

Computers and the small firm: 2

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This paper describes the second stage of the project 'Computers and the small firm', being carried out by the University of Liverpool Data Processing Research Unit for the Ministry of Technology. Some preliminary results of the system design are presented.

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In an earlier paper (Hunt *et al.* 1968), a description was given of the work of the Liverpool University Data Processing Research Unit and of some of its preliminary results. This paper describes further results which have since been obtained. To avoid repetition, the reader is assumed to be familiar with the work set out in paper I.

The foundation of this entire study of the possible uses of computers by small firms rests on the results of a survey in which the structure of a number of such firms is being investigated. The technique which has been developed for the survey has already been described in paper I as are some of its early results. Since then the survey has been continued and there has been a substantial increase in the number of firms on which reports have been written. Because of the marked similarity in the systems used by groups of companies, each of which was handling a different type of product, it has been decided that an alternative method of grouping companies should be adopted. The revised analysis, together with a proposed basic system for firms in the major class is described below.

Additional results

Shortly after the earlier paper was written, it proved necessary to change the pattern of the initial approach because the available directories did not give relevant information on a sufficiently large number of companies. An elementary questionnaire, intended only to give some idea of the size of the company and its type of business, was sent to over 1,200 companies in the Merseyside area. These were divided into three major categories each of which was subdivided as shown in Table 1.

Because hardly anything was known about these companies at this stage, it was not possible to place each in a single category. In a number of cases it was thought advisable to include the company in two or even three categories, until it was possible to define the main business more accurately. Even when the completed questionnaires were returned it was not possible to single out one category for certain companies. In such cases, where the company covers more than one category of business, an entry has been made in the table for each category, so that the right-hand column (103 useful replies) covers information collected from 85 firms, including 28 of the 61 approached in the original enquiry (paper I).

The additional data obtained has been of considerable interest for two reasons.

Firstly, it has confirmed the main results reported in paper I, namely that the operation of the very high proportion of firms of the size defined in paper I could be described by a single skeleton procedure.

Secondly, it has allowed the preparation of a second, admittedly less important, skeleton procedure for the majority of service type firms.

However, as 75% of the companies surveyed to date fit the original skeleton (the second covers a further 17%) they have been grouped as class A and a basic system has been designed for them.

Proposed basic system for firms of class A

One of the difficulties in designing systems other than very simple ones is the substantial subjective element which must, of necessity, be present. As a result it is

Table 1

MAIN CATEGORY	SUBDIVISION	NUMBER APPROACHED	NUMBER REPLIES	NUMBER USEFUL
Manufacturing	Perishable Goods	55	15	4
	Non-Perishable Goods	418	104	32
Factoring	Perishable Goods	87	11	6
	Non-Perishable Goods	307	69	26
Service	Transport	54	12	4
	With Construction/Fitting	268	61	17
	Without Construction/Fitting	289	69	14
	Totals	1478	341	103

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always possible to suggest modifications which, in the eyes of the maker of the suggestion, would be 'improvements'. In order to reduce the subjective element as much as possible the design described here has been produced with a number of points in mind.

Firstly, an attempt has been made to go back to 'first principles' in systems design (Storey, to be published).

Secondly, the object of the work is to make it to the firm's immediate (or long term) advantage to automate its clerical procedures.

For many of the firms of the size considered in the survey, several of which are small enough to possess extremely efficient manual systems, the financial advantages of automation are not particularly obvious. It is only in the 'larger' firms amongst those surveyed that an immediate advantage can be seen in the use of bureau services at current rates in the area of stock accounting and control, and sales analysis.

Finally, the system is intended to be 'open-ended' in the sense that it should be possible for the user of the basic system, in the event of future growth of his operation or a future reduction in computing costs, to add several modern management techniques to his system with a minimum of disruption.

A macroscopic view of the system proposed for firms of class A is given in Fig. 1. The diagram is largely self-explanatory and makes it clear that the system revolves about the management of stock. A few details, however, may require clarification.

