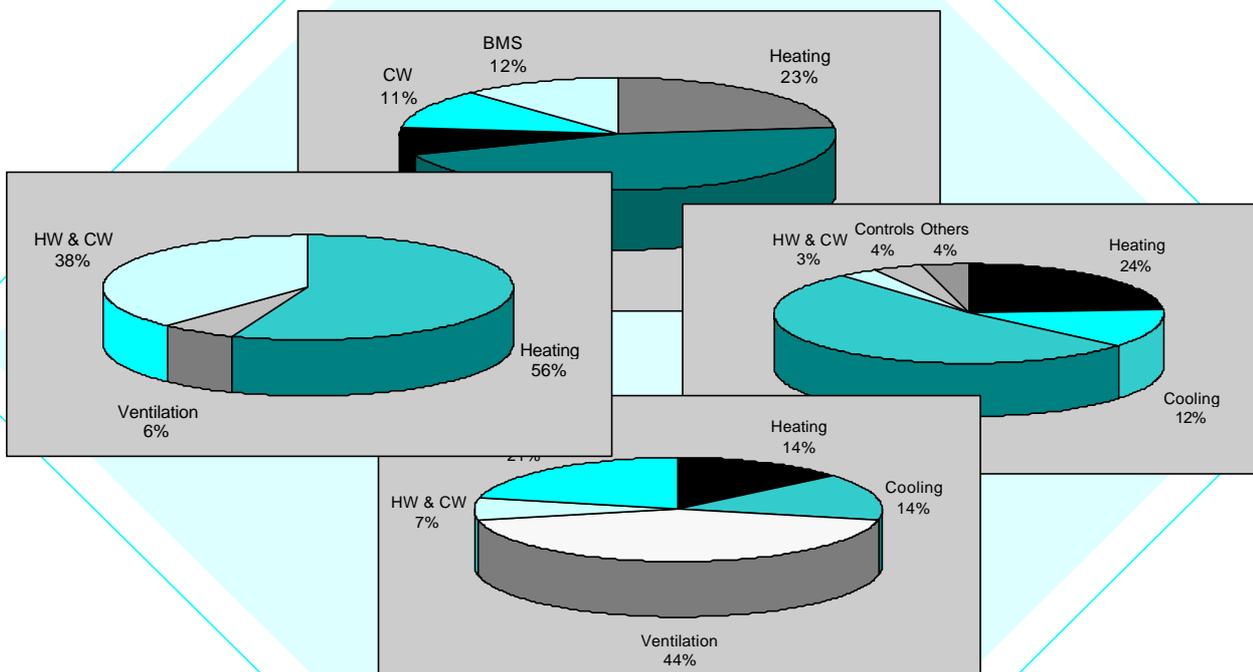


COST BENCHMARKS FOR THE INSTALLATION OF BUILDING SERVICES

Part 1 - The benchmarking process

R Nanayakkara
J Fitzsimmons



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PREFACE

HOW THIS PUBLICATION IS STRUCTURED

This publication is in three separately bound parts, and is also available on CD:

PART 1 - THE BENCHMARKING PROCESS

This part of the publication provides a synopsis of the cost benchmarking process carried out during the project and a commentary on cost data available from industry sources, their use and limitations.

It contains 6 sections:

Section 1 contains a general introduction to the cost benchmarking process. It contains basic knowledge about benchmarking (in general) and identifies the need for construction cost benchmarks. It should be useful to all construction disciplines associated with building services.

Section 2 provides a commentary on factors and issues that can affect installation costs. It provides a discussion of how different variables (for example, supply chain management, installation techniques and economic factors) can affect the cost and the quality of benchmarks produced. It also contains a summary of comparisons carried out to evaluate the cost effects of some construction variables. This section should be particularly useful to designers, cost planners and estimators.

Section 3 describes the benchmarking process and procedures adopted during the project. The contents are of general interest and should be useful to those involved in benchmarking research activities.

Section 4 provides a commentary on the cost data available for cost planning and benchmarking from industry sources. It should be useful to estimators, cost planners and those involved in the production of such cost information.

Section 5 describes the benchmarks developed as part of the project.

Section 6 contains project conclusions and recommendations.

PART 2 - COST BENCHMARKS FOR BUILDING SERVICES INSTALLATIONS^[1]

This part of the publication contains the cost benchmarks developed during the project. It contains seven sections.

Section 1 - is a key to the remaining sections. It describes how the remaining sections are organised and provides a list of building types analysed during the project. The building numbers allocated to buildings in Section 1 are used throughout the remaining sections.

Sections 2 to 7 - contain the benchmarks developed and cost comparisons of key installation processes.

PART 3 - A PROTOCOL FOR RECORDING PROJECT COSTS^[2]

This part provides a framework for recording cost information in a common format. It recommends a structure for a protocol that can be used for recording costs in a common format. Its aim is to promote future cost comparisons and benchmarking.

The protocol covers guidance and a framework for recording:

- project core information
- overall services costs
- building services systems costs
- sub-system costs and their design and installation details.

The protocol for sub-system costs and their design and installation details only covers heating and hot water systems, ventilation and air conditioning and LV electrical installations. However, this basis of recording costs can be extended to other installations.

HOW TO NAVIGATE THROUGH THIS PUBLICATION

Go to Part 1 ⇨

- Learn about the BSRIA project on cost benchmarking
- Learn about the current state of cost information available from industry sources and its suitability for cost benchmarking
- Learn about the effects of design fees on construction costs
- Learn about the cost effects of innovative installation processes
- Learn about the cost effects of productivity measures
- Find out how cost information should be recorded for future benchmarking
- Find out about the limitations of cost information given in Part 2.

