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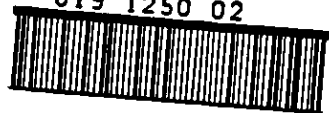


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Defining Management's Decision Making Information Needs

Volume II - Appendices

by

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A Doctoral Thesis submitted for the Award
of Doctor of Philosophy of the Loughborough
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Defining Management's Decision Making Information Needs

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APPENDIX A
INFORMATION FOR DECISION MAKING

APPENDIX A

Information for Decision Making

Introduction

During the implementation of the proposals set out in Appendix B it became apparent that management's information needs were not clearly understood either by management or the project team. Early in 1974 detailed research was started into how management's needs could be defined. This booklet was produced as a result of this research to set out an approach which it was believed would achieve the objective of defining management's information needs.

Content

The booklet sets out to provide an overview of the problems and possible courses of action. Its aim was to inform management of what was happening and why, and to persuade them to co-operate.

Relevance to the Research

The booklet is particularly relevant as it was used in the research project as follows:-

- a) as an introduction to the subject;
- b) as a guide to the research procedure;
- c) as a reference handout at seminars.

Cross References

This appendix is referred to in:-

Chapter 1, Section 1.7

Chapter 3, Section 3.6

INFORMATION FOR DECISION MAKING

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Introduction

The Management Information and Control Committee was appointed when Tilcon was formed. The first priority was to get the basic records straight and provide full monthly accounts. This would no doubt help management but the committee was also aware that information from accounting systems would not necessarily meet all management's needs. We made available what was felt to be useful and provided a means of monitoring business activities and profitability. In planning the new computer network using terminals we kept in mind the concept of providing a greatly improved Management Information and Control System in which the terminals and new data storage facilities would play a key role; providing faster data flows and increased accessibility to information. The new computer network was intended to pay for itself with a reduction of staff; it has not only done this but has also paid for itself several times over in the benefits we have clearly obtained in the reduction of debtors throughout the Group.

The aim of this seminar is not to sell the computer approach but to clearly put the computer's usefulness into perspective. Management's information needs will be provided in the best possible ways whatever these might be.

The aims of a new system are -

- a) To give the manager the information he wants to make decisions, in the form he wants it, at the right time, not as a by-product of the accounting system.
- b) In meeting the above to allow managers to improve profitability and cut waste through reducing paperwork and hence the time managers have to spend handling it.

(Introduction - continued)

The best people to decide what management want are the managers themselves and the purpose of this seminar is to start this process.

The Board can allow a great degree of flexibility in each division but obviously a co-ordinated approach throughout the Group has many advantages, not only to the Board.

The Need for a Review

At the present time we are suffering from a paperwork explosion which has inundated management. Much of this paperwork is "asking" rather than "telling" and managers have to use their self created sources of information to answer the questions.

There are, we believe, many areas where better information arriving at the right time would mean more effective action. Unfortunately, management tend to make do with existing information sources, probably unaware that improved facilities are available.

Up to the present time a survey of information needs has never been carried out. If we are to design effective, useful information systems we must ensure that we have a detailed knowledge of the manager's requirements for information. The manager should not have to make do with the information which can be extracted from the existing systems. His needs should be assessed and a system designed specifically to meet those needs. The purpose of this seminar is to discuss how management's information needs can be assessed. This is being done to enable an information system to be designed. The Group's facilities for the collection and processing of data are the most modern available. Their efficient use depends upon the outcome of these meetings and subsequent discussions.

It is possible for a specialist department to sit back in isolation and design a system which produces information. That information is only of value if the manager needs or wants it and it is a direct aid in his decision making. It is obvious therefore that the provision of a meaningful system can only be done on a joint basis with management and the systems designers.

"Modern management information systems are supposed to help the manager make better decisions. Few, however, are true management systems; they have been shaped by improvements in existing data processing functions, and do not significantly increase the decision-making effectiveness of managers. The 20/20 hindsight which we all possess in abundance reveals that this is the natural result of leaving information systems design to technicians. The manager has abdicated control over the design and implementation of the organisational MIS because systems design and the intricacies of such technicalities as data files are beyond his expertise. He has charged the computer specialists with these tasks, and the results are clear.