The system is activated by the arrival of an order or payment in 'sales', where sales is used in its broadest sense and includes a number of accounting functions. (The lack of a distinct 'accounts' function is fairly common in firms of this size.) It covers sales demand, sales analysis, the posting of ledgers, demands on product stores, invoicing and receipts of money. The stock control function includes the issue of stock and despatch to customers as well as (when required) the issue of materials for manufacturing. If the organisation is factoring only, or the item is held in store, the 'manufacture' function is bypassed. Otherwise the manufacture function includes not only the making of the product but also its despatch to the customer or to

store. There is, of course, a control feedback of information from 'manufacturing' to 'stock control'. This completes the first or 'sales/receipt' route of the information which should be compared with Fig. 1a of paper I.

Route 2, the other cycle shown in Fig. 1, is the 'order/payments' cycle. Here the stock control function includes the determining of re-order levels, and ordering new or non-'running contract' items, as well as the demands on material stores. The stock orders function is used to represent only the contract negotiation stage (where it arises). The purchasing function, again used in its broadest possible sense, includes checking of stock receipts, analysis, the posting of the appropriate ledgers, the control of the movement of stock to store, and the making of payments. As in the case of the 'sales/receipts' function it includes a number of procedures which in larger firms would be done by the accounts department.

Flow diagram of proposed basic system

Fig. 2 presents a sufficiently detailed flow diagram of the system to serve as a reasonable description of what is proposed. A number of the boxes shown are somewhat condensed.

The system can be regarded as being made up of a number of routines as follows.

1. The sales-demand routine

The input to this routine is an 'invoice' card, punched on receipt of an order and used to update the product stock master record, which is the relevant file. During the process of updating the product-stock master file the item is examined to find out whether or not it is a stock item. If not, it must be manufactured or purchased. The need for material reordering is tested for in this stage.

Two alternative conditions arise during the updating of the stock master file.

- (a) If insufficient stock is available the deficiency is calculated and suspended while the remainder of the order is despatched. The deficiency is then corrected by the manufacture or reorder

