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Tulli Business Park

CREDIT Case FI01

Danish Building Research Institute
AALBORG UNIVERSITY

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Construction and Real Estate -
Developing Indicators for Transparency

Tulli Business Park

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Contents

Preface

This report describes the results of a case study undertaken as part of the Nordic/Baltic project *CREDIT: Construction and Real Estate – Developing Indicators for Transparency*. The case study is part of the work in work package 4-6 with respect to project assessment tools, application in firms and national benchmarking systems.

CREDIT includes the most prominent research institutes within benchmarking and performance indicators in construction and real estate, namely SBi/AAU (Denmark), VTT (Finland), Lund University (Sweden) and SINTEF (Norway). Further, three associated partners have joined CREDIT. The three associated partners are the Icelandic Center for Innovation (Iceland), Tallinn University of Technology (Estonia) and Vilnius Gediminas Technical University (Lithuania).

The project has been managed by a steering committee consisting of the following persons:
- Kim Haugbølle, SBi/AAU (project owner).
- Niels Haldor Bertelsen, SBi/AAU (project coordinator).
- Pekka Huovila, VTT.
- Päivi Hietanen, Senate Properties.
- Ole Jørgen Karud, SINTEF.
- Magnus Hvam, SKANSKA.
- Bengt Hansson, Lund University.
- Kristian Widén, Lund University.

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Danish Building Research Institute, Aalborg University
Department of Construction and Health
August 2010

Niels-Jørgen Aagaard
Research director

Summary

Buildings (WP4) summary

Case study Tulli Business park is a part of NCC Property Development unit's Business parks concept. The purpose in case study was to collect performance indicators from Tulli project and at the same time analyse and find out performance improvement possibilities. In order to find weaknesses and improvement possibilities a short site evaluation was needed and focus was in indoor climate and mechanical systems. Some improvement possibilities related to thermal comfort and reporting of automation system was recognized. In Tulli project, several indicators were used but not any special performance indicator system.

Enterprises (WP5) summary

The best possibilities to develop performance and value of a building are in pre design and design phases. To develop KPI`s for the early phases is beneficial. During construction and purchasing process is necessary to implement documented performance requirements. Methods to verify and commission systems and results are also essential. Customer feedback questionnaires are already in use and they help to control implemented systems and give opportunities to improve building concepts and services.

National benchmarking (WP6) summary

In national level, several enterprises publish data related market values of real estates. However, there is a lack of qualitative information and performance data. Ecological and environmental aspects will be much more important in the future in order to evaluate and benchmark real estate values.

1. Introduction and objectives

1.1 Objectives and work packages of CREDIT

Sir Winston Churchill once said, “We shape our buildings, afterwards our buildings shape us” (28th Oct 1943). This quotation underlines how strong a building can influence an occupier or a user. Providing complex public facilities for example hospitals, schools, universities and libraries that are able to meet both the internal and external stakeholders’ needs and requirements is not without complications. The aims and demands of different stakeholders within a project can sometimes create conflict with each other’s interest. Understanding the needs and requirements of these stakeholders are essential to remain competitive in today’s market. A client that pays attention to the needs of the end-users will be rewarded with a high-performance property. Simultaneously, this shift seeks to solve many ills associated with inadequate building conditions and resulting in poor building function.

Due to the amount of both public and private money being invested in delivering public and private facilities, strong actions must be adopted. Collaboration with the relevant stakeholders will help building owners in identifying the required performance indicators to create high-performance facilities. The project aims to define a model for the implementation of performance requirements, which ensure the fulfilment of the various types of users’ and stakeholders’ needs and demands. The model shall also allow for the continuous measuring of the effectiveness of the used requirements and the model as such so that it may be improved as more knowledge and experience of it is achieved.

Following the themes of the ERABUILD call closely, the aim of CREDIT is to improve transparency on value creation in real estate and construction. Thus, the objectives of CREDIT are:

– To capture end user needs and requirements in order to identify and quantify – where possible – value creation in real estate and construction.
– To develop compliance assessment and verification methods.
– To define and develop benchmarking methods and building performance indicators in real estate and construction.
– To set out recommendations for benchmarking internationally key building performance indicators.

