

Warehouse Design: A Structured Approach

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PB Hello – my name is Peter Baker – a Senior Lecturer at the Centre for Logistics and Supply Chain Management at Cranfield. I would like to talk to you about a paper entitled “Warehouse Design: A Structured Approach” which I co-authored with a former Cranfield MSc student, Marco Canessa. This paper was published in the European Journal of Operational Research in 2009.

When reading through the literature on warehouse design, we found previous authors making statements such as: *“a comprehensive and science-based methodology for the overall design of warehousing systems does not appear to exist”*.

A second author agreed with this saying: *“a sound theoretical basis for a warehouse design methodology still seems to be lacking”*.

And a third author wrote: *“there is not a procedure for systematically analysing the requirement and designing a warehouse to meet the operational need using the most economic technology”*.

Even an ethnographic study carried out with warehouse designers used terms such “eye-ball the data” and “decisions based on intuition”.

However, some papers have directly addressed the overall warehouse design issue. Those papers normally suggested a series of steps. In all, fourteen such papers were identified, written during the last thirty to forty years. Each of these contained between three and fourteen steps. There was considerable commonality between these steps and thus a generally agreed framework could be identified.

The next part of the research was to go out to warehouse design companies and ask about the steps that they use and, more importantly, the tools used within each of these steps. Responses were received from seven design companies, ranging from large multi-national materials handling suppliers through to small and medium sized consultancies.

From this research, an eleven step methodology was developed and, for each of these steps, tools and techniques, actually used in practice, were

identified. These tools include for example activity profiling techniques, warehouse flow charts, and decision trees, as well as such software as spreadsheets, databases, computer aided design and simulation.

The paper concludes that there is some consensus on the overall steps to be used in warehouse design but far less consensus on the precise tools and techniques to be used for each step. This research brings together the current state of knowledge and also provides a framework for further research in terms of the development of more precise tools for each step.

A comprehensive methodology whereby one can enter data in one end and obtain a scientifically formulated design at the other end - is thus a long way off at present – and may in fact remain that way as there are many conflicting objectives to satisfy.

However, this paper has gone some way to structuring how this goal can be achieved - and I hope that some of you listeners will be stimulated to develop this subject much further – as the design of modern distribution centres is extremely complex and there is a real need for a more systematic approach to be developed.

I will be very interested in future developments. Good luck!
