysis extracts categories by individual cases and on axial coding, which creates ideas/concepts from cross-case analysis (Bryant and Charmaz, 2007).

The result from the analysis shows that visitors of the house of culture expressed use value on the building and its performance in three main categories, Form and Shape, Activities and Place and Space, see table 5.

Table 5 Visitors' use value of the House of Culture in Luleå (share of 335 respondents)

Form & Shape (29 %)	**Activities (44 %)**	**Place & Space (27 %)**
Architecture	Music	Physical location in the city
Multifunctional	Library	Central location in the city
The existence of the house	Art hall	Located by a beautiful place in the city
A house for everybody	Restaurant	A meeting place
	Parking	A room for weekday and party
	Artists, visiting and local	A cultural space for meeting people creating opportunities and inspiration

Discussion

The visitors to the house of culture describe three perspectives of the use value. The three categories, Form & Shape, Activities and Place & Space can be related to the investigated stakeholder groups' articulated values.

The public client expressed the importance of the Place & Space that the house of culture should create with a perspective from the city planner's view:

> "… a space for a concert hall, an art hall and a library. These are separate activities, but as far as possible certain facilities will be combined e.g. entrance, foyer, restaurant/café, offloading and certain personnel facilities…… in the future a cohesive city character and the central parts of the city will be bound together with the water and the beaches … to be a symbolic building, part of the city's silhouette and a landscape surrounding the northern harbour…"(*Brief for architectural competition, 2003-12-22)*

Due to the procurement the contractors were just allowed to follow the building documents and not to brief the client's requirements. The construction professional represented by the architect expresses the Form & Shape with its architecture and functionality in his quotation:

> "It is important to create an artistic building with a functional perspective." *(Architect, 081002)*

The public client's internal stakeholders, the employees working in the building with responsibilities to perform the activities to their 'visitors' express the value of the Activities in the following quotation

> "…it should foremost be a functional house useful for library activities, art performances, concerts and conferences." *(Cultural manager, 080117)*

These stakeholders' use value is at the same time articulated by the public client's values summarized from the feasibility study and the strategic brief.

Transforming the client's requirements into stakeholders' use value creates a description of the value that building a house of culture creates in the built environment.

- Design – a symbol for the city creating future beliefs articulating use value: Form & Shape with symbolic value – a cultural hub for the region

- Place – a meeting place for people articulating use value: Place & Space with social value – a house for everybody

- Functionality – a functional place for performing cultural activities articulating use value: Activities with economic value – an asset for the citizens

In the case study these strategic values were transformed via the architectural design competition into an operational brief with the normal functional and technical specifications focussing on cost, time and quality of the end product, see Figure 2.

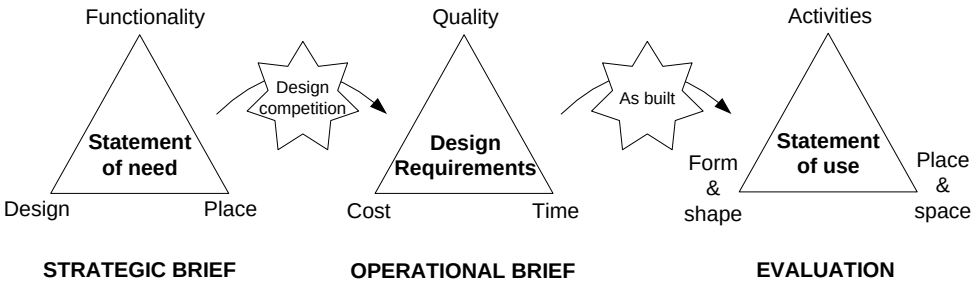


Figure 2 Value transformations in the case study of the house of culture in Luleå

Conclusion

The empirical study show that the public client's requirements were communicated between the client and the design and construction teams describing a briefing process that ran throughout the construction project. The briefing was performed in two stages, where the first stage, the strategic briefing, articulated the citizens' needs for a House of Culture, combining a new concert hall with the city library and art hall in the same building in a brief for architectural competition. During the second stage of the briefing process, the operational brief, design requirements were communicated and documented in functional and technical specifications during the design phase as well as during the construction.

The results from the study show how stakeholder value is created during the strategic briefing process. In the case of the house of culture strategic briefing created different solutions to the building's final performance evaluated by the visitors to the house expressed in use value: Form & Shape, Activities and Place & Space.

References

Alvesson, M. and Sköldberg, K. (2000) *Reflexive methodology: new vistas for qualitative research*, London: Sage.

