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# MANAGING OF CONSTRUCTION-RELATED BUSINESSES IN ENVIRONMENTALLY SUSTAINABLE WAYS - A FOCUSED REVIEW OF 62 CONCEPTS

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**Abstract**
*The on-going literature review has revealed a platform of the 62 construction-related business management (BM) concepts, published mainly via the journals between the years 1990-2009. The aim of this paper is to enhance the managing of construction-related businesses in highly environmentally sustainable ways. A focused review resulted in the expected findings, i.e. environmental sustainability is so far being taken into account only by the 8 (13%) BM concepts within the 62-concept population. Academic and practicing concept designers can incorporate sustainability into BM concepts as a dimension, an element, an attribute of managing, and/or a criterion in business decision making. In turn, sustainability is herein enhanced by designing a 5-element, high-sustainability BM concept. The five pioneering firms are used to highlight sustainable elements such as offerings with no negative impacts, business processes with minimal carbon footprints, core competitiveness nurturing based on sustainability foresights, business framing with high-sustainability rules, and dealings with sustainable collaborators. CIB related researchers can both individually and jointly incorporate sustainability in their existing and new BM concepts. It is envisioned that this reviewer be able to report on higher sustainability in managing by the year 2015.*

**Keywords**: business management, construction, design, literature review, sustainability

## INTRODUCTION

The background involves **the on-going literature review** that has revealed the 62 construction-related business management (BM) concepts, published mainly via the journals between the years 1990-2009 (e.g. Huovinen 2010). The reviewer argues that **BM is the most challenging, evolving, and critical area (or level) within strategic management** both in general and across various private and public contexts (Huovinen 2003). Herein, **built environments** are seen to be coupled with capital investment, real estate, and construction markets that deal with design, implementation, services, and life-cycle aspects of both existing object stocks and investments in new objects across the utilization of natural resources, energy supply, telecommunications, transportation, other infrastructure, manufacturing, and general building concerns. Later, the term **"construction markets"** is used to encompass all these built environments and concerns.

**The main aim** is to enhance the managing of construction-related businesses in highly environmentally sustainable ways in the future. The three sub-aims are as follows. (i) The unique review of a population of 62 construction-related BM concepts, published mainly via journals between the years 1990-2009, is briefly introduced. This reviewer explores especially **the degrees of environmental sustainability** that the authors have incorporated inside each of their respective BM concepts. Next, the key finding is being told for the sake of the setting of a meaningful, second sub-aim. Namely, this focused review reveals that only 1 (2%) BM concept deals with sustainability to a medium degree and 7 (11%) BM concepts take sustainability into account to a low degree.

In other words, it seems that the existing construction-related BM concepts are not advancing sustainability. Thus, (ii) **an exemplary, 5-element, high-sustainability BM concept** is being designed in this paper. Each element is illustrated with the pioneering action of a globally leading firm in its targeted construction markets. Finally, (iii) some future actions are put forth in order to enhance high-sustainability BM in the contexts of built environments.

## 62-CONCEPT PLATFORM AND EIGHT SCHOOLS OF THOUGHT ON BM

The review consists of **the three review rounds** that have been carried out in the years 2003, 2006, and 2010. The same limitations have been re-adopted to maintain the validity and to expose any major developments. Hart's (1998) literature review **guidelines** have been relied upon. The method for the reviewing of conceptual literature, i.e. the replicable ways of searching, browsing, in-/excluding, retrieving, inferring, moderate coding, describing, and analyzing the construction-related conceptual data is introduced in Huovinen (2003, 2006).

The volumes of **the 20 construction-related journals** (1990-2009) and those of **the 42 management journals** (1990-2008) have been browsed comprehensively. This is so because peer reviewers apply the most rigorous criteria when they are pre-reviewing manuscripts for publishing in scientific journals. Otherwise, the degrees of the comprehensiveness of the search has varied markedly via the other formal channels, i.e. (i) generic and construction-related management books and reports, (ii) chapters in edited, generic and construction-related management books, (iii) generic and construction-related management journals, (iv) generic and construction-related management conference proceedings, and (v) generic and construction-related management databases. This author will submit the itemized lists of all the publication channels on request.

