Conference Paper

Strategic cooperation networks for life-cycle service provisions in building construction
CIB2007-030

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Publication Date:
2007

Permanent Link:
https://doi.org/10.3929/ethz-a-005996497

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ABSTRACT
Professional clients of the Swiss construction industry are focusing more and more on the complete life-cycle costs of their real estate and are moving away from a focus on the initial investment costs. As a proactive answer to the market demand in Switzerland for a paradigm shift the paper presents a draft of a business model for a strategic cooperation network for life-cycle service provisions in building construction.

Following the constructivist research paradigm the paper outlines the research concept to develop a new cooperative business model for building system providers (SysBau®). The cooperative business model offers life-cycle oriented service provision that focuses on energetic overall optimization of a building. By showing benefits for all stakeholders of a life-cycle service provision it concludes that the business model implies potential for a real win-win-situation.

KEYWORDS
Life-cycle service provision, cooperation network, business model, cooperative synergies

1. INTRODUCTION

The paper presents a research concept to develop a business model for strategic cooperation networks for life-cycle service provisions in building construction. The life-cycle service provider business model (LC-SPB-Model) puts the client and his requirements in the centre of the business
activities of construction companies. In the past the client oriented approach was not always self-evident in the construction industry (Girmscheid, 2004a). This research work is part of the life-cycle and client oriented research portfolio of the Institute for Construction Engineering and Management at the ETH Zurich.

The consideration of life-cycle costs of buildings (Schulte and Allendorf, 2005) in Switzerland gains increasing significance for the evaluation of real estate investments of professional institutional clients. The users of buildings are focusing on operation and maintenance costs and are considering them as the performance indicator for real estate investment. Therefore increasing energy costs with lasting increasing tendency are a potential driver for new life-cycle products, service provisions and business models.

Despite the understanding for a paradigm shift from initial investment cost to life-cycle cost consideration neither clients nor service provider in Switzerland have undertaken action to make the necessary changes. The reason for the lethargic behavior is the lack of appropriate project delivery and service provision forms and adequate business models providing such life-cycle services. Present project delivery forms for buildings and competition for construction services in Switzerland are totally focused on initial investment costs although the accruing costs within the utilization phase for operation and maintenance of a building exceed initial investment costs many times within a relatively short period of time (see figure 1).

Figure 1 Comparison of the investment costs of a building with its life-cycle costs (Staudt et al., 1999).

The finding from figure 1 and the corresponding reference (Staudt et al., 1999) as well as the empirical study carried out by the Institute for Construction Engineering and Management of the ETH Zurich (Schulte,
2002), indicates, that a long term focussed, life-cycle oriented consideration of costs is an imperative requirement for the economic comparison between different alternatives of real estate investments.

The intended consideration of life-cycle costs of capital investment in real estate causes sustainability of the investment measure with respect to two aspects:

1. Microeconomic sustainability by ensuring a considerate exploitation of business and environmental resources that stand for pecuniary advantages for the stakeholder of the life-cycle service provision (professional investor, client, contractor etc.)
2. Macroeconomic sustainability by utilizing national wealth efficiently, in order to tie less capital to investment and utilization costs in the long term thus generating national wealth for additional investments that allow for national advantages in the global theatre.

Despite the rising economic situation in Switzerland, an increasing demand for construction services and a hence resulting, improving order situation of the Swiss construction industry, the construction companies in Switzerland have not managed to disengage from the prevailing pure price competition.

At present the economic situation of the companies of the Swiss construction industry is affected by:

- the interchangeability of many service providers due to little or no features of differentiation of their service provision (Girmscheid, 2006b),
- increasing competition and thus induced pricing pressure through the entry of market competitors coming from low-wage countries (Russig et al., 1996),
- low public budgets and
- a practice of tendering and awarding construction contracts that focuses on minimum investment costs (VOB, 2003) rather than on life-cycle costs (Bock and Schweiz, 1996).

