THE BENEFITS AND COSTS OF INFORMATION TECHNOLOGY SYSTEMS IN BUILDING MAINTENANCE MANAGEMENT BASED ON INTERVIEWS

Information technology systems in buildings

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Abstract

This is an introduction to how the benefits and costs of information technology (IT) systems of building maintenance management are evaluated in thirteen Finnish real estate companies. The focus is on maintenance systems, however the links to the other parts of real estate management are not forgotten. The benefits of the new IT-system are divided into performance, savings and bigger incomes. The evaluation of IT-systems includes assessing the usability, functions, integration to other systems, presentation quality, life cycle of software, references, ergonomy and price. The costs and benefits are forecast for several years to check the profitability of the investment.

Keywords: Information technology, cost-benefit evaluation, building maintenance management

1   Introduction

This paper is part of a research project financed by VERA (Information Networking in the Construction Process, a technology programme of Tekes, Technology Development Centre) and seven companies. The project is focused on the strategic development of information technology systems for real estate management.   In this paper the IT development in rather small real estate companies is studied by classifying the typical steps in making cost-benefit evaluation. The knowledge is based on interviews with employees of thirteen companies (appendix A) and checked the answers later. The author used theme interview approach in 1998 (appendix B). The aim was to clarify the state of the art of IT-systems. The focus of this paper is on maintenance management.

2   Maintenance management

Maintenance refers to keeping, holding, sustaining or preserving a building and its services at an acceptable standard to enable it to fulfil its function. This can take the form of a planned maintenance programme or emergency corrective maintenance. One of the most important things is to optimise the planning of maintenance activities.

Preventive actions in maintenance can reduce costs by 14-15 % in blocks of flats, if damage can be avoided (Kuusela, 1998). On the other hand, preventive maintenance may cost twice as much as reactive maintenance if the lifecycle of the product is assumed to be short. The optimisation of maintenance action is important.

Maintenance manuals have been required for two years for residential buildings that are financed by the Finnish government (Pirinen et al. 1996). Last year also the prototype of maintenance manual for office buildings was created by RAKLI (The Finnish Association of Building Owners and Construction Clients). The maintenance manual gives guidelines for maintenance management. The manuals mentioned are in test use. The manuals are sometimes criticised for being forgotten paper documents. IT technology gives possibility of handling this information in a more rational way.

As far as is known, real estate managers in Finland use IT at a level of 100 % in bookkeeping operations. IT-systems of maintenance management are used in about half of the companies. The software companies that sell these applications have started this business in the 1980s or later. According to Kiviniemi (1997) half of the total of real estate companies planned to develop IT-systems for maintenance management in a one to three years time span. About one third of the companies already used IT in this field, and they claimed that the applications were rather mature. In the near future the companies planned to develop databases of suppliers and project management tools.

There could be found four different types of IT systems for maintenance management in the interviewed companies:
- Maintenance manuals for residential buildings - based on government instructions
- A maintenance system which is integrated with bookkeeping and facilities management
- Advanced heating, air ventilation, lightning and other environment maintenance systems - with automatic control systems, bookkeeping and performance control
- Spreadsheet based own systems by which the energy consumption is monitored or/and repair databases are managed.

3   Benefits

The objectives of the IT-investment varies according to the state of the business (figure 1). When a company has cash flow problems it will focus on lowest cost, purpose-made-systems. When the company is growing fast the preferred solution is to bolt-on new products to "bolster" the existing system. The company tries to sort out the capacity problem and the company especially worries

about customer care. After bolting on systems the company finds out that it is not economically viable to continue this process. The decision is taken to commission a total solution replacement. All the old information has to replaced. Often this replacement is even more expensive than the replacement system itself. Taking full advantage of fully functional systems, the processes of the company must be re-engineered around the new system.
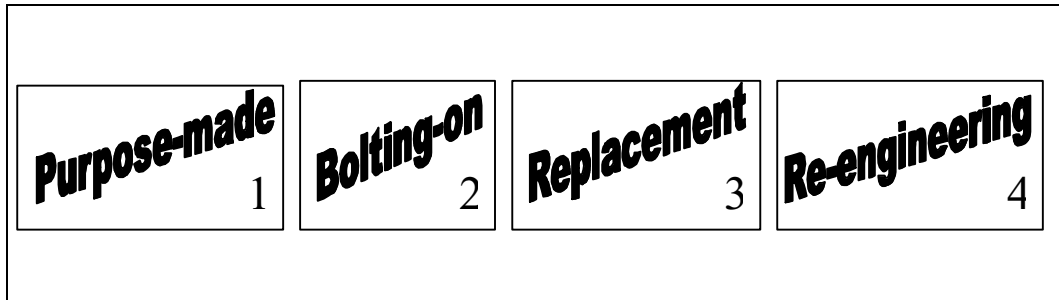

Fig. 1: Implementation of IT systems in four phases

The implementation of IT systems has followed that path in the companies interviewed (thirteen Finnish real estate companies). Now half of the companies are facing the stage where the bolt-on systems are no longer viable and they are searching for total solution replacements.