In this short paper, the 62-concept population can only be overviewed in terms of the following three questions. **Question 1. What is the relatedness of the 62 concepts to one or several of eight schools of thought on BM?** Generic BM research involves the eight schools of thought: (1) Porterian school, (2) resource-based school, (3) competence-based school, (4) knowledge-based school, (5) organization-based school, (6) process-based school, (7) dynamism-based school, and (8) evolutionary school (Huovinen 2008). During the three review rounds, each of the BM concepts could be assigned to one of the eight schools based on the authors' rationales and replies to the question "What is the primary way (element) of managing that will enable managers to set challenging business goals and also to attain them?", within their root references. The combined share of 15 Porterian concepts, 14 organization-based concepts, 10 knowledge-based concepts, and 10 dynamism-based concepts is 79%. Overall, none of the schools (and their key generic concepts) has triggered a coherent, published flow of construction-related BM concepts or applications. The temporal pattern is emerging and fragmented. Only the 10 (16%) new concepts have been published via the journals between the years 2006-2009 (Table 1). **Question 2. What is the relatedness of the 62 construction-related BM concepts to one or several applied scientific fields?** 32 (52%) concepts are primarily related to construction management, 11 (18%) concepts are related to project management, 11 (18%) concepts are related to corporate real estate services, and 8 (13%) concepts are related to industrial management and international marketing. Overall, no established research traditions or groups exist in the area of construction-related BM. Only 7 (11%) concepts have been designed by the authors who are affiliated with the business schools. Clearly, construction is outside the interests of generic management researchers vis-à-vis alternative contexts and application areas.

***Table 1:*** *Relatedness of the 62 construction-related BM concepts (published between the years 1990-2009) to the eight schools of thought (Huovinen 2010).*

| School of thought on BM | Concepts published btw 1990-2002 (1st review) | | Concepts published btw 2003-2005 (2nd review) | | Concepts published btw 2006-2009 (3rd review) | | All concepts | |
|---|---|---|---|---|---|---|---|---|
| | No. | (%) | No. | (%) | No. | (%) | No. | (%) |
| 1 Porterian school | 11 | (29%) | 0 | (0%) | 4 | (40%) | 15 | (24%) |
| 2 Resource-based school | 1 | (3%) | 0 | (0%) | 0 | (0%) | 1 | (2%) |
| 3 Competence-based school | 3 | (8%) | 0 | (0%) | 2 | (20%) | 5 | (8%) |
| 4 Knowledge-based school | 7 | (18%) | 3 | (21%) | 0 | (0%) | 10 | (16%) |
| 5 Organization-based school | 9 | (24%) | 4 | (29%) | 1 | (10%) | 14 | (23%) |
| 6 Process-based school | 0 | (0%) | 4 | (29%) | 3 | (30%) | 7 | (11%) |
| 7 Dynamism-based school | 7 | (18%) | 3 | (21%) | 0 | (0%) | 10 | (16%) |
| 8 Evolutionary school | 0 | (0%) | 0 | (0%) | 0 | (0%) | 0 | (0%) |
| Sum | 38 | (100%) | 14 | (100%) | 10 | (100%) | 62 | (100%) |

**Question 3. For what primary contexts, i.e. industries, businesses, or sectors have the authors designed their 62 concepts, respectively?** 21 (34%) concepts address construction or building, 21 (34%) project-based business, contracting, complex product systems, or combined engineering, purchasing, and construction (EPC) projects, 10 (16%) real estate development and services, and 5 (8%) capital investments-based businesses, 4 (6%) design and consulting services, and 1 (2%) building products supply.

## ASSESSED DEGREES OF SUSTAINABILITY INSIDE THE 62 BM CONCEPTS

In general, OED (2011) defines **sustainable** "to be capable of, relating to, or designating forms of human economic activity and culture that do not lead to environmental degradation, especially avoiding the long-term depletion of natural resources". Herein, **sustainability in construction-related BM** is defined to encompass the utilization and development of natural resources in ways which are compatible with the maintenance of these resources, and with the conservation of the natural and built environments, for current and future generations (applying OED 2011). Sustainability calls for incorporating environmental and green concerns into business level management, but sustainability is causally also related to bottom lines and social issues. Similarly, project level management is - along managing contract, quality, schedule, and budget issues - considering how every project (or capital investment object) will impact communities, environments, and businesses (applying Fister Gale 2009).

In this paper, sustainability is approached according to the above mentioned definitions. For the focused review, **the four degrees of environmental sustainability** were pre-defined as follows. A particular BM concept may take environmental sustainability into account to:

- a high degree, i.e. sustainability is one of the primary elements along one, several, or all dimensions of BM such as a business goal, a key attribute of offerings, competitive

advantages, and strategies as well as an edge of competitiveness and a key performance indicator of business processes, organizations, project portfolios, etc.

- a medium degree, i.e. sustainability is one of the supportive elements along one, several, or all dimensions of BM
- a low degree, i.e. sustainability is only an implicit part of a firm's offerings and underlying expertise in built environments and/or it is taken into account only as one requirement or tendency in clients' buying behavior, one criterion in stakeholders' decision making, one factor in environmental analyses, etc.
- no degree, i.e. the authorship is silent vis-a-vis environmental sustainability, no single 'thing' is explicitly written along this dimension in the reference.