The solution to the dilemma is clear. Since neither the manager nor the analyst ^e alone can design and implement a true management information system, they must work co-operatively. Each must make his own unique contribution, and anything short of complete co-operation will probably result in a systems design that is either ineffective or inefficient." (1)

The aim then is to produce a "meaningful information system". To be called information, data must add to the manager's store of knowledge. To be meaningful the increase in knowledge must be relevant to the manager's decision taking activities.

Before we can discuss Management Information Systems on a coherent and beneficial level we must know the needs of those at whom the information is directed. It has been said that a good salesman can create needs for his product and there is no doubt that this is what has happened in the development of computer based systems. It is time we found out what our customers' real needs are and it is time that we admitted to ourselves that these needs may not always require the most sophisticated solution.

This seminar introduces a survey which sets out to establish management's information needs by focussing on the decisions taken by the managers and the information necessary to provide the input for the decision process. This identification of decision points and the subsequent analysis of information needs is an essential prerequisite for the successful design of meaningful information systems.

- (1) W. R. King, D. I. Cleland - MANAGER ANALYST TEAMWORK IN MIS.

Information and Decisions

There have been many definitions of a manager's role. All of these definitions boil down to the need for decisions to be taken in order for the manager to operate.

Accomplishing tasks via other people can only be done by making decisions.

Planning, organising, co-ordinating and controlling can only be done by making decisions.

The definition of a manager's role was set out by Peter F. Drucker in 1959:-

"In dealing with their new tasks, the managers of the 1960's will, to a large extent, have to employ the same tools they are using today. But managers will also find, increasingly, that they are expected to use systematic methods of analysis and decision making, supplemented by new tools of communication, computation, and presentation.

Executives can safely disregard all the fanciful talk about the computer "replacing managers" and "making decisions". Managers' work, it can be said with confidence, is going to become more important and their numbers larger. But the "management sciences" - such as operations research or decision-making logic - and the new electronic tools and systems are going to make a difference, even to the manager in the small business.

And the manager of 1970 will need all the help he can get from such new concepts and tools. For his job is going to be so complex, so big, so demanding as to require all the tools of simplification and systematisation that can possibly be obtained." (2)

There is no doubt that the manager is a decision maker and that his future responsibilities will increase as will his needs for accurate, timely and relevant information.

If you examine your own job you will see that it can be sub-divided into the following types of decisions.

1. Mechanical decisions taken frequently for which you have developed stores of knowledge both mentally and recorded.

Such decisions as:-

What to do when plant breakdowns occur.

How to deal with staff sickness, etc.
2. Routine decisions concerned with planning and organising the way work is to be done, and setting performance standards for staff.
3. Routine control decisions concerned with assessing whether performance standards have been achieved and taking the appropriate action.

(2) P. F. Drucker, THE NEXT DECADE IN MANAGEMENT. Dun's Review and Modern Industry, Vol. 74, No. 6, December 1959, pp 60 - 61.

4. Major non-routine decisions of a complex nature
such as -
Opening a new plant.
Buying new equipment.

As decisions become more complex and less routine there is a greater need for information to assist with making the best decision. Such decisions involve more subjective opinion than the routine decisions and usually involve greater risks.

Whatever level of decision making we consider there is a need for information. Whether or not the interpretation of the information can be structured according to a set of rules, it is essential for the right information to be produced at the right time at the right place.

Imagine that you are faced with the routine decision of ordering transport for the following day, but have no information, i.e.

You don't know the tonnage on order.

You don't know the materials.

You don't know the destination.

You don't know the customers.

Now imagine you are faced with the same decision but you know the tonnage on order.

The difference is obvious and the benefit of the information is considerable.

The more information you have then the better the decision.

This is only true, however, if the information you receive is:-

in time to affect the decision,
relevant to the decision,
understood by the manager.

In the example above it would have been possible to arrive at a decision by guessing. It is quite possible that such guessing could be quite accurate if related to accumulated knowledge, i.e. the average number of vehicles usually ordered for that quarry on that day. On the other hand there is no reason why on this occasion the answer should be a good one. The very best you could hope for would be an average result as the decision is based on average information. The quality of a decision, i.e. the result of the outcome, is directly related to the amount of information available. It is extremely rare to know precisely what is going to happen tomorrow and so there must always be some measure of risk involved when a decision is taken.

The importance of timely information is related to the reduction in the degree of risk and consequently enables a more precise decision to be made. In the case of ordering vehicles, if you are told that the tonnage is going to be at least 700 but could be 1200 your decision must be made taking account of the risk of either not having enough vehicles or of having too many. In order to improve the outcome you might try and delay the decision until you have more information, i.e. until the next morning, by which time you can't get the vehicles.