Barrett, P. and Stanley, C. (1999) *Better Construction Briefing*. Blackwell Science Ltd, Oxford.

Blyth, A. and Worthington, J. (2001) *Managing the Brief for Better Design*, Spon Press, London.

Boyd, D. and Chinyio, E. (2006) *Understanding the Construction Client*, Blackwell Publishing Ltd, Oxford.

Bryant, A. and Charmaz, K. (2007) *The SAGE Handbook of Grounded Theory*, SAGE Publications Ltd, UK.

Bröchner, J. (2009) The changing nature of the built environment, an economic perspective, in Ruddock, L. (ed) *Economics for the modern built environment*, Taylor and Francis, London, pp. 11-33.

Cairns, G. (2008) Advocating an ambivalent approach to theorizing the built environment. *Building Research & Information*, 36(3), 280-289.

Connaughton, J. N. and Green, S. D. (1996) *Value Management in Construction*: A Client's Guide: Special Publication 129, CIRIA, London.

Egan, J. (1998) *Rethinking Construction*, Report of the Construction Task Force to the Deputy Prime Minister, John Prescott, on the Scope for Improving the Quality and Efficiency of UK Construction. Department of Trade and Industry, HMSO, London.

Eisenhardt, K.M. (1989) Building theories from case study research. *Academy of Management Review*, 14(4), 532-550.

Finch, P. (2000) *Better public building, a proud legacy for the future*, The Better Public Buildings Group. Department for culture, media and sport, London.

Freeman, R.E. (1984) *Strategic Management: A Stakeholder Approach*, Pitman Publishing: Boston, MA.

Geertz, C. (1993) *The interpretation of cultures: selected essays*, Fontana, London.

Green, S. D. and Simister, S. J. (1999) Modelling client business processes as an aid to strategic briefing. *Construction Management and Economics*, 17(1), 63-76.

Gray, C. and Hughes, W. (2001) *Building Design Management*, Elsevier Ltd. Oxford.

Jencks, C. (2005) *The Iconic Building*, Frances Lincoln Ltd, London.

Kamara, J.M. and Anumba, C.J. (2001) ClientPro: a prototype software for client requirements processing in construction. *Advances in Engineering Software*, 32, 141-158.

Kelly, J. and Male, S. (1993) Value management in design and construction: the economic management of projects, E & FN Spon, London.

Kelly, J., Hunter, K., and Male, S. (2003) The Client's Value Systems Explored: Case Studies from the UK Public Sector, *International CIB Symposium: Knowledge in Construction*, October 22-24, 2003, volume 1, pp. 423-433.

Laurell Stenlund, K. (2008) *Förstudie: Kulturens materia, [Pre-study: The Matter of Culture]*, Research Report, Luleå University of Technology, Sweden.

Laurell Stenlund, K. (2010) *Effekter av byggandet av Kulturens hus i Luleå, [The Matter of Culture]*, Research Report, Luleå University of Technology, Sweden.

Laurell Stenlund K. and Eriksson, P.E. (2010) Design factors' influence on value creation when building Houses of Culture. *Proc. 26th Annual ARCOM Conference.* Association of Researchers in Construction Management, Leeds.

Lindahl, G. and Ryd, N. (2007) Clients' goals and the construction project management process. *Facilities*, 25(3/4), 147-56.

London, K. and Kenley, R. (2000) Mapping construction supply chains: widening the traditional perspective of the industry, *Proc. 7th Annual European Association of Research in Industrial Economic EARIE Conference*, Switzerland.

Macmillan, S. (2006) Added value of good design. *Building Research & Information*, 34(3), 257-271.

Miles, M.B. and Huberman, A.M. (1994) *An Expanded Sourcebook, Qualitative Data Analysis* (2nd ed), Sage Publications, London.

Mitchell, R.K., Agle, B.R. and Wood, D.J. (1997) Toward a Theory of Stakeholder Identification and Salience: Defining the principle of who and what really counts. *Academy of Management Review*, 22, 853-886.

Murdock, J. and Hughes, W. (2008) *Construction Contracts, Law and management*. (4 ed)Taylor & Francis, Oxford.

Olander, S. (2007) Stakeholder impact analysis in construction project management. *Construction Management and Economics*, 25(3), 277-287.

Preiser, W.F.E. and Vischer, P. (2005) *Assessing Building Performance*, Elsevier Butterworth-Heinemann, Oxford.