**Overall, this sub-review revealed that only 1 (2%) BM concept deals with sustainability to a medium degree and 7 (11%) BM concepts take sustainability into account to a low degree**. No high-sustainability BM concepts belong to the 62-concept population. **The concept-specific results** are compiled in Tables 2-8, by each of the 7 schools of thought on BM (there are no construction-related, evolutionary BM concepts). Within these tables, the identified, original terms are quoted. When such a quotation is coupled with a statement "no degree", this implies that the authors are using, respectively, the terms sustainable, sustainability, environment(al) only in the spheres of strategic, business, and project management or real estate development. Therein, sustainability refers to the continuity of a focal firm, unit, or other entity and environments refer to business environments and work environments. The references in the text refer only to the authorship and its BM concept presented in the respective, resultant tables. This reviewer will submit a complete list of the 58 references containing a population of the 62 construction-related BM concepts on request.

Only one dynamism-based, construction-related BM concept is taking sustainability into account, but to a medium degree as follows (Table 5). **Chinowsky with Meredith (2000)** have defined the seven areas of a firm’s strategic management within a feedback framework (wheel) including (1) vision, mission, and goals, (2) core competencies, (3) knowledge resources, (4) education, (5) finance, (6) markets, and (7) competition. Within a civil engineering organization, these strategic management activities are a process to ensure that a constant focus is retained on the core purpose of existence. The framework allows leaders to formulate strategic concepts. In particular, they emphasize that re-examining a firm’s strengths requires a move beyond the thoughts of current, short-term profit centers, to a focus on the objectives the organization can potentially achieve over a sustained period of time and effort. Leveraging human resources into core strengths along a competency spectrum provides an organization with confidence, knowledge, and abilities to pursue objectives with the greatest possibility to succeed. **A medium degree** of sustainability is incorporated as (i) a firm's environmentally sensitive core designs that are based on many support strengths and, in turn, (ii) core designs enable the design of project-specific solutions. (iii) Environmental engineering is one of the surface characteristics of core competencies. (iv) An environmental area is designed as one of a firm's knowledge areas. (v) Environmental testing is listed as a competency (Chinowsky with Meredith 2000: 130, 142, 146).

Among the 15 Porterian BM concepts, there are two low-degree concepts (Table 2). **Veshosky (1995)** has used Porter’s (1980/1998) generic competitive strategies as a basis for developing an analytical framework and applying this to the design segment of the A/E/C industry in the USA. The content and use of the cost leadership, the differentiation, and the focus on a niche have been elaborated. He has concluded that the formulation and implementation of explicit business strategies appear likely to be superior to strategies that

occur by default. **A low degree** of sustainability is indicated as environmental systems and facilities among a firm's project types as well as core competencies for managing hazardous waste (Veshosky 1994: 43-45). In turn, **Huovinen (2001)** has designed a competitive strategy framework for technology-intensive contractors. It is based on the idea of creating the best fit between the primary decision maker, i.e. the focal investor with its need and investment process and the most competent contractor with its solution and delivery process. The framework consists of four areas: (a) business scope and objectives, (b) marketing and sales, (c) investment solution, and (d) contract fulfilment. **A low degree** of sustainability is designed as one of clients' decision making criteria, i.e. environmental impacts are taken into account when choosing winning solutions or bids (Huovinen 2001: 73).

Among the 14 organization-based BM concepts, there are two low-degree concepts as well (Table 3). **Flanagan (1994)** envisioned that, by the year 2000, a successful construction company will have many desired features of a service provider, i.e. flat, lean, quick to respond to change, IT intensive, expert resources (lockers), shared design skills (by chambers), marketing intensive, more global in outlook, i.e. acting locally but thinking globally, alert to financing issues, involved in project creation, complex as well as technologically sensitive and driven. **A low degree** of sustainability is designed as follows: (i) Environmental consciousness and sustainability are among the 11 forces that drive strategies, (ii) in design, external impacts on surroundings, e.g. energy, traffic, waste, and ecology are becoming more important, and (iii) successful companies are concerned about the environment and the community (Flanagan 1994: 312, 316, 318). In turn, **Huovinen and Hawk (2003)** have designed a collaborative client-supplier relationship model for globally operating building product suppliers. **A low degree** of sustainability is implanted as a product's environmental impacts among the 11 decision making criteria that clients use for choosing winning bids (Huovinen and Hawk 2003: 158).

Among the 10 knowledge-based BM conceps, there is only one low-degree concept (Table 4). **Love et al. (2002)** have introduced a model for long-term learning alliances, total quality management (TQM), and integrated supply chains in construction. One of the sub-models consists of systems thinking, learning culture, knowledge and communication, changing mental models, joint learning structure/processes, and the development of learning relationships. A long-term learning alliance improves the ability of staff, i.e. to become more productive and less likely to make mistakes. One of the goals is to attain a successful project that can enhance the reputations of all parties. **A low degree** of sustainability is designed as taking into account the ethical consideration of the social and environmental responsibility in such cooperative alliances (Love et al. 2002: 12).

