



# DEVELOPMENT OF INNOVATIVE SYSTEM TO AIDE THE CONSTRUCTION INDUSTRY

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**Abstract :** *In order to answer the following four issues, the study first examines the logic of innovation in the construction industry. How is it carried out? Who is concerned? And why do businesses innovate or not? In order to examine data from a study of innovation in the Norwegian and Swedish construction sectors, the research combines an industrial network approach and the exploration-exploitation dichotomy. The results demonstrate that construction organisations are methodically transforming project-level ideas into corporate knowledge. This suggests a logic of innovation that is focused on utilising novel combinations through the internal network. The corporations are also more and more concerned with forging stronger ties with users and consumers, which have historically been tenuous. At least on the client side, this has resulted in a focus on exploitation through the external network. As a result, the industry as a whole can experience a rebirth and more creative behaviour. Companies in the construction sector should be aware of their innovation logic, specifically whether it is skewed towards exploitation or exploration, or towards the internal or external network, when determining their innovation behaviour. There must be equilibrium.*

**Index Terms** - Perspective, Investigate & Exploit Innovation Logic Creation Network

## 1. INTRODUCTION

Like all other industries, the constructions sector is constantly evolving. A complex system of several components affects the pace and impact of construction development. When attempting to comprehend the evolution of construction, that is, when attempting to comprehend the construction innovation systems, knowledge of the characteristics of the industry, its driving factors, and external impacts, are of fundamental importance.

Additionally, because of how tightly the national social structure is related to construction, local, governmental, and other institutional players have a significant impact on the industry. It is sometimes insufficient to examine innovation from a micro level because a single company depends on the actions of its partners due to the effects of the project direction and the huge number of actors in the construction sector. As a result, national systems of invention in the construction sector are more sporadic than national systems of innovation in traditional manufacturing industries since the relationships between the industry's participants are not constant but change from project to project.

## 2. THEORETICAL BACKGROUND

### 2.1 Construction industry innovation.

When businesses undertake new or current operations in novel ways, this is generally referred to as innovation. In other terms, innovation entails a "change in routine" and the "carrying out of novel combinations". Innovation has been observed in new goods, new processes, new raw resources, new organizational structures, and new markets. It is necessary to distinguish between technical and organisational innovation since the former is heavily impacted by how the economy and the enterprise are organised, and because training and organisational transformation are key conditions for converting technological innovation into economic success.

### 2.2 Relationship characteristics in general.

In order to create and execute innovative ideas, construction businesses must collaborate with other players. Manufacturing enterprises are also important sources of innovation since they may supply and create new solutions that construction firms can utilise. Hence, the interactions between persons and businesses inside the industry, as well as between the industry and external parties, have an impact on innovation. Partnerships with "innovation brokers," such as professional organisations, universities, and construction research organisations, are also valued.

### 2.3 Project-specific features.

Projects, by definition, present unique spaces for generating new solutions since they lack the stability of a mature organisation and are dependant on issue solving or producing new knowledge among a group of individuals. New project objectives that cannot be satisfied with existing means initiate the search efforts required for discovering new solutions. Yet, new solutions are hazardous, and introducing change in complex processes such as construction might have unintended consequences. As a result, innovation must be appropriately controlled. Attention management is especially crucial since creativity is dependent on the convergence of means, purpose, and opportunity to create.

### 2.4 Corporate characteristics.

Substantial study has been conducted on the transfer of learning and new information between project and organisational levels. Capturing information obtained in individual initiatives, transferring it back to the corporation, and applying it to future projects has proven difficult. Yet, for innovation to occur, construction firms must be able to embrace and execute new ideas on projects or transfer findings from project problem-solving to the company level. For example, once a project is completed, project members are assigned to new projects.

### 2.5 At the industry level, features.

The structural characteristics of the construction sector as a whole stifle innovation, notably the fragmentation and segregation of duties for system integration among designers and contractors. Additionally, the kind of rules and how they are shaped by various interest groups have an impact on innovation. The impact of regulations/standards on innovation was also underlined. While prescriptive restrictions stifle innovation, many observers agree that performance-based regulations may actually promote it. Nonetheless, this necessitates that regulators and policymakers have sector-specific expertise.

### 2.6 Understanding the Construction Innovation Logic.

Building is a complicated product system that does not adhere to the typical product life cycle; thus, innovation follows a distinct pattern. As a result, the following proposition is made:

- Identifying new activity linkages, resource ties, and actor bonds among construction players will be a beginning point for understanding what sort of innovation occurs in construction.
- Inter-organizational construction projects may be key sources of innovation for construction firms since each construction project provides opportunity for exploration in terms of encountering new counterparts, resources, and activities.

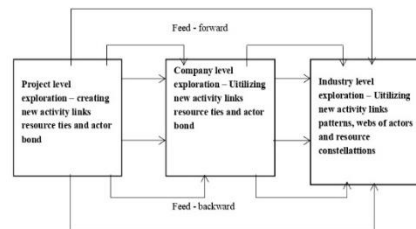


Figure 1. An analytical model for the understanding of how new solutions need to be transferred between Three different Organizational levels for the achievement of Innovation.