Ryd, N. (2003) *Exploring Construction Briefing, from Document to Process*, Thesis, Dept of Architecture, Chalmers University of Technology, Sweden.

Ryd, N (2004) The design brief as carrier of client information during the construction process. *Design Studies*, *25*, 231-249.

Ryd, N. (2008) *Initiating building projects, clients' and architects' front-end management of projects*, Dept of Architecture, Chalmers University of Technology, Sweden.

Ryd, N. and Fristed, S. (2007) Transforming strategic briefing into project briefs. *Facilities*, 25(5/6), 185-202.

Saxon, R. (2005) *Be Valuable: A Guide to Creating value in the Built Environment*, Construction Excellence, London.

Segerstedt, A. and Olofsson, T. (2010) Supply chains in the construction industry. *Supply Chain Management*, 15(5), 347-353.

Shen, Q., Li, H., Chung, J. and Hui, P. (2004) A framework for identification and presentation of the client requirements in the briefing process. Construction Management and Economics, 22(2), 213-221.

Short, C.A., Barrett, P., Dye, A. and Sutrisna, M. (2007) Impacts of value engineering on five Capital Arts projects. *Building Research and Information*, 35(3), 287-315.

Spencer, N. and Winch, G. (2002) *How buildings add value for clients*. Construction Industry Council, Thomas Telford Ltd, London.

Wandahl, S., Faber, L. and Bejder, E. (2007) A diverse understanding of value in the building industry. In *Procs COBRA 2007*, RICS, London.

Winch, M.G. (1998) Zephyrs of creative destruction: understanding the management of innovation in construction. *Building Research & Information*, 26(5), 154-163.

Winch. M.G. (2002) *Managing Construction Projects*, Blackwell Science Ltd, UK.

Yin, R.K. (1994) *Case Study Research: Design and Methods*, Thousand Oaks, Sage, CA.

Yu, A.T.W., Shen, Q.P., Kelly, J. and Hunter, K. (2006) An investigation of critical success factors in construction briefing by way of content analysis. *Journal of Construction Engineering and Management*, 132(11), 1178-1186.

Yu, A.T.W., Shen, Q., Kelly, J., Hunter, K. (2008) Comparative study of the variables in construction project briefing/architectural programming. *Journal of Construction Engineering and Management* 134(2)122-138.

PAPER VI

DESIGN FACTORS' INFLUENCE ON VALUE CREATION WHEN BUILDING HOUSES OF CULTURE

Kristina Laurell-Stenlund[1] and Per Erik Eriksson

Department of Civil, Mining and Environmental Engineering, Luleå University of Technology, 971 87 Luleå, Sweden

Public clients have an interest in understanding how a public building can be developed into a successful landmark and perhaps also an iconic building. An explorative case study has been undertaken, studying strategic briefing processes when building 'houses of culture', i.e. public buildings with a cultural content. Within the case study, a survey of end-users has been conducted, with the aim of exploring design factors' influence on end-users' evaluation of a house of culture. The survey was responded to by 452 people visiting a house of culture. A questionnaire was handed out randomly on seven different occasions when different cultural activities in the building were performed. A factor analysis was conducted resulting in four design factors describing end-user evaluation of a house of culture: (1 technical design (2) multifunctional design regarding spaces for experiences (3) multifunctional design regarding spaces for consumption (4) experience of activities. Multiple hierarchical regression analyses revealed that technical and multifunctional design factors have an impact on end-users' experience of the activity. However, the relation between design factors and visiting frequency is slight and almost negligible. The visiting frequency is thus not a useful measure of describing how a public building attracts its visitors. More interesting is the number of visitors coming to building. These different types of design factors contribute to the understanding of how clients and construction professionals can develop public buildings for cultural activities creating landmarks in small cities.

Keywords: Architecture, Briefing, Client, Design, End-user evaluation

INTRODUCTION

Construction clients have to consider organisational objectives and needs when making decisions about a construction project (Atkin and Flanagan 1995). Clients, developers and facility managers have an economic interest in their private houses, commercial offices and buildings for retailing and businesses. Still, there are other values that a building offers that are difficult to measure in monetary terms.