Among the 7 process-based BM concepts, there is only one low-degree concept (Table 6). **Anderson and Merna** (2005) have designed a framework for managing new business development processes in the case of firms offering project management services. **A low degree** of sustainability is implanted as environmental management among the 11 domains of development (Anderson and Merna 2005: 175). Among the 5 competence-based BM concepts, the assessment resulted in identifying no degrees of sustainability (Table 7). Instead, sustainability is being taken into account to a low degree within the only resource-based BM concept (Table 8). **Lowendahl (1997/2000)** has designed the three generic strategies, the four resource types, the four dimensions for resource-based differentiation, and the three phases in the evolution in the case of professional service firms. **A low degree** of sustainability is indicated as environmental protection among alternative targeted markets (Lowendahl 1997/2000: 106).

***Table 2:*** *Assessed degrees of sustainability inside the 15 Porterian, construction-related BM frameworks, published between the years 1990-2009 (the 1st school).*

| Author (year) | Applied concept and its focal context | Assessed degree of sustainability based on the key quotations (page number) |
|---|---|---|
| Betts, Ofori (1992) | Applying Porterian concepts in construction firms in the UK | No degree, "sustainable strategies" and "business environments" are mentioned. |
| Winch, Schneider (1993) | 2x2 matrix: strong delivery, experience, ideas, ambition in UK architectural practices | No degree, "competitive environments" is mentioned. |
| Veshosky (1994) | Analytical, applied framework for the design segment of the A/E/C industry in the USA | **Low:** Environmental systems (43) and facilities (44) as project types, hazardous waste related to core competencies (45). |
| Jennings, Betts (1996) | New generic strategy model to UK quantity surveying practices with IT support | No degree, "external environments surrounding business arenas" and "sustain-able competitive advantages" are mentioned. |
| Roulac (1999) | Real estate value chain as part of development in the USA | No degree, "environment is essence of experience and creativity" is mentioned. |
| Roulac (2001) | 8 strategies, 7 contributions to advantages in the US real estate | No degree, "work environments enhance productivity" is mentioned. |
| Pinto et al. (2000) | Project supplier's value chain | No degree |
| Huovinen (2001) | Competitive strategy in technology-intensive contracting | **Low:** Solutions' environmental impacts as one of clients' decision making criteria (73) |
| Langford, Male (2001) | Adapted 5 forces shape the UK industry structure | No degree, "relationships between firms and environments" is mentioned. |
| Rapp (2001) | Adapted 5 forces (incl. speedy response) and a client value chain in the US construction | No degree, "environmental opport-unities and threats as part of a SWOT or 5 forces analysis" is mentioned. |
| Kale, Arditi (2002) | Mode (cost, quality, time, inno-vation) and scope (geography, delivery systems, clients) in the US construction industry | No degree, "environmental determinism vis-a-vis explaining firm performance " is mentioned. |
| Milosevic, Srivannaboon (2006) | Framework for aligning PM and a firm's business strategy in US engineering, industrial firms | No degree |
| Singer et al. (2007) | Model for combining real estate and competitive strategies in Dutch multinational companies | No degree, "work environments that stimulate productivity" is mentioned. |
| Chiang et al. (2008) | Volume building strategy of contractors in Hong Kong | No degree, "sustainable sources of competitive advantages" is mentioned. |
| Heywood, Kenley (2008) | Sustainable competitive advantage model for corporate real estate in Australia | No degree, "sustainable competitive advantages and competitiveness" and "environmental changes" are mentioned. |

***Table 3.*** *Assessed degrees of sustainability inside the 14 organization-based, construction-related BM concepts, published between the years 1990-2009 (the 5th school).*

| Author (year) | Applied concept and its focal context | Assessed degree of sustainability based on the key quotations (page number) |
|---|---|---|
| Leinberger (1993) | Managerial systems change strategy in the US real estate | No degree |
| Flanagan (1994) | Successful construction company in the year 2000 (based in the UK) | **Low:** Environmental consciousness and sustainability are among 11 forces that drive strategies (312). In design, external impacts on surroundings, e.g. energy, traffic, waste, ecology) are becoming more important (316). Successful companies are concerned about the environment and the community (318). |
| Artto (1999) | Organizational model for PM in a project-oriented company | No degree, "multi-project environments" is mentioned. |
| Bennett (2000) | 7 partnering pillars balance competition and cooperation in the UK construction industry | No degree, "companies that survive long-term" and "networks interact with their environments" are mentioned. |
| Davies, Brady (2000) | Dynamic framework for capability building and interactions btw. levels within a firm offering complex product systems | No degree, "firm capabilities, adapting to, and a changing environment" is mentioned. |
| Hobday (2000) | Project-based organization offering complex product systems | No degree |
| Turner, Keegan (2000) | Management of operations in a project-based organization | No degree |
| Sauer et al. (2001) | PM-centered organization with its projects in the Australian construction industry | No degree |
| Cheng, Li (2002) | Customized model of partnering in the construction industry in Hong Kong | No degree |
| Huovinen, Hawk (2003) | Model for building product suppliers to manage their client relationships and collaboration | **Low**: "A building product's environmental impacts" is one of 11 criteria that clients use for choosing a winning bid (158). |
| Kendall (2003) | Support to PM office management in project-driven firms | No degree |
| Huovinen (2004) | Managing 5–element, capital investments-based business in organization-based ways | No degree, "governance takes place along ... environmental dimensions" is mentioned. |
| Kiiras, Huovinen (2004) | Virtual CM company model | No degree |
| Thiry, Deguire (2007) | Vertical and horizontal integration in project-based organizations (PBOs) | No degree, "turbulent environments" is mentioned. |

