

# **AUTOMATION PROBLEMS IN MATERIALS MANAGEMENT ON LARGE CONSTRUCTION PROJECTS.**

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## **Abstract**

This paper discusses results of a SERC sponsored investigation of the impacts and problems of automation in materials management on large construction sites. Surveying five large construction firms in the U.K. with structured questionnaires and formal interviews, the investigation centred around an evaluation of the level of automation in materials planning, requisition, supplier evaluation and on site control of materials. Contractors are at significantly different levels of automation. The major problems are lack of corporate policy on automation and the hesitant attitude of construction personnel to change.

## **Introduction**

Construction materials and components are expensive commodities, accounting for over 40% of the total resource input in construction. Effectiveness in materials management bears significantly on the profitability of construction projects.

Automation, used as a tool, can be of valuable assistance in making materials management more efficient. For example, it can speed up materials related functions such as estimating and project planning and also allow tighter management control over materials on site (1). At present there are many automated aids to materials management functions; but are available in the form of 'stand alone' software packages. They are extensively used in planning, estimating and buying departments. It is a widely held view that the next step in automation will be the use of integrated systems whereby data transfer between different functions will be accelerated.

This paper is based on a Science and Engineering Research Council's sponsored investigation into the impact and problems of automation in materials management on large construction projects. The investigation centres around an evaluation of the level of automation in materials management in five large construction firms in the U.K. The investigation took a broad overview of materials management functions (see Figure 1) within these companies, both at head office and on site with a view to assessing the comparative efficiency of their existing systems. The companies were surveyed by



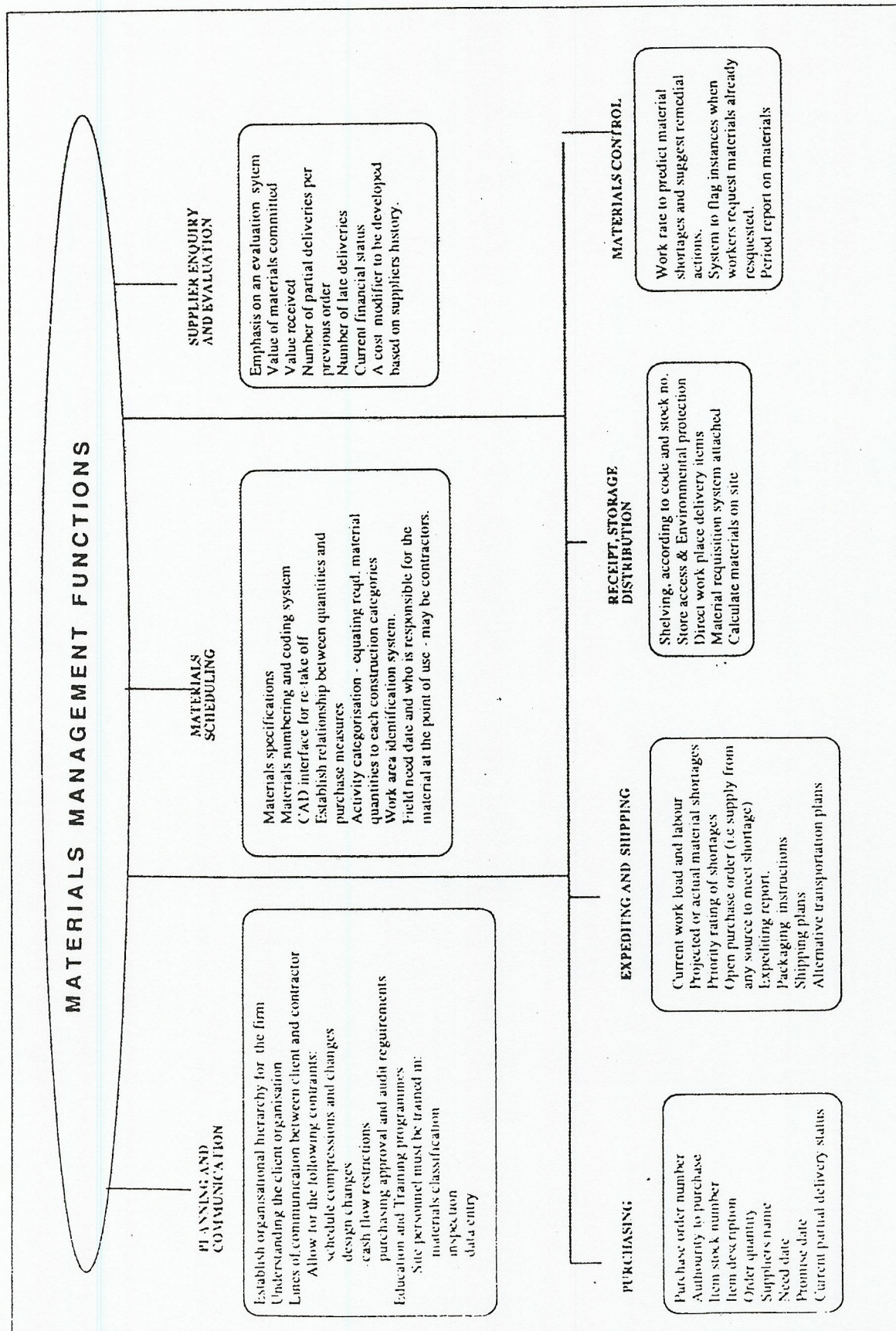


Figure 1 - A Broad Overview of Materials Management Functions



means of a structured questionnaire and formal interviewing; the targeted respondents being Planners, Buyers, Estimators and Site Managers. The information gathered, which forms the basis of this paper focuses on the major automation problems encountered in these firms with particular attention to the level of hardware / software integration across departments.