Consequently, the deliverables of CREDIT are:

– 1. The establishment of a network of Nordic and Baltic researchers for benchmarking and performance indicators through frequent interactions in workshops across the Nordic and Baltic countries.
– 2. A State-of-the-Art report, that will identify and critically examine a number of existing tools, databases, mandatory reporting, approaches and benchmarking schemes to capture and measure end-user needs, client and public requirements on performance and value creation.
– 3. A strategic management and decision making tool to guide the definition and development of benchmarking methods and building performance indicators in different business cases.
– 4. A comprehensive performance assessment and management tool with associated key performance indicators to capture end-user requirements and to continuously measure and verify the compliance of performance

throughout the lifecycle of an actual building project and linked to building information models.
– 5. Recommendations as to how sectoral and/or national indexes for performance indicators can be designed in order to allow for international benchmarking of construction and real estate.
– 6. Dissemination of the lessons learned and tools developed through news articles, press releases, workshops with actors in the real estate and construction cluster etc.

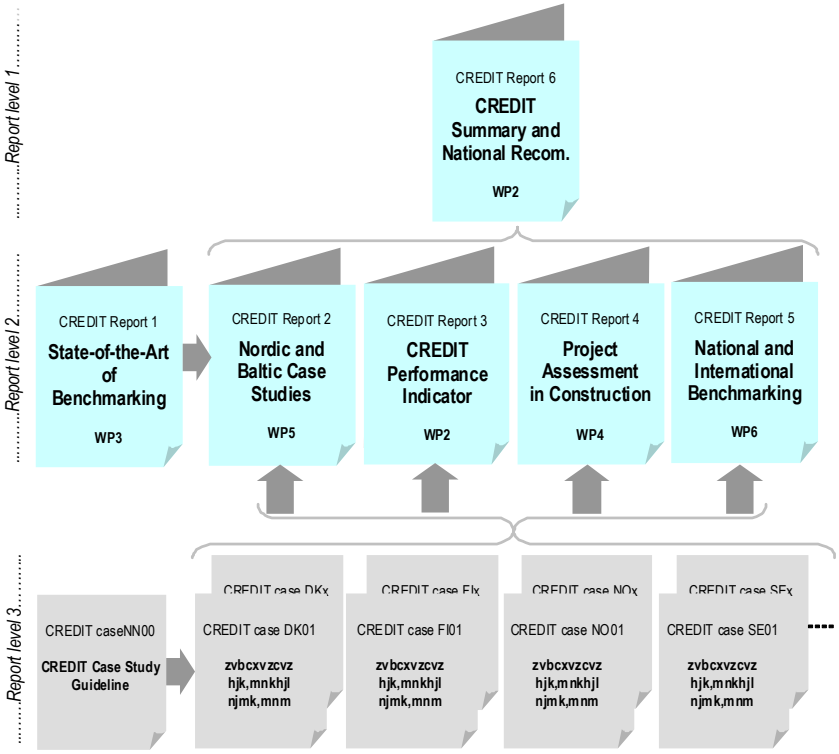
1.2 Background, purpose and focus of the case study

Tulli Business Park is NCC's suggestion to credit project. During the first discussions construction phase was ongoing and the first building block just completed. The focus of the case study was to collect performance indicators used in the project and to get information of indicator needs and progress.

1.3 Research design and methods applied in the case study

This case study has been conducted as an action research by researchers and members of a client organisation seeking to improve their situation (Greenwood and Levin, 1998). We have gathered data in this case study from multiple sources to enhance reliability and trustworthiness of the results (Robson, 2002). Documents, direct observations, interviews, questionnaires and to some extent also standardised tests have been methods for data collection. In Tulli Business park case study information was collected during several discussions, a questionnaire table and with a short performance audit. Research setting is exposed to changes, and because of this quantitative method has been used in collecting indicator and process data. Then qualitative analysis has been employed to the results. NCC's customer feedback results provided possibility to focus performance audit on essential matters.

Figure 1: Graphical illustration of the hierarchy of the CREDIT reports.