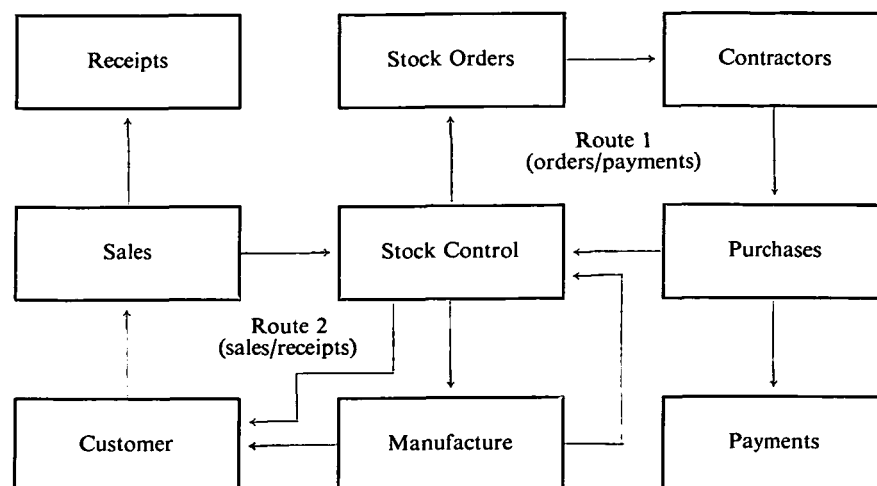


Fig. 1. Proposed system for firms of class A

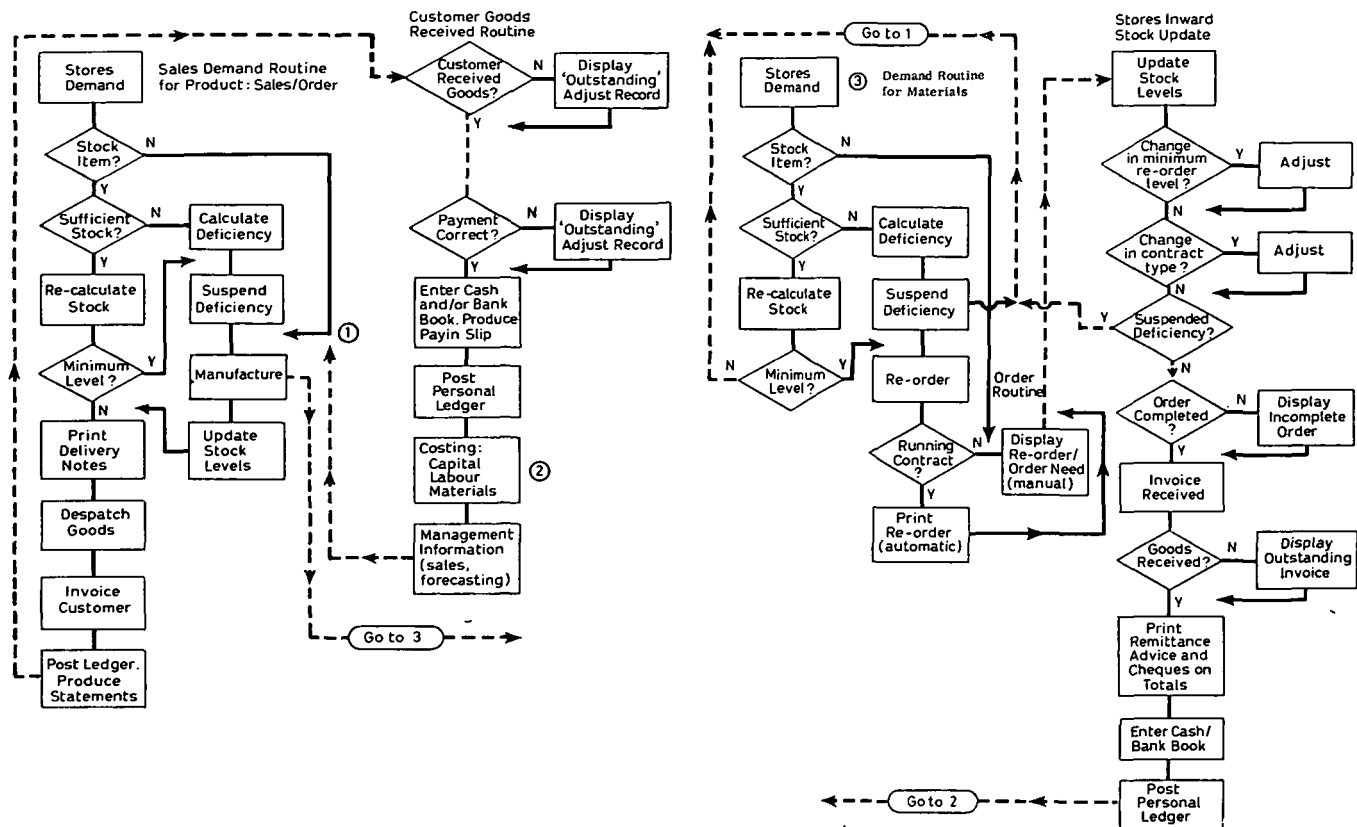


Fig. 2

of the stock item, at which stage the stock level is updated.

- (b) If sufficient stock is available the new stock level is calculated. If this falls below a predetermined reorder level the insufficient stock routine is followed. Delivery notes are printed, goods are despatched and the customer is invoiced.

The invoice cards punched at the beginning of this stage should contain enough information to allow all these actions to be performed automatically.