***Table 4:*** *Assessed degrees of sustainability inside the 10 knowledge-based, construction-related BM concepts, published between the years 1990-2009 (the 4th school).*

| Author (year) | Applied concept | Assessed degrees of sustainability based on the key quotations (page number) |
|---|---|---|
| Hawk (1992) | Continual learning system based on a learning capability in international building | No degree, "in a relative stable environment", "environmental forces" and "environmental technologies" are mentioned. |
| Anell (2000) | Analysis matrix for a Nordic firm's project portfolio management | No degree |
| Davies, Brady (2000) | Organizational learning-cycle model for UK firms offering complex product systems | No degree, "external, changing technological and market environments" is mentioned. |
| Love et al. (2000) | Conceptual model for a learning organization in construction | No degree, "... adapt to changing environmental conditions" and "a learning environment" are mentioned. |
| Langford, Male (2001) | Four ways of knowledge-based management in the UK construction industry | No degree, "knowledge ... is the only sustainable source of competitive advantage" is mentioned. |
| Love et al. (2002) | Model for construction alliances founded on TQM and integrated supply chains in the contexts of Hong Kong | **Low**: To take ethical consideration of the social and environmental responsibility in cooperative alliances (12). |
| Robinson et al. (2002) | KM framework including knowledge maps for continuous improvement in UK project organizations | No degree, "dynamic business environments" is mentioned. |
| Huovinen (2003) | Systemic concept for managing a 5-element, capital investments-based business in KM ways | No degree |
| Borner (2004) | Project and success-oriented KM for design-build contractors in Swiss markets | No degree, "environment/industry/ market" and "competitive environments" are mentioned. |
| Walker (2005) | Knowledge competitive advantage (K-Adv) concept for Australian construction firms | No degree, "sustainable business practices" and "external environments" are mentioned. |

***Table 5:*** *Assessed degrees of sustainability in the 10 dynamism-based, construction-related BM concepts, published between the years 1990-2009 (the 7th school).*

| Author (year) | Applied concept and its focal context | Assessed degrees of sustainability based on the key quotations (page number) |
|---|---|---|
| Meklin et al. (1999) | Framework of a Finnish firm's project business management | No degree |
| Barrett (2000) | Model of FM and a process to link core businesses and FM in the UK | No degree, "the business environment" is mentioned. |
| Chinowsky with Meredith (2000) | 7 areas of strategic management, feedback with a competency spectrum and maps in US civil engineering organizations | **Medium:** Environmentally sensitive core designs are based on support strengths. Core designs enable project solutions (130, 142). Environmental engineering is one of surface characteristics (146). Environmental area and testing is a competency (150). |
| Lampel (2001) | Modified, extended theory on core competencies that support core project processes in EPC projects | No degree, "the wider environment" is mentioned. |
| Langford, Male (2001) | Contingency model of strategic management in managing construction and supply chains in the UK | No degree, "sustainability versus strategic options and choices" and "environmental evolution" are mentioned. |
| de Haan et al. (2002) | Fit between market, a firm's strategy, its capabilities, and key external and internal conditions supporting capabilities in the Dutch building industry | No degree |
| Huovinen (2002) | Framework for managing a firm's competitiveness in a global, capital investments-based business | No degree, "sustainability of firms" is mentioned. |
| Mitchell-Ketzes (2003) | Linking workplaces to businesses in the USA | No degree, "healthy, sustainable environments" and "sustainable practices and design" are mentioned. |
| Osgood Jr. (2004) | Strategy alignment model and map for real estate and businesses in the USA | No degree |
| Huovinen (2005) | Recursive global, capital investments-based business management as a system | No degree |