2. Buildings – assessments in construction or real estate processes

Tulli Business Park is a result of NCC's Business Park concept, an approach invigorating office design for almost 20 years. Within the concept the role of the office environment as a strategic business tool is highlighted. The objective of environment is to offer prime locations, high-standard architecture, flexible facilities, the latest technology, versatile services and higher job satisfaction for tenants and their clients.

2.1 The actual building, building parts and processes

Tulli Building is a third-generation office and commercial complex right in the centre of Tampere. The design premise was the vision of a future office in Figures 3-8 in which people take centre stage – the very people who make a company succeed and ensure its financial performance. Job satisfaction is enhanced by the new Stress free area® solutions that minimize negative stimuli in the working environment and create a harmonious atmosphere conducive to creativity (Figure 8). A carefully thought-out colour scheme with an airy and spacious layout welcomes visitors in the lobby. The same airy theme is restated in upper floors with windows facing the urban milieu. In these offices, ideas flow more freely and an active state of mind can be maintained throughout the workday.

The design concept is flexible to built open offices, room offices or mixed office solutions (Figure 5). Four buildings are built in stages, the first one completed in 2008 and the last one in 2009.

– Location: South-West Finland, Centre of Tampere city next to railway station
– Total floor area: 34.900 m2
– Rentable floor area: 22.000 m2
– Leased office spaces 150 - 4.500 m2
– Commercial spaces 50 - 700 m2
– About 1.200 jobs
– Car parks: 320
– Age of real estate: 0 - 1 year (construction in phases between 2008 -2009)
– Indoor climate standard S2/S1
– Ventilation system: mechanical + heat recovery
– Heating system: water convectors + LON thermostats
– Cooling system: active chilled beams in office spaces
– Fire safety: sprinkler system in all spaces
– Electricity distribution: flexible electricity networks in office spaces

The range of services is supplemented by the additional services available in the immediate vicinity, such as the Tullintori Shopping Centre and Tampere Hall. Available ser-vices are as follows

– Conference and meeting rooms
– Lobby and office services
– Office maintenance and operating services
– Wellness services
– Security services
– ICT services
– Management services.

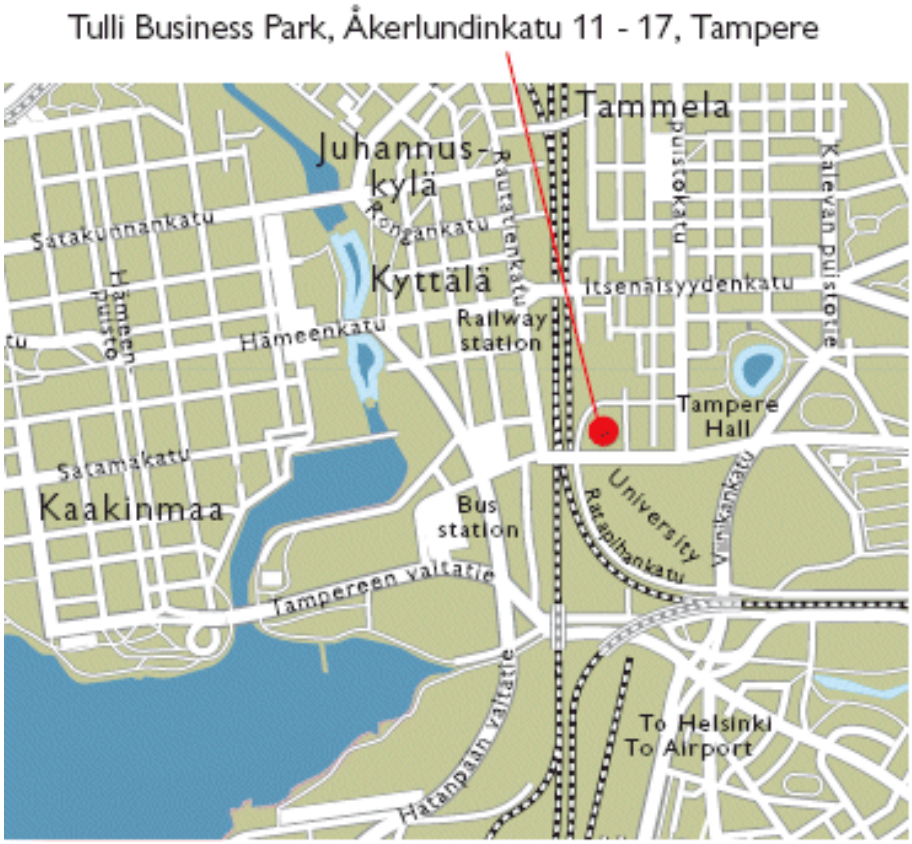


Figure 2: Location of Tulli Business park (Image courtesy of NCC).