In the above situation your decision will be a compromise between the best - just enough vehicles, and the worst - no vehicles at all. The value of information can be seen from this example.

If you had ordered 12 vehicles and received orders for 1150 tonnes you would probably have been unable to deliver 200 tonnes with the consequent loss of income. The value of knowing what was going to happen is equal to that loss of income.

The above example, though based on a routine daily decision, clearly shows the importance and relevance of information to decision making. As the decisions become more complex and more far reaching, the value of information increases rapidly.

"The manager will never be able to get all the facts he should have," wrote Drucker. "Most decisions have to be based on incomplete knowledge - either because the information is not available or it would cost too much in time and money to get it.

"To make a sound decision, it is not necessary to have all the facts; but it is necessary to know what information is lacking to judge how much of a risk the decision involves, as well as the degree of precision and rigidity that the proposed course of action can afford. For there is nothing more treacherous - or, alas, more common - than the attempt to make precise decisions on the basis of coarse and incomplete information."

It is vital that you know the following:

1. The decisions you take and which are crucial or key decisions which affect your performance.
2. The information needed to enable you to make sound decisions.
3. The information that is unavailable.

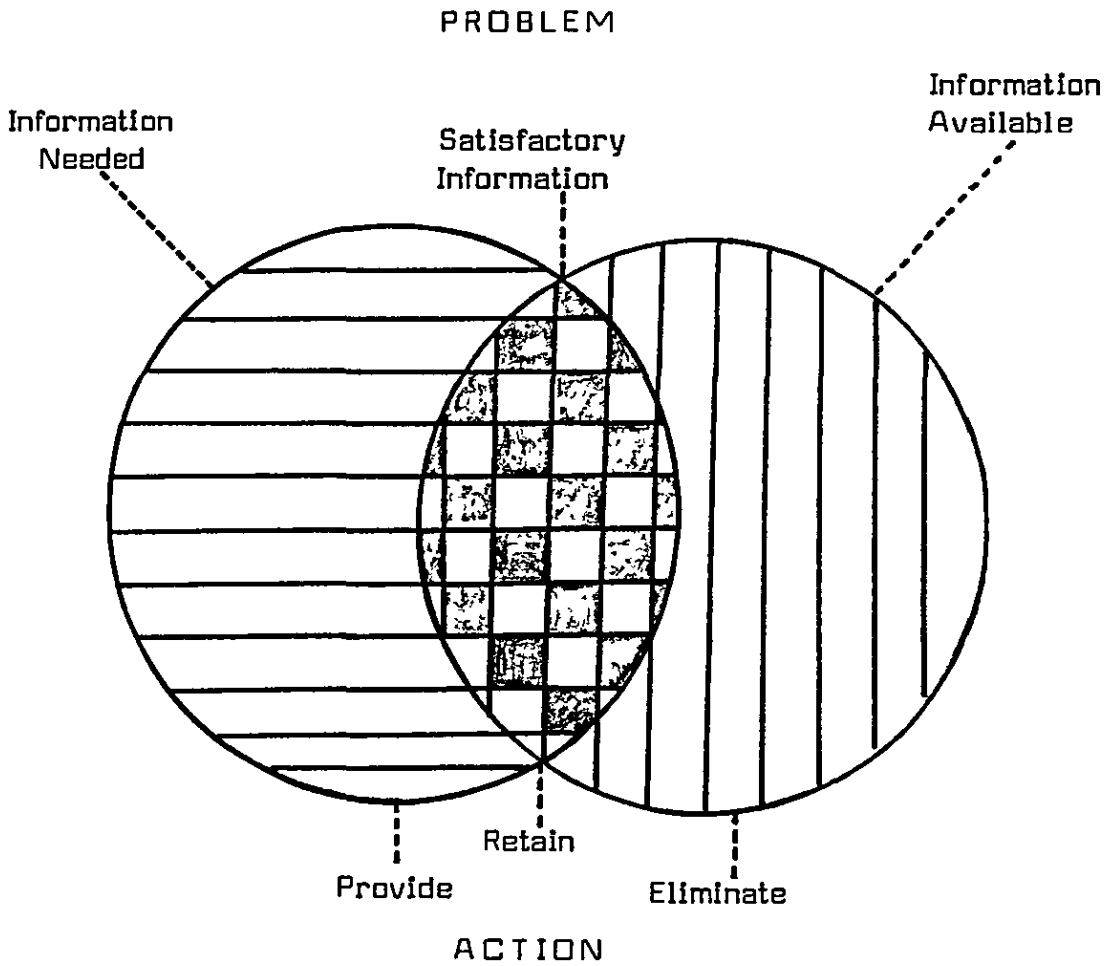


FIGURE 1

Determining the above facts can only be done jointly by management and the systems designer. The aim of this course is to start the ball rolling and to illustrate why your involvement is so important.