***Table 6:*** *Assessed degrees of sustainability in the 7 process-based, construction-related BM concepts, published between the years 1990-2009 (the 6th school).*

| Author (year) | Applied concept and its focal context | Assessed degrees of sustainability based on the key quotations (page number) |
|---|---|---|
| Kaya et al. (2004) | World-class FM framework for UK-based firms | No degree, "sustainability of business processes" is mentioned. |
| Rogers (2004) | High performance unit in FM services businesses in NZ | No degree |
| Anderson, Merna (2005) | Business development process in PM services in the UK | **Low:** Environment management is one of 11 domains of development (175). |
| Morris, Jamieson (2005) | Linking corporate strategies and project strategies in firms | No degree, "project environments" is mentioned. |
| Lindholm et al. (2006) | Model for value adding real estate in firms | No degree, "... provide an environment that enhances productivity" is mentioned. |
| Salonen et al. (2006) | Framework for ship power suppliers and systems sales | No degree |
| Whitla et al. (2006) | Global strategies for contractors based in Hong Kong | No degree |

***Table 7:*** *Assessed degrees of sustainability in the 5 competence-based, construction-related BM concepts, published between the years 1990-2009 (the 3rd school).*

| Author (year) | Applied concept and its focal context | Assessed degrees of sustainability based on the key quotations (page number) |
|---|---|---|
| Huovinen (1999) | Recursive, competence-based approach for managing a firm in capital investment markets | No degree, "firms, management, and environments" and "environmental stochastic factors" are mentioned. |
| Langford, Male (2001) | Strategies for international construction and the internationalization of UK firms | No degree, "traditional and overseas environments" and "sustainable competitive advantages" are mentioned. |
| Trejo et al. (2002) | Capability assessment for core competency development in US construction & engineering | No degree |
| Davies et al. (2007) | Model for selling, integrating capital goods into systems | No degree |
| Helander, Möller (2007) | Framework for managing supplier-client relations in complex system businesses | No degree, only "changes in business environments" is mentioned. |

***Table 8.*** *Assessed degree of sustainability in Lowendahl's resource-based framework for managing a professional service business, published in the year 1997 (the 2nd school).*

| Author (year) | Applied concept | Assessed degrees of sustainability based on the key quotations (page number) |
|---|---|---|
| Lowendahl (1997/ 2000) | 3 strategies, 4 resources, 4 dimensions for differentiation, and 3 phases for (US) professional service firms | **Low**: Environmental protection as a market (106). |

## DESIGN OF A HIGH-SUSTAINABILITY CONCEPT FOR MANAGING BUSINESSES IN CONSTRUCTION-RELATED CONTEXTS

In general, Nidumolu et al. (2009) advocate that pioneering business managers in their various contexts adopt **a generic, 5-stage process** for becoming sustainable, i.e. (i) viewing compliance as opportunity, (ii) making value chains sustainable, (iii) designing sustainable products and services, (iv) developing new business models, and (v) creating next-practice platforms.

For the management of businesses in construction-related contexts, environmental sustainability is herein incorporated as the primary sub-elements into a BM concept (applying Huovinen 2002). It is proposed that the successful management of a business in a construction-related context be based on the adoption of **a 5-element, high-sustainability business system**. The two elements through which a viable firm interacts with its competitive offering markets are redefined first, then the three more internal elements follow (Figure 1).

### Offerings and competitive strategies with no/low negative impacts on environments

A firm advances its competitive strategies and offerings (the front-line element 1) in order to offer the best solutions to targeted clients and managing all the contracts to be won for high client satisfaction, the highest degrees of sustainability, and high firm profitability. By definition, **offerings with no/low negative impacts** enable a firm to pre-empt or over-satisfy client needs, excel among competitors, and meet its business-specific, high-sustainability goals in the short term. In practice, the valuable knowledge on sustainability needs to be recreated on a continuous basis and then differentiated into strategies and customized into offerings. Typically, the top management of **KONE Elevators** of Finland is aware of a fact that elevators and escalators can account for 2-10% of a building's energy consumption. KONE wants to be the innovation leader in eco-efficient solutions for its global industry. A great potential is seen in further reducing the impacts of buildings on the environment by offering innovative and energy efficient solutions. In the year 2009, KONE released a range of elevators which reduce the energy consumption by 30% compared to the previous volume models (KONE 2010).

### Business processes with minimal carbon footprints

A firm integrates its business processes (the process element 2) to ensure the targeted level of operative effectiveness. In practice, a firm’s business processes and contract tasks are managed as a dynamic, IT-supported matrix where teams play integrative, flexible roles. By definition, **business processes with minimal carbon footprints** allow a firm both to ensure and to increase the targeted effectiveness across contracts to be won. In practice, generic and contract-specific, high-sustainability knowledge needs to be integrated and virtualized before leveraging it into a firm's processes. Typically, **the top management of HOCHTIEF** of Germany has itemized a set of the goals for cutting carbon emissions together with their clients in the area of active climate protection such as (i) cutting company carbon emissions in Germany and the UK by 5.0% by the year 2011 by lowering office power consumption (2008 base year), (ii) cutting Turner's (the subsidiary's) carbon emissions in the USA by 5.0% in the next five years (2006 base year), (iii) switching the major office locations in Germany fully over to green power, (iv) offering green power to construction sites, and (v) cutting business trips by 2.5% by the year 2011 through the greater use of communication technologies (HOCHTIEF 2010). In turn, **KONE** is annually re-setting more demanding targets in terms of improving the energy-efficiency and the eco-efficiency over the life-cycles of its products and minimizing also its operative carbon footprint (KONE 2010).