### **Materials Management Automation within Surveyed Firms.**

All participating companies were automated to a certain extent. They all had computers in their offices. The degree to which the companies utilised computers did however vary significantly. None of the companies had a set corporate policy on using computers on site for materials management functions, or any other functions.

Although one company was using a portable computer on one of the surveyed sites, an £80 million project, the applications of which were planning and provision of drawing register, computerised automation was more prevalent in the head offices of the firms than on their sites. At their head offices 4 out of the 5 companies actively use computers for materials related functions such as estimating, planning, and buying. The choices of particular hardware and software varied from company to company. The common factor which did emerge was the use of IBM compatible micro-computers in the targeted departments of the surveyed companies.

None of the surveyed firms had anything approaching an integrated system. The software packages in use being 'stand alone' systems with a specific management function.

Only one of the firms surveyed had not automated any of the materials management functions. The company had only automated its accounts department. This finding proved most unexpected considering the size of the company, the fact that other regional offices of the company are using automated materials management techniques and further because a company within the group produces and markets industry acclaimed materials management software.

### **The Impacts and Problems of Automation**

The general consensus of opinion of those interviewed was that their computers had certainly made their work quicker and more accurate. Automation has allowed them to carry out tasks that were previously not feasible because of the time involved in doing them, for instance the weekly updating and altering of the overall project programme. Whilst they were satisfied with the particular software they were using; they complained of limited capabilities in each software they use.



The problems of implementing and utilising an effective automated material management system (or indeed a complete management system) are severalfold but can be split into 3 main areas; problems relating to:

- i) Attitude of the Building Firm
- ii) Attitude of the Firm's personnel
- iii) Software and Hardware available

The attitude of the building companies over the years has proved something of an obstacle to automation. Whilst most of the respondent companies saw the advantages accruing from automation they have so far failed to produce a defined policy for implementation, leaving purchasing of equipment to individual departments. The result of this has been that automated communication between different departments within the companies is difficult because of the use of different hard and software. The setting up of an integrated management system using the companies existing automated equipment is virtually impossible.

The attitudes of the personnel within the companies also presented a problem to effective automation. Whilst those personnel who use automated management methods know and appreciate the advantages that such methods bring, personnel who do not use automation are skeptical of the benefits that they will get from computer. "Why use them, we operate successfully without them?" is a typical comment. This skepticism spans the entire management ladder. Of the people interviewed the most skeptical about the usefulness of computers for their particular discipline were site managers, a large number of whom could not see any point for having computers on site.

A further problem to implementing effective automated materials management system is the unwillingness of personnel to change from one software package in their field to a different package, preferring to stick to the one they have become familiar with.

The third problem area in materials management automation is the shortcomings of software for materials related functions. The construction professional interviewed were of the opinion that whilst their software "did the job" it was by no means perfect and did not include certain capabilities they would have liked.

## **Conclusions**

With construction companies at varying stages of automation it is difficult to give a definitive advice on the next step up the automation ladder. What is certain however is that construction companies operate in a rapidly changing market place. Whereas the construction industry was booming just two years ago, firms are now experiencing lower profit margins with the threat of a looming depression. Construction firms



would need to make their operations as efficient and productive as possible in order to remain competitive.

Firms already using automated 'stand alones' should endeavour to achieve integrated automated management systems, encompassing materials management, which would greatly speed up the transfer of information between departments and drastically reduce the amount of time spent inputting data into computers thus giving a significant gain in productivity. It is not enough to just concentrate efforts on automation to the office, companies should look into installing computers on site to assist site managers in all aspects of materials control and monitoring.

This automation ideal should be the goal of all large construction companies. For companies with low levels of automation, it is probably better for them to approach integration via 'stand alone' systems, as the concept of integrated systems would be a bit much for these already 'computer shy' companies to take in.

Full integration should be approached with caution. It would be unwise to implement such a system in a hurry; which may mean methods currently used are replaced by very different methods to achieve integration. If this is done it would initially result in much confusion and a loss of productivity whilst re-assimilation took place, not to mention any resentment it may cause amongst personnel

To successfully implement integration it should be carried out over a reasonable period of time and the process should involve close liaison between contractors and software / hardware producers, enabling the contractor to obtain software and systems that suits their operations and fulfil all the functions which the contractor deems necessary.

Before this process begins it is important that companies should develop a corporate strategy on automation. Such policy should be formulated at head office and should apply to all regional offices. This would solve the problems of automation inconsistencies within companies, such as the use of different hardware by different departments and also the situation of certain regions being automated while others are not.

No matter what the rate of automation expansion in the construction industry over the next couple of years, it should be remembered that it is just a means to an end, a tool to assist in management of materials in our particular case. Using automated systems does not necessarily ensure good materials management, it is only as good as the management system it is applied to. The automation of bad management techniques will not produce good results, only bad ones more rapidly.



## References

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