What is driving municipalities to invest tax money into public buildings with a cultural content? One reason is that customer needs create market demands for certain products. However, public buildings involve political decisions. Public buildings are

[1] Kristina.Laurell-Stenlund@ltu.se

Laurell Stenlund, K. and Eriksson, P-E. (2010) Design factors' influence on value creation when building Houses of Culture, In: Procs 26th Annual ARCOM Conference, 6-8 September 2010, Leeds, UK, Association of Researchers in Construction Management.

open to people in society as a whole, such as libraries, museums, theatres, stadiums, etc even though these buildings are not of direct use for all citizens, when charging an entrance fee. Still, public buildings are generally supported by government funds, which mean that public clients invest tax money in public construction projects with an interest that is more related to developing the city and fulfilling their political obligations than pure financial interests. Public clients may require that an investment in a public building for art performances also should become a successful landmark in the city. Successful landmarks or iconic buildings of today express ideas in their architecture differently from traditional, monumental buildings. They are driven by social forces and create instant fame and economic growth (Jencks 2005). In some cases, public buildings for art performances, sports events and other cultural activities become landmarks, icons or monumental buildings, having a special impact on their cities (Jencks 2005, Short et al. 2007, Bröchner 2009).

The first time the concept 'houses of culture', with the definition of combining different cultural activities, was mentioned in Sweden was when architect Peter Celsing gave Kulturhuset, The House of Culture in Stockholm, its name in the 70s (Laurell Stenlund 2010). Kulturhuset was built as a cultural complement to the new down town shopping district, since the politicians argued that shopping should be complemented with people's education by giving citizens an opportunity to an easy visit in the public library or in a museum. Today, the arguments instead are focusing the effects of the public building, i.e. a building with an artistic design attracts people to the city and its shopping, restaurants and hotels (Laurell Stenlund 2010).

Construction professionals need to understand the public client's requirements as well as end-user needs when designing and constructing the public building (Ryd 2004). It is thus of interest for public clients and construction professionals to understand the impact of design factors on end-users' perceptions of the value of a building with a cultural content. The word 'evaluation' is adopted hereafter to mean value as perceived by users.

Developing and designing houses of culture include the development of functionalities and technical solutions for different activities, e.g. a concert hall is combined with a library, an art gallery, and a restaurant in the same building (Laurell Stenlund 2010). However, not only when constructed, but also when managed, the citizens' use of the building will not only depend on the cultural policies but also on the citizens' values as well as on their own evaluation of the building and its activities. The influence of underlying design variables, describing the quality of the project to the public client, and the quality of the building to end-users, has motivated the study presented in this paper.

A systematic feedback and evaluation during every phase of building delivery, ranging from strategic planning to occupancy, throughout the building's life cycle is suggested by Preiser and Vischer (2005). Client needs and goals that arise out of end-users' interaction with a range of settings in the built environment are redefined as performance levels. Hence, building performance evaluation systematically compares the actual performance of buildings, places, and systems to explicitly evaluate expected performances as it relates to pre-determined criteria. Criteria for briefing, designing, and building new environments should be based on the evaluation of existing ones; however, these assessments are seldom done (Ryd 2005).

When evaluating the performance of a house of culture the end-users' perceptions of the building and its internal activities are vital. The aim of this paper is to investigate

how design factors influence value creation when building houses of culture. More specifically, we are interested in analysing how different design related factors affect how visitors experience the activities performed in a house of culture and how this affects their visiting frequency.

First a theoretical framework is presented, ending up in the formulation of three testable hypotheses. Second the hypotheses are empirically tested based on data collected through a survey among visitors and their evaluation of the house of culture. Finally, conclusions are drawn and discussed.

THEORETICAL FRAMEWORK

The theoretical framework is based on the assumption that public buildings with a cultural content and an architecture based on artistic design create value to stakeholders as well as to society by attracting visitors to the building.

Design factors' impact on experience of activity

Previous research stipulate that design and construction of arts buildings are both different to other building types and uniquely complex due to exacting technical demands and the accommodation of various and sometimes conflicting stakeholder needs (Short et al. 2007). The artistic design with its functionality and technical solutions should signal innate qualities of the cities, devised to attract temporary visitors or more permanent settling firms and individuals, when developing a landmark or iconic building (Bröchner 2009:21). The architecture, articulating something enigmatic and expressive, is commonly known as the artistic force behind the creation of landmarks or iconic buildings.

Artefacts for power and ideologies changes over time, as shown by studies of social and economic benefits associated with famous iconic buildings and the activities performed within them. The Sidney Opera is, for example, a building for Opera performances, but it is also used for commercial purposes such as conferences and business. The Guggenheim Museum in northern Spain is another example having become a symbol for urban revival, which is commonly known as the Bilbao effect (Anon 2007). Today, public clients are aware of these social and economic benefits when planning and investing in new public buildings. Although it is difficult to know in advance if a building will become an iconic building or not, design related factors are proposed to affect how end-users perceive a building and its content when using it (Preiser and Vischer 2005). Accordingly, the following hypothesis is formulated:

Hypothesis 1: The higher citizens evaluate the artistic design, based on functionality and technical solutions, the more satisfied they will be with the experience of the activity.