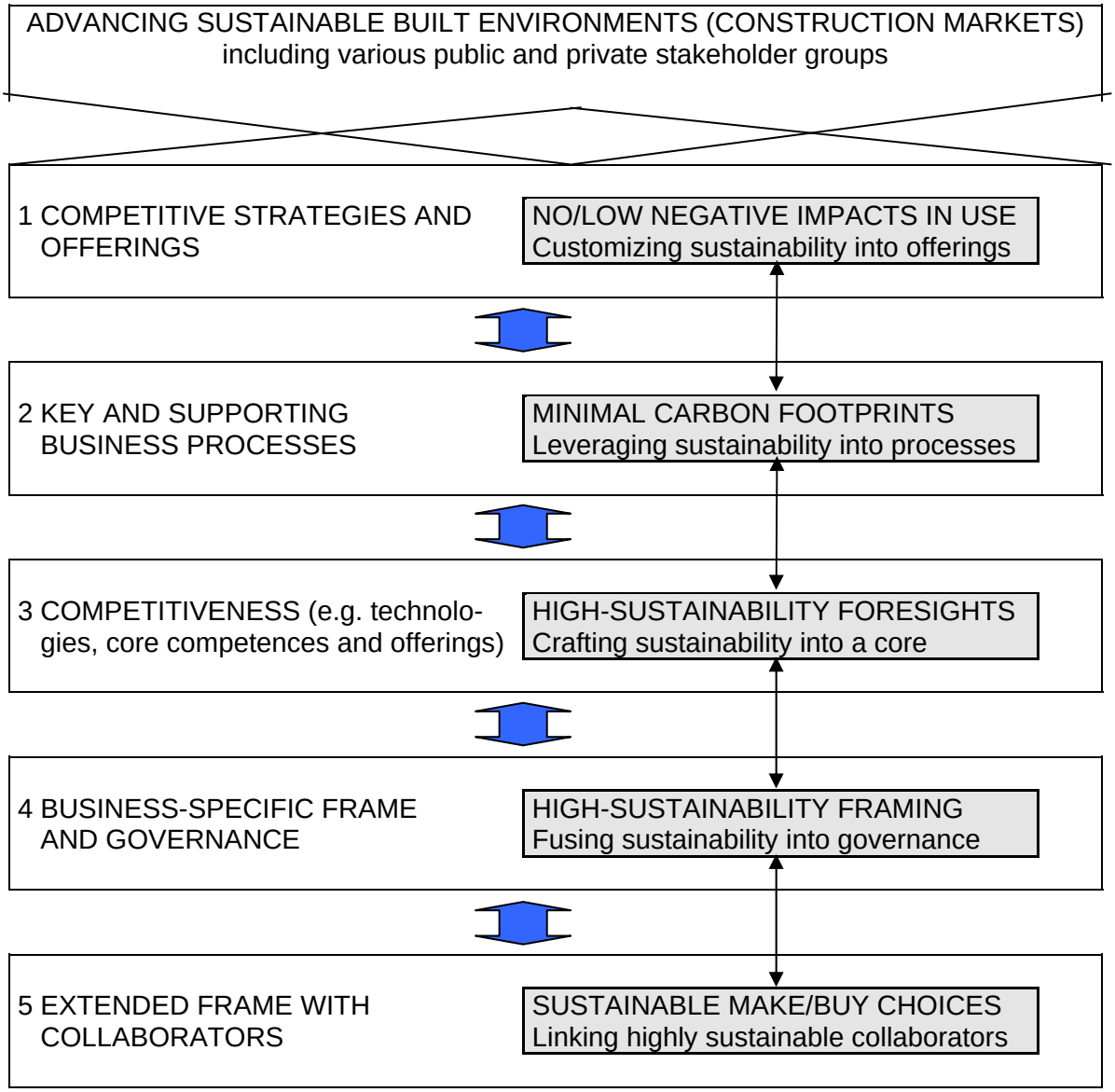


***Figure 1:*** *Management of a 5-element business in high-sustainability ways vis-a-vis the advancement of built environments across the globe (applying Huovinen 2002: 336).*