Figure 3: Tulli Business Park (Image courtesy of NCC).

Figure 4: Entrance to Tulli Business Park (Image courtesy of NCC)

Figure 5: First floor layout plan in Tulli Business Park (Image courtesy of NCC)

Figure 6: Photograph from Tulli Business Park (Image courtesy of NCC)

Figure 7: Photographs from lobby in Tulli Business Park (Image courtesy of NCC)

Figure 8: Photograph from work environment in Tulli Business Park (Image courtesy of NCC)

2.2 The applied assessment methods and tools in the processes

Tulli Business park design guidelines and goals have been written into NCC's business park concept book. Tulli Business park complies 2007/2008 building regulations in Finland. In order to get customer feedback information, an internet questionnaire has been sent to users. Results of the questionnaire give information for corrective actions, in order to control systems and also possibilities to improve Business Park concept for future projects.

2.3 Cost and performance indicators applied in the assessments

Following chapters are classified according to indicators system developed in CREDIT project – CREDIT indicator framework. We have selected relevant indicators from this framework, and then carried out estimation for selected localised indicator set in Finnish level. In Tulli Business Park, the indicators are structured under seven main categories. The final edition from framework in CREDIT was under development during implementation of this case study, and therefore, some of the indicators might be different to framework described in CREDIT report 5.

1. Cost, price and life cycle economy (LCE)

11 Capital investment, construction and commissioning costs

- Site costs total and €/m2
- Programming and planning costs total and €/m2
- Design and engineering costs total and €/m2
- Construction costs total and €/m2
- Space cots/m2
- Work place costs €/unit

12 Building service related to operation and maintenance

- Administration costs €/m2
- Maintenance and repair costs €/m2
- Energy costs, water consumption costs €/m2
- Cleaning costs €/m2

13 Business services related activities in the building

- User service costs
- Catering
- Lobby
- Office services
- Conference and meeting room reservation
- Office maintenance and operating services, management services
- Wellness services
- Security services
- ICT services
- Parking 0,32 car parks/employer

2. Location, site, plot, region and country

21 Location and address

22 Plot opportunities

- Size of the plot
- Bearing capacity
- Building efficiency and density
- The plot is brown field area

23 Spatial solution and property aesthetics

- Modifiability of spaces

- Modern head office architecture style

24 Surrounding services
- All kind of services are available within 500 m
- Distance to railway station 150 m, bus station 300 m, bus stops 150 m and 300 m
- Distance to Tampere – Pirkkala airport 17 km
- Distance to bicycle route 200 m, footway: 50 m
- Distance to Pyynikki park 2 km, Sorsapuisto park 300 m
- Distance from Tulli Shopping Centre 100 m

25 Social values
- Community acceptance

3. Building performance and indoor environment

31 Category of building, quantity, size and areas
- Office building
- Number of storeys 6
- Build up area
- Gross floor area 8942 m2
- Net floor area 5715 m2

32 Safety and security of burglary
- Report of an offence system
- Automated fire alarm system
- Sprinkler system in all spaces
- Access control system

33 Usability and adjustability
- Adaptability and compliance with needs
- Accessibility
- Workplace quality and usability
- Easy modification possibility, movable electric and network towers

34 Thermal comfort
- Allowed temperature range: 23-26 summer, 21- 22 C winter

35 Air quality and health
- Indoor climate class S2/S1 requirements

36 Visual climate
- Atractivity of workplaces
- Work place characteristics

37 Acoustic climate
- Indoor climate class S2/S1

38 Aesthetic of building and indoor spaces
- Stress free zones
- Open, mixed and room offices

4. Building part and product performance

44 Thermal quality
- Envelope, doors and windows comply 2006/2007 standard in Finland

45 Impact on air quality
- Indoor climate class S2/S1 requirements

46 Lightning quality
- Low energy fluorescent lightning
- In work places 400 lx luminous intensity
- In corridors and stores 300 lx

