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RESEARCH BRIEF

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IT Barometer Survey of Singapore and the Nordic Countries: A Comparative Study of IT Adoption in the Construction Industry

BACKGROUND TO THE RESEARCH STUDY

The IT Barometer project has been used in some Nordic countries since 1997 with the aim "to create a method and perform a survey for measuring the use of IT in the construction industry" (Samuelson, 2002). As a long-term strategy, the survey should be repeatable and comparable over time; be comparable between countries; and cover all categories of companies in the construction industry. Hence, a standard format for the survey questionnaire is developed to encompass wide-ranging questions on the extent of IT usage by architectural, engineering and construction (AEC) companies. So far, countries like Sweden, Denmark and Finland, in the Nordic region, have participated in the first survey, as well as a follow-up. They are the "IT Barometer 1998" and "IT Barometer 2000", respectively.

In Singapore, a corresponding survey has been conducted to allow a comparison with the three Nordic countries. The Singapore survey by itself is a check on the on-going IT development programmes, namely, the CORENET and national information standardisation.

RATIONALE FOR THE SINGAPORE IT BAROMETER SURVEY

Singapore aspires to become Asia's IT and business hub. The IT2000 master plan for Singapore was initiated in 1991 by the National Computer Board, and the Construction and Real Estate Network (CORENET) as part of the plan for leveraging IT to re-engineer and streamline the fragmented work processes in the construction industry to achieve a quantum leap, especially in quality and productivity aspects. Since the commencement of the CORENET national programme in 1993, key IT initiatives have been identified. The Building and Construction Authority (BCA), a government agency, is tasked to push ahead the CORENET programmes in partnership with the relevant industry bodies. Appropriate incentive schemes including capital grants for IT development have been put in place to help the industry adopt IT.

It is noted that there are comparable characteristics of Singapore and its construction industry with the selected Nordic countries, namely, Sweden, Finland and Denmark. Table 1 shows the similarities in relation to the size of population, GDP and construction output. Hence, the rationale for conducting the survey in Singapore, as well as comparing the survey results is clear.

Table 1 *Country statistics for comparison (Source: Relevant websites)*

Profile	Singapore	Sweden	Finland	Denmark
Population, 2002 (millions)	4.45	8.87	5.18	5.37
GDP, 2001 (US$ billions)	106.3	219.0	133.5	149.8
GDP per capita, (US$ billions)	24,700	24,700	25,800	28,000
Construction Output, 1998 (US$ billions)	11.6	24.1 (1997)	15.9	11.0
Construction Output per capita (US$)	3,000	2,700	3,100	2,048

AIM AND OBJECTIVES OF THE RESEARCH STUDY

The aim of the study is to allow Singapore to make a timely assessment of the effectiveness of its national IT programmes. Existing policies may need to be fine-tuned to increase the rate and level of IT usage over the next 3 to 5 years. As the means to achieving this end, the IT Barometer Survey was applied to Singapore and the results compared with those obtained from countries in the Nordic region. In essence, the process allowed similarities and differences in the national policies and industry practices which impact on the rate and level of IT usage in the construction industry of the three Nordic countries and Singapore to be ascertained. And, for Singapore, some policy implications to further develop the use of IT in all parts of the construction industry can be derived by drawing lessons from the experiences of the three Nordic countries.

SURVEY APPROACH

In February 2003, a standard questionnaire was mailed to a total of 754 companies operating in the construction industry in the areas of (i) Architecture; (ii) Engineering; (iii) Quantity Surveying; (iv) Property Development; (v) Construction; and (vi) Product Manufacturing and Supplies as shown in Table 2. It comprises: Section A – General Information; Section B - Computers and Software; Section C - Use of IT Systems; Section D - Data and Telecommunications; Section E - The Part Played by IT in the Company; and Section F - Standardisation and CORENET. While the general strategy was to involve as many, if not all, companies in each category, the primary focus was on the larger-sized ones, especially when there are numerous companies in a category. Responses from the survey were analysed using the SPSS software version 11.0.