**Core competitiveness based on high-sustainability foresights**

A firm nurtures its core technologies, competences, and offerings (the back-end element 3) in order to create competitive advantages and to prolong the current edge as long as possible. By definition, **a firm's competitiveness** is being nurtured based on its high-sustainability foresights that involve business opportunity perceptions, technology foresights, a technology platform, a core competence architecture, a core offering portfolio, and innovation paths. In practice, such foresightful knowledge on sustainability needs to be acquired or invented, rechecked continuously, and then comprehended before crafting it into technologies, core competences, and offerings. Typically, **Pöyry Group** of Finland perceives that a sustainable world will not happen by itself. It must be created and new engineering solutions must be developed. This is where Pöyry can contribute and make a real difference by designing realistic and innovative solutions that consider all aspects of sustainability. Pöyry's in-depth

expertise extends to the fields of energy, industry (e.g. pulp & paper), urban & mobility and water & environment. The concept of Balanced Sustainability is about improving resource efficiency. It involves finding solutions to improve energy, water, material, and supply chain efficiencies while improving the overall return on investments (Pöyry Group 2011).

**High-sustainability framing and governance of a firm's businesses**

A firm frames each of its businesses both externally and internally (the frame element 4) in order to optimize each business system's (unit's) existence and outcomes that add value to business performance and firm shareholding. The framing takes place along an inter-dependent set of legal, financial, venturous, organizational, institutional, social, and sustainable dimensions. By definition, **a high-sustainability framing** covers firm ownership, top management, business venturing, financing, and the preferred ways of firm-market interactions. In practice, knowledge on sustainability needs to be self-produced or bought, and then updated many times before it is fused into owners' and top management's decisions on business scopes. Typically, the top management of **Skanska AB** of Sweden is leading their corporation in order to be best-in-class regarding margins, the safest firm in the industry, and the leading "Green construction and development company" in the year 2015. The new business plan for 2011-2015 outlines the green future for Skanska (Karlström 2010).

**Extended, business-specific frames with sustainable collaborators**

A firm's extends its business-specific frames by engaging itself in collaboration (the extended frame element 5) with various domestic, foreign, global, and local stakeholders. The extent and depth of each collaborative relationship vary according to business-affecting goals agreed upon between parties. Forms include partnerships, networking, and similar new forms of physical and virtual collaboration in the long term. By definition, **sustainable collaboration** includes the synergistic ways of make/buy choices, opportunity exploitation, benefit balance, and risk avoidance. In practice, this (originally tacit) internal knowledge on sustainable collaboration is first explicated and documented before it can be exchanged between one, more, or all elements within collaborators' business systems. Typically, **Nokia Siemens Networks (NSN)** is positing that environmental leadership can be a differentiator for their customers, i.e. farsighted operators who are prepared to reduce energy usage, to improve network and system designs, and to create environmental sustainability for the entire business. In turn, NSN takes a holistic approach to environmental performance over product lifecycles. NSN foresees that the adoption of environmentally sustainable business strategies requires an overhaul of each "old way" of doing things. NSN integrates environmental issues into procurement processes. NSN is encouraging its networked suppliers to take a full environmental responsibility for their operations. NSN ensures that its suppliers embrace sustainable practices. Supplier and collaboration agreements include specific requirements such as using a documented environmental management system, meeting standards for raw materials content, and monitoring the environmental performance (NSN 2008).

## CONCLUSIONS

Concerning interested researchers, it is suggested that **high-sustainability BM concepts be advanced** so that they meet the following criteria in terms of serving as (a) a foundation of a meaningful communication vis-a-vis environmental sustainability, (b) a perspective or a way of looking at the empirical BM world related to construction markets and built environments, (c) a means of classifying and generalizing sustainability-focused BM situations, e.g. stating the conditions when the management's (and other key stakeholders') efforts are likely to be

successful and those conditions under which their efforts are likely to be carried out in vain, and (d) a component of a theory or a model and thus of an explanation, prediction, and prescription for high-sustainability BM in construction-related contexts (applying Ghauri and Gronhaug 2002). In particular, CIB related researchers are herein encouraged to incorporate environmental sustainability in their existing and new BM concepts through joint and individual efforts in the future. In turn, this author will follow up the emergence of both generic and construction-related BM concepts on an annual basis. It is envisioned that higher sustainability vis-a-vis business managing can be reported upon already by the year 2015.

Concerning practicing business managers in construction-related firms, some recommendations are put forth so that managers take into account **high-sustainability throughout all business transactions** in terms of (i) envisioning the preferred states and ways of managing environmental sustainability issues, e.g. in the years 2015 and 2020, (ii) embedding high-sustainability into the setting of business goals, (iii) incorporating high-sustainability into BM thinking as a major decision making criterion, and (iv) adding the minimization of negative impacts on natural and built environments onto dual agendas for business performance enhancement and competitiveness development.

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