These market conditions lead to the tender price being the decisive factor for success or failure of a construction bid. Opportunities to escape from this pure price competition are mainly the differentiation (Porter, 1992) from competitors by developing and establishing new, innovative and customer-oriented business segments (Girmscheid, 2005) that create added value for the client and that cannot be adopted easily by competitors (Girmscheid, 2004c).

2. STATE OF THE ART

At present there is no service provision of practical relevance available on the Swiss construction market that allows for the consideration of complete life-cycle costs in the competition about a construction project.
There are service providers that offer energy contracting services with increasing success. Studies in different German-speaking countries (Muggli et al., 1999) show a high potential for energy contracting service provisions (Bemmann, 2003). From these studies the potential for life-cycle service provisions can be derived (Lunze and Girmscheid, 2006).

Life-cycle orientation can be implemented into service provisions by means of two approaches:

- **In the case of a life-cycle management** the competition is realized at the design level comparing indicative life-cycle costs of different competitive alternatives without acceptance of any risk or guarantee by the provider. The service does not include any service or cost guarantees. The price competition amongst the construction service providers maintains during the construction and operation phase. Any risks of exceeding forecasted life-cycle costs remain with the client.

- **Life-cycle contracting** is based on the system provider approach (SysBau®) (Girmscheid and Behnen, 2001). The life-cycle oriented optimization of a building construction is exposed to competition by the acceptance of risks and service guarantees for the life-cycle costs through the service providing cooperation. In the competition, the life-cycle service provider cooperations (LC-SPC) are forced to develop the best life-cycle solution for each project and to generate innovations to maintain differentiation from competitors. Such a LC-SPC consists of key players, which have the potential to holistically optimize a building in regard to user flexibility and energy consumption. By considering the building envelope and energy provision and distribution as a holistic system, the risk to guarantee life-cycle costs can be transferred from the client to the life-cycle service provider (Girmscheid, 2006c), who can better bear the risk (Flanagan et al., 1987). The presented business model for a life-cycle service provider cooperation (LC-SPC) represents an innovative approach to contribute to the lack of adequate business models to foster life-cycle service provisions for the client.

3. STATE OF RESEARCH

Current research provides for the technical conditions to energetically and sustainably optimize building construction with respect to HVAC and building envelope. There are also systems (Boussabaine and Kirkham, 2004) to place a monetary value on life-cycle costs (Girmscheid, 2006a). Girmscheid (2006a) provides comparable results on life-cycle costs that allow for a comparison between different possible alternatives.

Girmscheid (2004b) developed and recommends quite a number of project delivery forms that are applicable for life-cycle oriented projects. Girmscheid (2006b) developed several life-cycle oriented business models for system providers. Further he outlines the necessity to take the option of
cooperation between key planner and key contractors into account; an approach that will be realized with the presented research project.

At present, an integral cooperation model that incorporates the existing approaches to an applicable business model is missing in science and practice. In particular a LC-SPC-Model which incorporates the key players, planners as well as contractors in a cooperation network, which have the technical expertise to optimise a building in regard to life-cycle costs and to bear the financial risk associated with performance and cost guarantees. The service provider of such a LC-SPC-Model should bear the performance risks of a building and the client/investor should bear the market risks on cost and revenues (Girmscheid, 2006c).

4. RESEARCH METHODOLOGY

The socio-technological LC-SPC-Model will be developed using the hermeneutical research paradigm (Guba and Lincoln, 1994) with the constructivist and interpretativist research approach (Girmscheid, 2004a). The constructivist research approach will be applied to develop the logical-deductive socio-technological LC-SPC-Model. The logical-deductive LC-SPC-Model will be validated and reliabilitated by triangulation (Girmscheid, 2004a) using theoretical reference framework and qualitative and quantitative research results (Yin, 1994).