Table 2 *The rate of response for the survey, in number and per cent*

Category	No. of Targeted Companies	No. of Respondent Companies	Per cent of Respondent Companies
Architecture	361	38	10.5
Engineering	131	15	11.5
Quantity Surveying	19	5	26.3
Property Development	23	2	8.7
Construction	129	10	7.8
Product Manufactur-ing/Supplying	91	1	1.1
Multi-disciplinary	-	13	N.A.
Total:	**754**	**84**	**11.1**

KEY DIFFERENCES IN IT ADOPTION IN THE CONSTRUCTION INDUSTRIES SURVEYED

A summary of the key differences, as findings of the comparison, is given below.

Key findings on IT Usage in Singapore

1. A high percentage (97.6 %) of construction-sector personnel use the personal computer or terminal at work.
2. Singapore leads in the usage of E-mail (100 %) and word processing at work.
3. Singapore leads significantly (almost double) in staff having their own personal computer (94.7 %).
4. Firms in Singapore do not primarily send documents digitally as compared to the Scandinavian countries.
5. There are fewer firms in Singapore having access to the Internet at the workplace and fewer staff having access to the Internet from own computer as compared to their Danish counterparts, but more when compared to the Swedish.
6. Firms in Singapore generally do not document their IT strategy formally as most do not think it is necessary to have one to begin with.
7. There are lesser firms in Singapore that will increase their IT investment as compared to those in the Scandinavian countries.
8. Firms in Singapore will consider new IT investments in the areas of improving technical capability and increasing competition.
9. Firms in Singapore have noted “Work Done More Quickly”, “Better Quality” and “Faster Access to Information” as the top advantages.

Key findings on IT Usage in Scandinavia

1. Denmark leads all in the use of the CAD software by Architects and Engineers at the workplace.
2. Most Danish firms have access to the Internet at the workplace as compared to their Singaporean and Swedish counterparts.
3. A significantly higher percentage of staff in Denmark have access to the Internet from own computer as compared to their Singaporean and Swedish counterparts.
4. Denmark leads Sweden and Singapore in firms having a Homepage on the Internet.
5. Better communications and sharing of information is the latest advantage derived from IT at the workplace, implying a certain level of interoperability among firms in Denmark.
6. Incompatible software, as a disadvantage, is less prominent among Scandinavian firms than their Singaporean counterparts.
7. Danish firms know more about the specified IT standards than their Singaporean counterparts.
8. Customer satisfaction is an important reason for Danish firms to consider when deciding on new IT investments.

Note: The results from the following surveys have been

10. Firms in Singapore have noted "Need to Continuously Upgrade" and "Investment Cost is Too High" and "Incompatible Software" as the top disadvantages/ obstacles.
11. Firms in Singapore have generally used national standards relating to CAD and Construction Costs.

used in the comparison:

i) IT Barometer Survey in Scandinavia, 1998;

ii) IT Barometer Survey in the Nordic Countries, 2000;

iii) IT Barometer Survey in Denmark, 2001; and

iv) IT Barometer Survey in Singapore, 2003.

POLICY IMPLICATIONS FOR THE SINGAPORE CONSTRUCTION INDUSTRY

A new vision is crafted as follows:

> **To create a strategic IT-enabled construction industry that strives on interoperability and builds on integrated databases and interactive applications to achieve quantum-leap efficiency with global connectivity.**

The proposed vision adds value to that of Construction 21 in 1999 by building on the fact that IT must be given even more prominence in the knowledge age for a world-class builder to operate in. More importantly, it highlights the pre-requisite conditions for the industry to develop further into the knowledge age, stressing for a collaborative, productive and global culture. Five strategic thrusts that support the new vision have been proposed and, they are:

Strategic Thrust 1: Create a Vision for a Strategic Role of IT.

Strategic Thrust 2: Focus on Management rather than only Technology.
Strategic Thrust 3: Reinforce Efforts in Information Standardisation and Software Development.
Strategic Thrust 4: Promote the Strategic Use of Information Systems within Private and Public-Sector Organisations.
Strategic Thrust 5: Focus on Stakeholders' Commitment to a National IT Development Programme.

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