Information is the raw material which the manager needs to make a decision. Without information the manager is unable to carry out his function in the organisation.

The manager needs information to assist him to select courses of action i.e. take decisions, to control the implementation of action and to record the success or failure of the action taken. It is necessary therefore to define the decision making areas of each manager's job in order to provide information which will be of help.

The relationship of information to decisions is fundamental to the survey and is clearly a vital consideration in the development of the right approach to the problem. The manager must then receive information related to his job, his responsibilities and the decisions which he takes. Such information can be broadly categorised, as shown below.

- a) The objectives which he is to attempt to achieve.
- b) Technical information about specific jobs, for which he is responsible.
- c) Control information based on feedback of the results of decisions so that corrective action can be taken.
- d) Background information about activities related to those for which he is responsible and of the company and the environment in which he is operating.

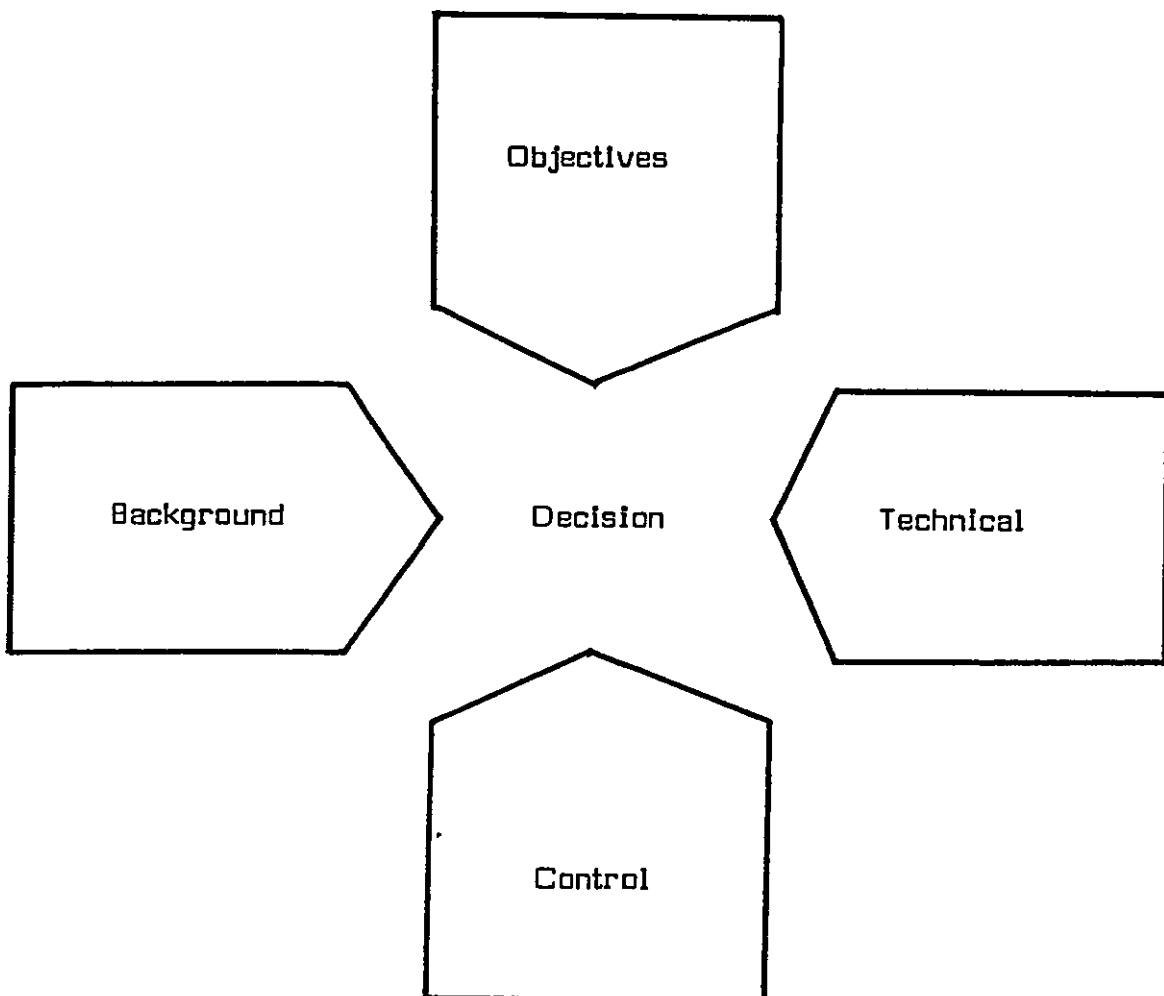


FIGURE 2

Information is a peculiar thing which varies depending upon when it is received, how it is received and who receives it. The same piece of information may be interpreted differently by different managers depending upon their attitudes and approach to the decision concerned.

"Like management itself, management information has vital human implications To demonstrate a point, then, let's consider the implications to various people of a train whistle penetrating the evening dusk.

To the saboteur crouching in a culvert it might signify the failure of his mission because the whistle indicates that the train has already passed over his detonating charge without causing an explosion. To the playboy it might presage the imminent arrival of a transgressed husband. To the fireman in the cab of the locomotive it indicates a drop in steam pressure and the need for restoking the furnace. To the lonely wife it means the return of her travelling husband. To the man with his foot caught in the switch down the track it preshadows doom For another (preparing to retire) it signifies time for prayer In brief, the nature and significance of any information are fundamentally and primarily functions of the attitudes, situations, and relevant responsibilities with respect thereto of the people involved with it

.... Information is management information only to the extent to which the manager needs or wants it; and it is significant to him only in terms of its relation to his accumulation of relevant knowledge and plans and to his personal responsibility." (3)