The cooperation parameters required for the life-cycle oriented cooperation network will be identified by adopting the interpretavistic research approach using qualitative empirical studies i.e. in terms of expert interviews (Mayring, 1999).

The validated empirical studies will be incorporated in the constructivist logical-deductive LC-SPC-Model. For the theory based structure and the further validation of the LC-SPC-model, the theory of structuration (Giddens, 1985) will be used as theoretical framework to prevent opportunistic behaviour within the cooperation and to establish a win-win situation for the partners.

The research project is structured into the following phases:

- Part A: Conceptual design of the life-cycle service provision and evaluation of potential types of project delivery
- Part B: Developing the organizational and cooperational structure of the LC-SPC-Model with competency profiles of the partners, structure and organisation of the cooperation, decision making process, risk distribution etc.
- Part C: Recommendations for customer oriented strategic cooperation networks for life-cycle service provisions in building construction

5. OBJECTIVES OF THE COOPERATIVE BUSINESS MODEL

The Institute for Construction Engineering and Management together with the Swiss construction industry has launched a research project to develop...
a cooperative business model for a strategic cooperation network for the provision of a life-cycle service in building construction (LC-SPC-Model).

![Diagram](image)

**Figure 2** Structure of the cooperative business model for life-cycle service provision.

For the construction companies involved, the business model offers the possibility to open a new business segment through a differentiation strategy instead of a pure cost leadership strategy.

Clients obtain custom-made buildings which are optimized to life-cycle costs and satisfy important aspects of sustainability. Thus, the life-cycle service provision constitutes a win-win situation for all participants involved (Girmscheid, 2004b).

The main scientific objectives of the development of the cooperative business model for a life-cycle service provision (LC-SPC-Model) are:

- the configuration of a win-win partnership of traditionally dependant contractors and subcontractors into a new cooperative life-cycle business model,
- the configuration of an energetically optimized customer-oriented life-cycle service provision and
- the structuring of a competent life-cycle cooperation network.

The main practice related objectives of the partners are:

- to develop a differentiation strategy in the market to provide more value for the client and to improve their profit,
- to bundle and efficiently utilize the core competencies of the key partners, planners and companies and
- to exploit synergy potentials, which ensure that the competencies of the cooperation are more than just the sum of the core competencies of the involved cooperation partners.
The cooperation partner have to initialize a continuous improvement process and generate sustainable life-cycle oriented innovations, in order to hold the intended market leadership in the delivery of life-cycle service projects in the long run.

6. LIFE-CYCLE SERVICE PROVISION

The planned life-cycle service provider cooperation model (LC-SPC-Model) intends to support the particular client competently and in partnership throughout all phases of the real estate life-cycle. The offer of the LC-SPC-Model includes a customer oriented, flexibly usable and energetically optimized building. For differentiating purposes and according to their LC-SPC-competence, the cooperation partners have to provide for defined life-cycle performance and cost guarantees, leaving only the market risk for cost and revenues to the client.

The client oriented requirements are the basis for the design and energetic overall optimization of a building offered through this customer oriented life-cycle service provision.

In terms of an integrative approach, all life-cycle phases will be linked with each other interactively through the life-cycle service provision, thus enabling the cooperation in all life-cycle phases to consider the influencing factors of the respective other life-cycle phases. In the long run, the cooperation network respectively its participating companies will pursue business activities in all life-cycle phases in order to ensure the declared integrativity of the service provision.

![Figure 3](image.png)

**Figure 3** Service provision according to clients’ requirements in all life-cycle phases.
6.1 Cooperation development

The LC-SPC-Model proposes the implementation of the cooperative business model through three so-called levels of cooperation development (LoCD) that have been empirically developed in workshops with experts. In this LC-SPC-Model the offer and marketing-mix, the extent of the service provision and the scale of integration of the cooperation network increase gradually with the progress in these levels of cooperation development (LoCD).