## 3. RESEARCH DESIGN AND METHODS

While the studies in the two nations were different, comparable questions were included in both the surveys and the interviews. Them as complimentary sources to better understand construction innovation in general and construction organisations' innovation reasoning in particular. This figure also comprised over 200 group units dispersed across the country for three of the major firms (PEAB, NCC, and Skanska). The 440 responses indicated a 20% response rate. This data was deemed challenging to get from secondary sources and single interviews. We report on the survey results related to 1) what types of innovation are prioritised (Tables 2 and 3 show areas for recent and future development, 2) the most important learning sources, and 3) the most important counterparts in terms of acting as important sources for the development of new ideas, processes, and products (Tables 4 and 5). How its opponents participate in renewal, Interviews with subcontractors, material suppliers, and clients were conducted as part of the research (see Table 1).

Type of company	No of interviews
Client	5
Consultants	4
Building contractor	15
Technical contractor	5
Building supply company	3
Production company	3
Total	35

Table 1 - Overview of interviews.

Swedish survey	Share of respondents (%)
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Planning level of production	72
Partnering relationships with clients	65
Share of Subcontractors and specialists	58
Share of prefabricated materials and construction elements	55
Standardization through technical platforms	44

Table 2 - Areas for recent and further renewal and Development reported in the swedish survey.

The quantitative data findings serve as a foundation and supplemental source for this study, while the qualitative data serves as the major source of insight. The use of mixed-methods research was appropriate for the topic at hand since it allows for the investigation of many elements of a phenomena.

The study's findings show that much of the innovation in construction over the last few years has been related to processes and organisational arrangements, specifically how planning is carried out and the type of administrative routines that are used for this type of activity, as well as how relationships with other actors are handled. According to the Swedish poll, approximately 70% of respondents said that the most prevalent sort of development during the last five years was connected to production planning, as shown in Table 1.

## FINDINGS

### 3.1 Different types of innovation and the creation of new activities.

The project, the business, and the industry levels all exhibit behaviour. The interviews offered useful information on why various sorts of learning behaviours were pursued. The study's findings show that much of the innovation in construction over the last few years has been related to processes and organizational arrangements, specifically. According to the Swedish poll, approximately 70% of respondents said that the most prevalent sort of development during the last five years was connected to production planning, as shown in Table 1.

Norwegian survey	Share of respondents (%)
Specialist development	91
Management development	79
Sales and customer relationships	76
Partnering with other actors	68
Standardization	48

Table 3 - Areas for recent and further renewal and development reported in the norwegian survey.

Driving forces of innovation	Share of respondents (%)
Co-workers	80
Customers	79
Competitors	34
Subcontractors	33
Technical consultants and architects	30
Other units in the company	28
Material suppliers	23
Equipment suppliers	15
Research institutions	11

Table 4 -the most mportant Driving forces of innovation in the swedish survey.

According to Table 2, approximately 80% of respondents in the Norwegian study felt that management was a targeted area for further improvement. Similarly, in the Norwegian poll, over 70% prioritised sales and customer connections, while two-thirds saw collaboration with other players as a key area for future development. About 60% of respondents in Sweden reported an increase in customer collaboration during the previous five years.

Sources of innovation	Share of respondents (%)	
	Local	National
Customers	66	36
Personal networks	55	42
Suppliers	47	47
Industry organizations	38	47
Consultants	37	31
Competitors	37	27
Alliance partners	32	31
Other units in the company	14	12
R&D institutions	10	16

Table 5 - The importance of relations to different actor groups as sources of innovation in the norwegian survey.

Innovation in some technical components of a product, such as prefabrication, frequently necessitates changes in how the project is planned as well as changes in the manufacturing process itself. Another example is the implementation of Building Information Models (BIM), which has altered the way projects are planned, built, and delivered.

### 3.2 Construction actors explore and exploit on multiple levels, which leads to innovation.

The data demonstrate unequivocally that projects are seen as an essential forum for creativity. The Norwegian CEOs were invited to think on the notion of innovation throughout their interviews. As one of the managers put it:

I don't have a precise concept of innovation, but it happens in initiatives. I have a nice example of a skilled tunnel project manager. They used to create three rock bolts every hour, but today they make 36.

Exploration, or the discovery of new ideas and solutions during projects, is more or less formally disseminated to the rest of the company.

### 3.3 The interactions between construction actors have an impact on innovation.

According to the Swedish poll, coworkers are the most significant driving force for innovation, followed by consumers. Suppliers were given less attention. In the Norwegian poll, virtually all respondents said that customer relationships were vital for innovation. Personal networks (which are likely to include coworkers) were also rated highly by Norwegian respondents.

The study's advisors agreed with these points of view. They mentioned additional areas, such as oil and gas, where resources will be committed as part of the initiative to promote exploration and the development of innovative solutions.

## CONCLUSION

According to our findings, the network context in which construction businesses operate influences the logic of innovation in this industry. Concerning how innovation happens, we have highlighted two important network-related concerns: one relating to a specific organization's internal network and the other relating to how this network interacts with the outer network comprised of suppliers and customers. Understanding how to apply more effective solutions throughout the organisation and projects appears to be critical in this type of process development. Moving on to how this internal network interacts to the external network, a variety of variables have been identified as causes for a lack of inter-organizational connectivity within the sector, including procurement practises, price emphasis, project orientation, and so on.

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