47 Acoustic quality

- Partition walls 35 dB, acoustic ceilings

5. Facility performance in operation and use

51 Category of tenancy and operation and area of space

- Spaces to different size customers
- Rentable area/total area > 0,85 (the whole building)

52 Applicability of the facility

- Flexible concept: open, mixed and room offices
- Easy access by public transport

54 Services

- Maintenance services
- Cleaning, catering, lobby services, office rooms, moving services

6. Process performance in design and construction

64. Quality management

- QM system complies with ISO 9001 standard.

65 User involvement and cooperation

- Requirements from users for final space design

7. Environmental impact

71 Resource use

- Electricity kWh/year
- Heating energy kWh/year
- Water consumption m3/year

72 Emissions

- Fixed waste amount

2.4 Relation to different enterprises and national benchmarking

Tulli Business Park was designed according to Finish 2006 – 2007 regulations and any national rating system was not used. Tulli Business park facility has been sold to UBS United Bank of Switzerland and NCC take's care of minor services and contractual liabilities after handing it over 2009.

2.5 Visions and innovation for future improvements

NCC is going to use experiences from Tulli Business Park project in order to develop Business Parks concept in the future.

3. Enterprises – assessments and indicators internally applied

3.1 The actual enterprise, company and firm

NCC's organization consists of NCC Construction, NCC Property Development, and NCC Roads and NCC Housing (NCC, 2009). NCC Property Development develops and sells commercial properties in defined growth markets in the Nordic countries and the Baltic region.

3.2 Assessment methods and tools applied in the enterprise

To conduct and manage operations while reducing the impact on the environment, the activities of all business areas are regulated in accordance with the ISO 14001 environmental management standard. This means that systematic environmental work is conducted in all business areas in NCC (NCC, 2009).

In terms of its office operations, NCC Property Development is affiliated to the EU's Green Building concept. This means that the buildings covered by the concept use 25 percent less energy than the standard requires. A couple of projects meet already the Green building requirements. In early 2009 NCC has also became a Breen building Corporate Partner, as the first property developr in Europe. Concerning indicator systems in the future, NCC is planning to use British BREEAM rating system in property development projects. 3.3 Costs and performance indicators applied in the enterprise
In enterprise level, NCC group focuses on four overall environmental objectives; to create healthy environments, to constantly reduce the climate impact, to minimise use of harmful substances, and to encourage recycling of materials and responsible and eco-friendly treatment and disposal of hazardous waste (NCC Property Development, 2009). Cost and performance indicators collected for this case are presented in the chapter 2.3, and indicators in the other Finnish case studies in CREDIT project are following similar set of indicators.

3.4 Relation to building cases and benchmarking organisations

NCC Construction's units in Sweden, Finland and Denmark, as well as NCC Property Development and NCC Roads, corresponding to about 86 percent of NCC's operations, have been certified by a third party according to ISO 14000 (NCC, 2009). NCC's quality management systems have been certified as well by a third party.

NCC Property Development has also set focus on building projects to have lower energy consumption, illustrated by the commitment to Green building requirements. Target is not to consider energy consumption in the finished building, but also environmental exposure over the life cycle.

3.5 Visions and innovation for future improvements

In the future NCC is going to design and build facilities which meet the A level energy consumption requirements. NCC attaches great importance to offering solutions that reduce energy consumption. NCC's goal is to be the leader in energy-efficient construction, and its vision is to develop CO2-neutral products and services (NCC, 2009). Customer oriented workplace design and planning are key themes as well as usability of office spaces and buildings.

4. National benchmarking – indicators, assessment and organisation

4.1 The actual benchmarking organisation and it's purpose

In Finland KTI Institute for Real Estate Economics updates real estate indicators and related data. They update real estate index and several economical factors are included. Large real estate owners and consulting organisations publish also real estate indicator data mostly related to market information.