Impact of experiences of activities on visiting frequency

Research on strategic briefing, where all the players are responsible for adopting the operation’s overall goals and where they are developing them and realising them in the best possible way in the individual project, has an important role when managing end-user needs in the early phases of the building process (Ryd 2004, Ryd and Fristedt 2007). When construction professionals develop a well-designed built environment end-user needs should be identified together with different types of values delivered by the built environment (Spencer and Winch 2002, Saxon 2005, Macmillan 2006).

Strategic briefing was an important activity related to the success of the investigated construction project (Stenlund et al. 2009). The public client's requirements were described in the architecture programme, in terms of citizens' desires and needs in terms of a house for multiple cultural activities, such as a library, concert performances, art exhibitions but also spaces for public meetings and facilities for refreshment and food (Stenlund et al. 2009). The functionality with building a house for everybody has been in focus. Thus the functionality of the house of culture is also related to its activities described in the written program. A broad spectrum of activities, tailored to different end-user interests and requirements is proposed to enhance visitors' satisfaction and make them want to come back and experience the activities again. This argument generates the following hypothesis:

Hypothesis 2: The better the visitor experience the activities, the more frequent the visitor will come to the building.

Mediating effect of visitors experience of activity

When we juxtapose the two hypotheses above, a full mediating model emerges. That is, the end-users' visiting frequency in the house of culture will indirectly be affected by the design factors when the visitors experience the activity. Visitors' experience of the activities performed within the building then works as a mediator, transmitting the effects of design factors on visiting frequency, generating the third hypothesis:

Hypothesis 3: Experiences of activities mediates the positive relationship between design factors and visiting frequency.

In Figure 1 below we illustrated the proposed relationships in a mediating model.

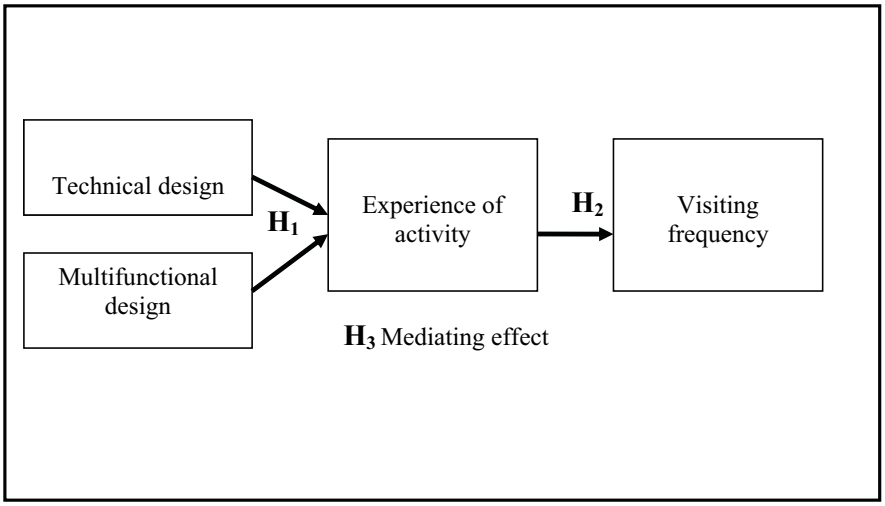


Fig. 1. The proposed mediating model of relationships between design factors, experience of activity and visiting frequency.

METHOD

A case study of houses of culture and the effects for the public client, stakeholders and citizens have been undertaken with focus on the public client's decision process, strategic briefing, stakeholder values and citizens evaluation of the building. The specific case has been chosen due to the researchers' possibilities to make a broad and open data collection. A case study creates possibilities to build theories by multiple data collection methods and data triangulation (Yin 1994, Barrett and Sutrisna 2009). The data collection is based on several methods, i.e. integrative focus groups, participatory observations, document analysis, semi-structured interviews and a survey. In this paper we focus on analysing the survey results.