Benefits of the new IT-system are divided into performance, savings and bigger incomes. The companies pursue better service, faster processes, so called performance benefits. Economic factors are checked to avoid the unprofitable solutions. Estimation of benefits is often based on the software producers presentations. Deep-going verification like testing several solutions can be done only in large companies. The companies quite often co-operate and ask each other's opinions on the software they find attractive.

Evaluation of IT systems includes assessing the usability, functions, integration to other systems, presentation quality, life cycle of software, references, ergonomy and price. One result from the interviews is that when evaluating the IT-systems, companies use three types of information:
1)   Experiences from internal processes - restrictions, visions and problems
2)   Collection and elaboration of external information
3)   Exchange and communication of information between software companies and own organisation. (Naaranoja and Östman 1998)

4   Costs

Cost evaluation of IT-systems did not vary in the interviewed companies. The bigger the investment the more time was used to evaluate the costs. Normally the costs and benefits are forecast for several years to check the profitability of the IT investment. Costs can be divided into development costs and ongoing efforts – like saving backups, updating the software and error handling. The time needed to implement the project is very difficult to estimate. If accurate expenses are needed the experts themselves forecast how much time they need to work. The rest of the time is spent with administration and other work.

It is easy to ask the prices of new hardware and software, but estimating the

functions of different solutions is difficult. Usability is one of the most important things in evaluating the training time and use of old information. All the other costs, including testing, need to be remembered. The time for testing is often underestimated.

The maintenance has to be defined for example who will update the data in the system since if the data is not reliable the solution cannot be used efficiently. The number of hours used in IT service varies a lot in different organizations. Especially small companies use software companies to support their IT-systems and they buy the service from there.

5   Conclusion

This study has shown that the evaluation of benefits of IT-systems is based on the experiences of internal processes like the phase of implementation of the IT system: purpose-made; bolting-on; replacement; or re-engineering. This influences what kind of benefits the company is pursuing and also how much money the company may use in evaluations of different software solutions. It would be interesting to study how benefits could be forecasted and how the performance should be changed when aligned with the new IT-system. The relationship between partners and real estate companies is also interesting. Can a real estate company force the partner to use more intelligent systems than they would voluntarily use, can companies jump from the purpose-made IT-systems stage to re-engineering?

Companies find cost/benefit evaluation difficult. They have to rely on software companies and their reference lists and experiences of other companies when purchasing new IT-systems. In Finland the software companies that work in this area are relatively small and they customise their products quite much, so the wishes of the real estate companies are well known. However, product development in real estate companies is needed since the IT-systems enable such functions that have not been possible before and the re-engineering would give the most powerful benefits.

6   References

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Appendix A: Real estate companies and people that have been interviewed:

- Halli Ltd, Heikki Punkari, Markku Törmä
- Pikipruukki kiinteistöt Ltd, Birgit Mäkinen
- Wärtsilä Nsd, Asko Hartman
- Svenska Österbottens Förbund, Ossian Westlin
- Vaasa town, Markku Ahola
- Valtion kiinteistölaitos, Pentti Aromaa
- Reikälevy Ltd, Matti Mäki-Haapoja
- Ruukin kiinteistöt Ltd, Kalervo Saarimaa
- VOAS Ltd, Eila Kultti
- Soleado Ltd, Juho Sillanpää
- ABB-kiinteistöpalvelut Ltd, Jouni Väkeväinen, Matti Malmberg
- Kokkola town, Göran Björkgård
- Hermia Ltd, Olli Niemi

Appendix B: English version of theme interview questions

1. How have you developed your IT-systems? Where did the development idea come from?
2. How have you evaluated costs/benefits of your IT-investment?
3. What kind of time span do you use for the evaluation of your IT investments?
4. How did you create your IT strategy if you have any?