Go to Part 2 ⇨

- To find overall building services cost benchmarks
- To find cost benchmarks for building services systems
- To find cost benchmarks for building services sub-systems
- To find a case study comparing on-site installation labour productivity against estimated and best practice figures
- To find a cost comparison between pre-fabricated boiler plant against site-built installations
- Go to Part 1 if you want to know about limitations of cost information given in Part 2.

Go to Part 3 ⇨

- For a protocol which provides a pro-forma for recording building services cost data for future comparison and benchmarking

EXECUTIVE SUMMARY

THE PROJECT OUTPUTS

The major outputs of the project are:

- a range of cost benchmarks that can be used for future planning of building services (Part 2). These include:
 - a) design cost benchmarks
 - b) installation cost benchmarks
 - c) commissioning costs and the cost of record drawings and maintenance manuals
 - d) cost effects of innovative installation techniques
- a commentary on cost data available from industry sources, their use and limitations (Part 1)
- a protocol for recording cost information in a common format to promote future cost comparisons and benchmarking (Part 3).

Guidance on how to navigate through this publication and how it is structured is found within the preambles.

THE PURPOSE OF COST BENCHMARKING

Benchmarking is the process of measurement and comparison of strategies, policies, practices, and performance against best-in-class organisations. It is an important management tool for improving practices and performance. Cost benchmarking is carried out to find examples of superior project cost performance, to understand the processes and practices driving that performance and to provide performance measurements as targets for best practice. The knowledge of project attributes underlying performance often enables performance targets to be normalised (or tailored) to suit other projects with different requirements.

THE BSRIA PROJECT FOR COST BENCHMARKING

The objective of the project was to obtain, collate and analyse building services cost data relating to actual buildings and scheme designs. The aim was to develop typical costs for various buildings that can be used as reference cost benchmarks for a range of building services installations. These benchmarks could be used by the clients and designers as targets for planning and monitoring costs and enable comparison between installation types that would satisfy similar client requirements.

This publication is the result of this project.

OBSTACLES TO COST BENCHMARKING

A number of obstacles that hinder the development of meaningful cost benchmarks have been identified. These stem from the current industry culture for managing its projects, the supply chain and project costs.

Problems include:

- the unique nature of building services projects which restricts the number of samples suitable for comparison. This makes project attributes contributing to costs wide-ranging
- a reluctance by industry to part with cost information
- cost data available in the industry does not generally identify cost-significant project features from which the costs have been derived
- statistical cost data available from industry sources often contains averages from good and bad projects, therefore cannot be used to represent best practice.

A main conclusion of the project is that this paradigm of cost management needs changing before meaningful benchmarks can be developed. It is also essential to relate costs to value before such cost information can be used for benchmarking.

WHAT DID THIS PROJECT ACHIEVE?

The project analysed a number of projects as well as cost data from published sources. It developed a range of cost data for building services, systems and sub-systems in a cascading approach. Although there are limitations in their use as true benchmarks (due to the limitations of cost data described above), this information provides a useful starting point for cost comparisons.

This data is also useful during the design process and in future benchmarking exercises as they identify areas where costs are significant and where effort should be focused to obtain better costs. Miscellaneous costs such as design fees, cost of documentation and commissioning costs have also been analysed and their effect on total project costs has been discussed.

Other benchmarking work carried out included a number of process comparisons. This was to demonstrate the cost advantages that can be achieved by the use of alternative technologies. Examples are the use of pre-fabricated plant rooms instead of site-built installations and mechanically jointed pipework in place of welded or flanged pipes.

Analysis was also carried out on labour productivity and its effect on project costs. The results of this exercise indicate that labour time allocated in tenders varies from what is actually achieved on site and there is potential to make considerable savings from present costs.

THE WAY FORWARD

There is a significant variation in the input costs to the construction process due to quality factors and market forces. Due to the absence of an industry-standard protocol for recording project cost information, currently these variations are not captured and recorded in a standard manner. A protocol for recording project cost information was produced and published as Part 3 of this project.

This protocol may be used by a central body such as BSRIA, CIBSE (Chartered Institution of Building Services Engineers) or BCIS (Building Cost Information Service) to obtain industry feedback on costs and to develop a central cost data base for building services.

RECOMMENDATIONS

This research recommends that initially the cost benchmarking effort should be focused upon very specific and more narrowly defined areas of project management processes, design solutions, input costs and construction activities. Further recommendations include:

- Benchmarking individual cost performance should be done where there are benchmarking partners who are willing to share cost information for comparison. Although cost comparisons can also be done using published cost data, limitations associated with such data can render the exercise invalid.
- Benchmarking should be focused on elements of the construction or project management processes which are crucial to the cost performance.
- Construction input costs vary significantly, particularly where quality attributes are not fixed in specifications. Tender specification should focus on both technical and quality aspects affecting construction input costs.
- Research indicates that in the UK labour productivity is low compared with the USA and many European countries. There is room for improvement and cost savings. Labour skill and productivity should be a key issue on which construction costs are negotiated particularly where labour costs are significant in the total installation costs.
- Tenders should be evaluated on whole life costs rather than capital costs alone. This is best practice but often tenders are evaluated/awarded as directed by the client to suit his/her objectives and available funds - sometimes without regard to the ultimate long term economies.

FEEDBACK PLEASE

BSRIA's policy is constantly to seek to improve its research methodology and the resulting publications. We would therefore welcome feedback on this guide, particularly on how appropriate and useful it is to the industry. We would also like to hear about any suggestions for ways in which the contents, presentation, style and format could be improved. Please send your comments and suggestions to BSRIA Publications, Old Bracknell Lane West, Bracknell, Berkshire RG12 7AH; telephone 01344 426511, fax 01344 487575, e-mail: bsria@bsria.co.uk.

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