Sample and data collection

The purpose of the survey study, which was conducted two years after the building opened to the public, was to investigate how visitors evaluate the building and its design. The development of the questionnaire is based on the theoretical argument that buildings with an artistic design, where functionality and technical solutions signal innate qualities of the cities, attract temporary visitors or more permanent settling firms and individuals. Questions were initially tested with a few visitors, as a pilot. After that the pilot test the questionnaire was further developed and handed out to 565 visitors on seven different occasions (activities) over a period of two weeks. Activities were performed in different rooms and halls within the building and were selected to obtain a broad picture of the visitors to different cultural activities. The response rate was 80 %, equating to 452 respondents in seven groups (see Table 1).

Table 1: Sample profile (n=452)

Visitors activities	Handed in No	Handed in %	Handed out to visitors No	Response rate %	Age participant Mean value	Female %	Man %	Residence in city %
Youth festival	155	34	177	88	22	33	30	55
Orchestra performance	61	13	70	87	62	66	25	97
Library visit	43	9	80	53	36	58	35	93
Jazz performance	26	6	43	60	66	73	27	100
After work	87	19	94	92	54	55	33	77
Visiting building	59	13	80	73	52	54	44	68
Art exhibition	21	5	21	100	45	48	52	81
Total	452	100	565	80	43	60	40	75

Measurement

Questions regarding respondents' gender (nominal scale), age (interval scale) and place of residence (nominal scale), have been used as control variables.

Three questions were initially asked about the respondents' visiting frequency to a) the house of culture, b) to an activity in the Main Concert Hall and c) to an activity in the Small Concert Hall. These three variables have been measured through 5-point interval scales: never visit before=0, visit once a year=1, visit 2-4 times per year=2, visit 5-8 times per year=3, 9 or more times per year=4.

Four questions were asked regarding end-users' evaluation of technical design variables for a specific room or hall. The questions asked were: What was your experience of the hall/room that you have visited regarding: 1) in general (the visitors general feeling/experience of the hall/room), 2) sound (acoustic feelings), 3) scene picture/decoration (visible experience of the room) and 4) personal convenience (seating space, the design of the chairs, auditorium, comfortable)? A further question 5) was about the visitors' experience of the show/performance/ activity performed in the room visited. Finally, seven questions asked visitors about their experience of the buildings multifunctional design regarding the library, art hall, tourist office, reception, the restaurant, café and bar.

The twelve design related variables were measured in a four-graded interval scale: not at all good=1, less good=2, good=3, very good=4. The choice of a four-graded interval scale was to force participants to grade the variables as negative or positive and to avoid answers from some people that might be undecided.

Data analysis

The twelve different design related variables: 1) in general, 2) sound, 3) scene picture/decoration 4) personal convenience, 5) show/performance/ activity, 6) library, 7) art hall, 8) tourist office, 9) reception, 10) restaurant, 11) café and 12) bar were subjected to a principal component factor analysis (PCFA) with varimax rotation using SPSS (Statistical Package for the Social Sciences) Version 17.0. The twelve items are theoretically related to the functional and technical solutions when building a house of culture.

The be able to address H1 and H2 the experience of activity factor is used first as a dependent variable affected by design factors and subsequently as an independent variable, potentially affecting the visiting frequency. A hierarchical multiple regression analysis was performed to test H1, assessing the ability of technical and multiple design factors to predict levels of experience of activity, after controlling for the influence of the three control variables. In order to test H2, a second hierarchical multiple regression analysis was performed assessing the ability of the experience of activity factor to predict levels of visiting frequency, after controlling for the influence of the three control variables. Additionally, we followed the three-step approach specified by Baron and Kenny (1986) to test for the mediating effect proposed in H3. When a variable has a mediating role it is (1) caused by the independent variable and it (2) causes the dependent variable, while it (3) weakens the direct relationship between the independent and dependent variable (Baron and Kenny, 1986).

PRESENTATION AND ANALYSIS OF EMPIRICAL RESULTS

Visiting frequency

Most of the visitors, 67 %, have been to the House of Culture nine or more times per year. Only 5 % were visiting the building for the first time and 2 % have been there once before. The citizens' visits of the house of culture (mean 3.0) and different activities in the Main Concert Hall (mean 1.7) and Small Concert Hall (mean 1.4) have been reduced into a factor describing visiting frequency of permanent and temporary visitors during a year. The PCFA resulted in KMO=0.70 and the Bartlett's Test of Sphericity reached statistical significance (0.00).The analysis of visiting frequency resulted in a one-dimensional factor with factor loading between 0.67 and 0.77 and with a Cronbach's Alpha (CA) of 0.81.