<table>
<thead>
<tr>
<th>LoCD 1</th>
<th>+ „energy contracting“ (5 – 10 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LoCD 2</td>
<td>+ integrative optimization of façade and internal energy infrastructure of the building</td>
</tr>
<tr>
<td>LoCD 3</td>
<td>+ Provision of a complete on users requirements aligned office or accommodation infrastructure</td>
</tr>
</tbody>
</table>

„life-cycle service provision for building construction“

Figure 4 Service integration in the course of three level of cooperation development (LoCD)

At the first level of cooperation development, the service provision of a total service provider for building construction (turnkey construction) is supplemented integratively by energy-contracting services in cooperation with an appropriate service provider (figure 4). At the second level of cooperation development, the service provision of the cooperation network for life-cycle services in building construction is extended to a full life-cycle service provision including all system service elements that interact within the building’s energy system. Basically, those elements are the building facade and the energy-related technical infrastructure of the building. An energetically optimized life-cycle oriented building is facilitated by an interactive integrated system service provision by the cooperating, service providing partners (service provider collaboration structure). This offer includes performance or cost guarantees for a defined life-time and service content (figure 4).

At the third level of cooperation development which has to be developed as a result of further research, a system service supplemented by further aspects of facility management will be offered, in order to provide complete office and/or housing infrastructure that is fully adapted to the needs of its users. The performance and cost guarantees for the client could consist of a service cost fixed price per square meter building under defined conditions over a contractually stipulated life-time (figure 4).
6.2 Cooperation organization

The main focus of the research project from the scientific point of view is the development of the cooperation network (also see figure 2) as the key for a customer-oriented life-cycle service provision.

Under the leadership of a construction company that has experience as a total service contractor, the architect with the key planners and also the corresponding contractors (building envelope/HVAC) are required to energetically optimize the building and with respect to the integral solution to bundle necessary competencies.

A focal management organization merges the cooperative strategic interests of all cooperation partners. This management organisation is responsible for a market-oriented business development of the cooperation and its life-cycle oriented service provision and serves as focused link of the cooperation network to its clients. It must be organized in terms of a lean management and at the same time, in order to be successful, the organization has to be organized independently and stringent success-oriented.

The focal management organization represents the cooperation network with respect to all external-oriented elements of strategic planning. It, for instance, carries out the project acquisitions and internally forms the project team as a matrix organisation out of the cooperation partners according to a project specific competency profile for the offer and execution phase.

The architect is incorporated into the project team from an external network pool depending on the type of building to be designed and according to the preferences of the clients.

All services that do not belong to the core competencies of the cooperation network and its involved cooperation partners are usually integrated into the project in terms of sub contractor relationships.

7. CONCLUSION

The presented strategic cooperation network for life-cycle service provisions in building construction constitutes a substantiated, proactive and market oriented as well as customer oriented answer of the Swiss construction industry to their clients' claim for a paradigm shift in the competition for construction services towards a focus on the costs of a complete life-cycle costs and away from a focus on the initial investment costs of buildings.

For investors, clients and owner-occupant the life-cycle oriented cooperative business model offers the following benefits:

- life-cycle oriented energetic overall optimization of their buildings while maintaining user flexibility requirements,
- life-cycle oriented reduction of operation and maintenance costs of their buildings,
• generation of additional cash for alternative investment over the life-cycle of their real estate investment and
• less interface management due to reduction of contact partner within a project and with respect to their buildings’ life-cycle.

For the construction companies involved in the life-cycle oriented cooperation network, the life-cycle oriented cooperative business model offers the following benefits:

• generation of comparative competitive advantages,
• sustainable differentiation from their competitors,
• exemption from the prevailing pure price competition and
• commitment to cooperation, in order to generate synergies that allow for added value for the clients and that favour the cooperative approach over market procurement.

By providing benefits for all stakeholder of a life-cycle service provision, the model allows for a real win-win-situation in the relationship between the service providing company and its clients.

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