RAKLI ry and Rakennustieto Oy have published some years ago environmental rating system Promise. KTI and real estate consulting companies provide benchmarking services. Universities and VTT make also some real estate benchmarking related mostly research projects.

4.2 Assessment applied in the benchmarking organisation

Different organisations have their own benchmarking indicators. Economic cost and value indicators are probably more or less the same in different organisations. Performance and qualitative indicators may vary between different organisations and a purpose of use of indicators. Environmental rating system Promise is used in some enterprises. VTT has published EcoProP tool some years ago for performance goal documentation.

4.3 Cost and performance indicators applied in benchmarking

Real estate index is used to follow success of real estate portfolio and to support investment and sales decisions. KTI's real estate index include following factors:

- yield from a property, %
- value change yield, %
- net yield rate, %
- market value, €/m²
- rent value, €/m²/month
- net yield requirement, %
- contract rent, €/m²/month
- over/under rent, €/m2/month
- vacation rate, %
- gross yield, €/m²/month
- costs, €/m²/month
- net yield, €/m²/month
- capitalization, €/m2/month
- market value, € or %-share
- real estate sales contract numbers

The above economical factors and indicators are generally used in real estate assessments and benchmarking. Rent value is divided into capital rent and maintenance rent (running costs). Generally used performance indicators are energy kWh/year and water consumption m3.

4.4 Relation to enterprises, building project and real estate

Enterprises can freely use any indicators or indicator system they see beneficial. Building regulations set a minimum level for some indicators like energy consumption. Building owners' requirements can push developers and contractors to use some specific indicator or rating system and verify that buildings meet the requirements. There are couple of possibilities for such a system. For example in Finland some owners and developers, such as Pöyry which is one of the leading consultants in Finland, are committed to LEED rating, while others in the industry see BREEAM as a better alternative.

LEED (Leadership in Energy and Environmental Design) rating provides a comprehensive sustainability report for a building. The rating encourages and accelerates global adoption of sustainable green building and development practices through the creation and implementation of universally understood and accepted tools and performance criteria. LEED certifications are available to s a third-party certification program and the nationally accepted benchmark for the design, construction and operation of high performance green buildings (USGBC, 2009).

BREEAM (BRE Environmental Assessment Method) instead is used for evaluating a building's environmental impact (BREEAM, 2009). It addresses wide-ranging environmental and sustainability issues and enables developers and designers to prove the environmental credentials of their buildings to planners and clients. Assessment system is used by trained assessors.

4.5 Visions and innovations for future improvements

It's possible to forecast that importance of benchmarking is growing in the future. One reason is new rising environmental and energy requirements as well as energy price risks. Differences between new buildings and old buildings are growing. It means at the same time that differences of market values will be bigger between new and old buildings.

Most of the indicators are needed in more than one phase during a life cycle of a building or even in all main phases. We can benchmark performance requirements, design criteria and performance in use. During construction process and handing over clear performance indicators and criteria are needed for verification. In the future need to find clear sustainability indicators, such as in LEED and BREEAM systems, is growing.

5. Discussions and conclusions

5.1 Buildings - lessons learned and recommendations

Tulli Business Park was competed 2008-2009 in four phases. The implemented user inquiry gave data and information in order to improve control activities related to building automation, heating and ventilation systems. The design goals are based on finish 2006/2007 regulations. Therefore high energy efficiency was not yet one of main topics, but in the future projects it will be.

Implemented short performance audit highlighted some improvement possibilities in design solutions. Implemented mechanical systems need as well some extra control activities. General national rating system has not been used in the project. However, a number of indicators have been addressed during the project and in internal benchmarking the Tulli Business Park got the best project status.

5.2 Enterprises - lessons learned and recommendations

Participation in Credit project gave possibilities to discus on real estate indicator needs and to collect data and benefit valuable comments. Indicator tables should be opened so much that it's possible to see what means e.g. "social performance" or "resource use" in indicator level.