Design factors

The PCFA for the design variables resulted in KMO=0.80 and the Bartlett's Test of Sphericity reached statistical significance (0.00). This supports the four-factor solution explaining 27.0 %, 13.4 %, 9.7 % and 8.4 % of the variance respectively, se Table 2.

Table 2: Principal component factor analysis of design factors

	Item Mean	Factor 1 Technical design	Factor 2 Multi-functional design (experiences)	Factor 3 Multi-functional design (consumption)	Factor 4 Experience of activity
Scene picture/decoration	3.26	0.77	0.05	0.10	0.07
Personal convenience	3.17	0.72	0.16	0.07	0.01
Audience surroundings	3.17	0.64	0.26	0.08	-0.06
In general	3.37	0.64	0.07	0.05	0.44
Sound	3.21	0.54	-0.02	0.00	0.50
Art hall	3.22	0.01	0.73	0.10	0.09
Tourist office	3.15	0.24	0.65	0.27	-.012
Reception	3.29	0.15	0.60	0.16	0.05
Library	3.58	0.12	0.57	-0.23	0.36
Restaurant	2.88	0.07	0.07	0.81	0.09
Café	2.97	0.02	0.06	0.74	0.14
Bar	2.97	0.14	0.19	0.62	-0.10
Show/exhibitions/activity	3.40	0.04	0.14	0.15	0.81
Percentage of variance		27.0	13.4	9.7	8.4
Cronbach's alpha (CA)		0.76	0.67	0.71	NA
Factor mean value (MV)		3.25	2.96	3.37	3.40

The identified factors are; 1) technical design (CA=0.76, MV=3.25),
2) multifunctional design, spaces for experience (CA=0.67, MV=2.96),
3) multifunctional design, spaces for consumption (CA=0.71, MV=3.37) and
4) experience of activity (one item with MV=3.40).

From the factor analysis we can draw the conclusion that the item visitors' experiences of the performed show/exhibitions/activities in a public building is not a part of the technical and multifunctional design factors, which supports our proposed theoretical framework consisting of design factors, experience of activity and visiting frequency. The multifunctional design construct is however divided into two factors, distinguishing between a) spaces for activities related to experiences and b) spaces for activities related to eating and drinking, i.e. consumption.

Design factors' impact on experience of activity

The control variables were entered in Model 1, and the technical and multifunctional design variables were entered in Model 2, see Table 3. Both solutions are statistically significant ($p < 0.05$). The effects that technical and multifunctional design factors have on visitors' experience of the performed activities in a house of culture (R Square Change = .051) are small but definite (Hair et al. 2008). H1 is thus confirmed with a weak but positive relationship between technical and multifunctional design variables and the experience of the activity.

Table 3: Hierarchical regression analysis testing Hypothesis 1

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	,182a	,033	,027	,525	,033	5,019	3	439	,002
2	,290b	,084	,071	,512	,051	8,057	3	436	,000

Impact of experiences of activities on visiting frequency

In the next analysis, see Table 4, the control variables were entered in Model 1, and the experience of activity variable was entered in Model 2. Both solutions are statistically significant ($p < 0.05$). However, the control variable accounts for a higher degree of variance and has thus a stronger effect on visiting frequency than the visitors' experiences of the activities performed. Although it is statistically significant, the impact from visitors' experience (R Square Change = .027) is slight and almost negligible (Hair et al. 2008), giving very limited support to H2.

Table 4: Hierarchical regression analysis testing Hypothesis 2

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	,524a	,274	,270	,947	,274	55,985	3	444	,000
2	,549b	,302	,296	,930	,027	17,445	1	443	,000

Mediating effect of experience of activity

Of the three steps suggested by Baron and Kenny (1986) to test for the mediating effect proposed in H3 we have already addressed two. (1) The mediator variable experience of activity is caused by the independent variables technical and multifunctional design for experience and multifunctional design for consumption and it (2) causes the dependent visiting frequency variable. Hence, it remains to analyze if

it (3) weakens the direct relationship between the independent and dependent variables. To test for a potential direct relationship we conducted a regression analysis with the three design factors as independent variables and the visiting frequency variable as dependent variable. These analysis verifies that there is no statistically significant direct relationship between the three design variables and visiting frequency ($p > 0.05$). Due to the lack of direct relationship between design variables and visiting frequency, experience of activity can not work as a mediating variable. Hence, H3 is not supported.

RESULTS AND CONCLUSIONS

When investigating how visitors evaluate a building and its design a proposed mediating model of the relationships between design factors, the visitors experience of the activities in the building and the end-users' visiting frequency has been tested.