2. The receipts routine

At the 'invoice customer' part in the cycle the punched card produced as an invoice card becomes the 'customer record' card, which is retained until payment is made. This card allows the printing of monthly statements, the posting of ledgers, and the checking of payments and the customers' receipt of the items. Cash and bank book entries are posted as they occur, and exception listings are produced where incomplete orders have been received or incomplete payments made. It will be noted that although goods received notes are printed they are not part of the mechanised system, but are merely filed when returned to be referred to at payments exception listing stage. Information from the current customer records is also available for costing, sales analysis, and forecasting.

3. The materials demand routine

The routine is similar to the stores demand routine, but includes an 'order routine'. The materials stock master file determines which reordering routine is to be

followed. If the item is part of a running contract, automatic reordering takes place, otherwise manual reordering is necessary. An order card is produced.

When the stores items are received a 'stores receipt' card is produced. The order card and stores receipt card are compared to produce any exception listing. This is followed by the updating of the materials stock master.

4. The updating of the stock master file

This comprises the normal insertions and alterations of a stock master file together with the deletions of any line of stock to be dropped. The routine will allow adjustments to be made to the minimum reorder levels and to the specifications of running contracts.

If a suspended delivery is noted the 'completed order' routine is entered.

5. Payments routine

The order card produced on ordering (or reordering) now becomes the current 'payments card'. On receipt of the invoice an 'invoice received card' is punched. The payment cards and invoice received cards are compared and an exception listing is produced.

The payment cards are then used to produce the remittance advice and cheque, post the ledger, and enter-up the cash or bank book.

Sufficient information will be housed on payment cards to perform these actions automatically.

The proposed system, described above, will be seen to be heavily based on punched cards as opposed to newer input media. There are several reasons for this



Fig. 3

apart from cost. A number of firms in the class considered are probably too small to make use of a full-blown computer bureau. As a result of the card-based structure, however, these firms could still make use of the system, virtually unchanged, as a purely card system, although this would prevent the use of some modern management techniques. Apart from this, the use of cards provides the users of the system with something tangible to 'control' and for reference, and should help overcome the initial resistance of firms to a new and informative system.

It should be noted that although the proposed system does depart somewhat from the system in current use described in paper I, the differences have been kept fairly small, again to facilitate changing over. The system is centred round the management of stock which is sadly lacking in many of the firms surveyed, and although the system should be cheap to maintain it will allow actual savings to be made by improving (or introducing) stock control.

The system has also been left open ended in that it should be easy to add on such things as costing, forecasting, and especially sales analysis.

Standard skeleton II

This has been designed to cover those companies which offer a service. It may be transport, or special manufacturing or fitting work, but the essential feature is that this type of company employs some system of accumulating the costs of each operation in order to be able to invoice the client for those costs plus a percentage. Fig. 3 shows the new part of the second skeleton. To complete it requires sections of the skeleton from paper I. Connection A goes to the box 'make out order' and the input B comes from the box 'post personal ledger' both of which appear in Fig. 1b of paper I. Many firms in this category have a very large number of clients and the amount of business transacted with each one does not justify keeping open individual accounts.

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It is more usual to find the file of copy invoices acting as the personal ledger. In these cases connection C would go to the box 'produce statement' in Fig. 1a of the previous paper. However, if the company does keep a personal ledger the 'file copy' box and connection C on the current skeleton are replaced by that section of Fig. 1a paper I from 'post to personal ledger' to the end (inclusive).

Comments

It is encouraging that the most recent surveys have served to confirm the results of paper I. In consequence work has definitely been directed to the preparation of an integrated rather than the building block type of system for firms of class A, the preliminary version of which has been described above.

At this point, before a 'final' version of a proposed system for class A firms can be presented, some form of field trial is clearly essential in order to settle the working details (and of course any undetected gaps in the logic). It is hoped that some form of field trial, or at least a simulation, will be possible, the results of which will be reported in a subsequent paper. The authors would welcome (constructive) comments on the system proposed.

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