5.3 National benchmarking - lessons learned and recommendations

Benchmarking was based on official building regulations and different assessment and benchmarking methods. The main goal in assessments has been earlier to find out market value of a real estate "Finnish real estate assessment handbook (1991)"/4/. The most important factors which was represented to influence on market value of a real estate were size of a town, location, access to pedestrian, parking, plot solution, size of a building and space solutions, modifiability, condition, rent contracts, plot ownership, opportunity of a plot, unused permitted building volume and neighbourhood. These factors are still essential in real estate assessments and benchmarking.

Nowadays and in the future performance, usability, ecological and energy aspects will be much more highlighted in national benchmarking. Enterprises and organisations can use different indicator systems and assessment methods.

CREDIT Indicator Classification

Company: NCC

Role: Property development

Project: Tulli Business Park Country: Finland

Date: 17.9.2009 Sign: Olli Niemi, Elisa Tuomisto

To which degree are the following indicators preferred?

Please use the following scale when answering:

2 Always - strategic and very important

1 Sometimes, depends upon the project

0 Not at all, unimportant

Cost and performance indicators	Public demands	Internal project demands	Measures during building process	Measures when finished project	During facility management	Comments and other indicators recommended
1. Cost, price and life cycle economy (LCE)						
11 Capital, investment, construction, commissioning cost	1	2	2	2	2	
12 Building services related to operation and maintenance	0	2	0	1	2	
13 Business services related the activities in the building	0	2	0	1	2	
2. Location, site, plot, region and country						
21 Location and address	2	2	2	2	2	
22 Plot opportunities	2	2	1	0	0	
23 Spatial solution and property aesthetics	2	2	1	2	2	
24 Surrounding services	2	2	0	2	2	
25 Social values	2	2	0	2	2	growing importance
3. Building performance and indoor environment						Minimum in regulation
31 Category of building, quantity, size and area	2	2	2	2	2	
32 Safety and security of burglary	1	2	1	2	2	
33 Usability and adjustability	1	2	1	2	2	
34 Thermal comfort	1	2	1	2	2	
35 Air quality and health	1	2	1	2	2	
36 Visual climate	1	2	1	2	2	
37 Acoustic climate	1	2	1	2	2	
38 Aesthetics of building and indoor spaces	1	2	1	2	2	
39 Feelings and sensations	0	2	1	2	2	
4. Building part and product performance						-> considered in 3
41 Category of building parts, quantity, size and area						Difficult to make
42 Safety						difference between
43 Durability						3 and 4 categories
44 Thermal quality						
45 Impact on air quality						
46 Lighting quality						
47 Acoustic quality						
48 Aesthetic quality as form, surface, colour and details						
49 Feelings and sensations						
5. Facility performance in operation and use						
51 Category of tenancy and operation and area of space	0	2	1	2	2	
52 Applicability of the facility	2	2	1	2	2	usability
53 Operation	1	2	1	2	2	
54 Services	0	2	1	2	2	
55 Social performance	1	2	0	2	2	

6. Process performance in design and construction						
61 Category of process, supplier and organisation	0	2	2	1	2	
62 Resource control and project management	0	2	2	1	2	
63 Health and safety and work environment	2	2	2	1	2	
64 Quality management	2	2	2	2	2	
65 User involvement and cooperation	0	2	2	2	2	
7. Environmental impact						
71 Resource use	1	2	1	1	2	Heating energy consumption! regulations are changing
72 Emissions	1	2	1	1	2	
73 Biodiversity	2	1	0	0	1	

Table 1. NCC's evaluation of CREDIT Indicator Classification.

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Construction and Real Estate -
Developing Indicators for Transparency

This report represents the finding and results from the first Finnish case study (FI01) called Tulli Business Park. Work belongs to Nordic project Construction and Real Estate – Developing Indicators for Transparency (CREDIT), that represents a sectional view to case studies from varied building types in Nordic and Baltic countries: offices, housing, schools and nursery, shopping centres and hospitals. The work has been undertaken by the most prominent research institutes within benchmarking and performance indicators in construction and real estate, namely SBi (Denmark), VTT (Finland), SINTEF (Norway) and Lund University (Sweden), and partners from Icelandic Center for Innovation (Iceland), Tallinn University of Technology (Estonia) and Vilnius Gediminas Technical University (Lithuania).

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