A factor analysis has resulted in four main design factors with influence on visitors' valuation of a house of culture: 1) Technical design, 2) Multifunctional design, with spaces for experience 3) Multifunctional design, with spaces for consumption and 4) Experience of activity.

The regression analyses present a weak but positive relationship between technical and multifunctional design variables and the end-users' experience of the activity in the house of culture. This result of a positive relationship is expected, thus clients' requirements should be fulfilled by the development of functional and technical solutions during briefing (Ryd 2004). The public client had in this case a focus on developing a public building for everybody, i.e. all the citizens. However, the relatively weak relationship was not expected. One explanation could be the validity and reliability of the selected and measured design variables. The questionnaire has been developed in accordance with results from the qualitative analysis performed within the case study both from interviews and from analysis of the results of the pilot study. The broad data collection, with visitors between 13 and 81 years, with different interests and purposes for visiting the building, resulted in questions being relatively short and to the point (which indeed they should be). It could be a problem when questions are developed to everybody and therefore not usable to anybody. The number of different design variables was also kept to the minimum. The different cultural activities performed in various rooms and halls were also a concern in terms of the physical distribution of the questionnaire.

A statistically significant relationship between experiences of activities and visiting frequency is also identified, but it is very weak. Furthermore, the lack of direct relationship between technical and functional design variables and visiting frequency is interesting. It has been argued that buildings with different cultural activities as well as an architecture attracting visitors, should influence on visitors satisfaction and the visiting frequency.

One explanation of these results can be that the visitors of the house of culture are both permanent citizens and temporary visitors. Interesting is that the house of culture had many temporary visitors, 30 %, from different regions and cities. The building is thus also attracting people not having the possibilities to frequently come back even though they would like to. The visiting frequency is thus not a useful measure of describing how a public building attracts its visitors. More interesting is the number of visitors coming to building. These results are also supporting the arguments that

successful landmarks or iconic buildings are driven by social forces and that these buildings have a special impact on their cities in terms of articulating something enigmatic and expressive, common known as the artistic force behind the creation of the landmark or iconic building (Jencks 2005, Short et al. 2007, Bröchner 2009).

REFERENCES

Anon. (2007) Will Boston's new Institute of Contemporary Art be its "Bilbao on the Harbor"? Architectural Record, 195(3), 14.

Atkin, B and Flanagan, R (1995) "Improving Value for Money in Construction". London: Royal Institution of Chartered Surveyors.

Barrett, P and Sutrisna, M (2009) Methodological strategies to gain insights into informality and emergence in construction project case studies. "Construction Management and Economics", 27(10), 935-948.

Bröchner, J (2009) "The changing nature of the built environment, an economic perspective", in Ruddock, L. (ed.), "Economics for the modern built environment", London: Taylor and Francis, 11-33.

Hair, J.F, Andersen, RE, Tatham, RL and Black, WC (1995) "Multivariate Data Analysis with Readings", Prentice Hall, New Jersey.

Jencks, C (2005) "The Iconic Building". London: Frances Lincoln Ltd.

Laurell Stenlund, K (2010) "Effekter av byggandet av Kulturens hus i Luleå" (The Matter of Culture), Research report, Luleå University of Technology.

Macmillan, S (2006) Added value of good design. "Building Research & Information", 34(3), 257-271.

Preiser, WFE and Vischer, P (2005) "Assessing Building Performance". Oxford: Elsevier Butterworth-Heinemann.

Ryd, N (2004) The design brief as carrier of client information during the construction process. "Design Studies", 25, 231-249.

Ryd, N and Fristed, S (2007) Transforming strategic briefing into project briefs, "Facilities", 25(5/6), 185-202.

Saxon, R (2005) "Be Valuable: A Guide to Creating value in the Built Environment". London: Construction Excellence.

Short, C A, Barrett, P, Dye, A and Sutrisna, M (2007) Impacts of value engineering on five Capital Arts projects. "Building Research and Information", 35(3), 287-315.

Stenlund, K.L, Ryd, N. and Vennström, A (2009) Client's decisions in strategic briefs and their impact on user values. In: Dainty, A. (Ed) "Proc 25th ARCOM Conference, 7-9 September 2009, Nottingham, UK, Association of Researchers in Construction Management, 361-70.

Spencer, N and Winch, G (2002) "How buildings add value for clients". Construction Industry Council. London: Thomas Telford Ltd.

Yin, R K (1994) "Case Study Research: Design and Methods". California: Newbury Press, Sage.