The problem being faced is therefore a complex and difficult one. There is unlikely to be a specific solution, but if a way can be defined to analyse and categorise information needs then the aim will have been achieved.

"....There is a frighteningly common desire today to prove that incredible amounts of information can be developed with electronic devices by preparing business reports that are incredibly long, incredibly dull, and, all in all, just plain incredible. Information alone is not enough. Try visualising for example one of our big daily newspapers if it was presented straight off the wire in continuous columns, with no headlines, no attempt to avoid duplication, and no simple means of judging the relative importance of the various news stories or putting them in proper perspective. Would you even attempt to read such a paper? I think not. Yet management is frequently forced to hunt through a haystack of irrelevant information in its reports in order to find for itself the needle of pertinent fact. What is needed, obviously, is a planned system of business intelligence - or, as the author of this report prefers to call it - a "management information system" which selects, rejects, edits, and headlines business information - in short, which turns it into business intelligence." (4)

- (3) Edward D. Dwyer: Some Observations on Management Information Systems. In Advance in EDP and Information Systems. American Management Association NY 1961.
- (4) Gerald L. Phillippe: What Management Really Wants from Data Processing. Data Processing Today, A Progress Report. Management Report No. 45, American Management Association NY 1960.

The Review Itself

The review is intended to be carried out by discussion between the reviewer and the manager. This discussion will aim to establish each manager's decision areas and the related information.

This will then be compared with the existing system to establish -

- a) What information is received and used.
- b) What information is received but not used.
- c) What information is lacking.

It is suggested that this is done by the manager completing the Decision Record Sheet (See Figure 3) for an agreed period of time, entering the following information for each decision taken.

Company or Division	=	The Company and Division for which you work.
Title	=	Your job title.
Date	=	The date of the decision.
Decision Taken	=	A brief description of the decision eg Selection of supplier.
Reason	=	The reason the decision was necessary eg new quotes received from 2 suppliers.
Codes	=	<div> <div>K = Key Decision</div> <div>I = Important Decision</div> <div>R = Routine Decision</div> <div> F = Frequency D = Daily W = Weekly M = Monthly Q = Quarterly A = Annually </div> </div>

DECISION RECORD SHEET

DATE	DECISION TAKEN	REASON	* CODES			
			K	I	R	F

COMPANY or DIVISION		TITLE	
INFORMATION USED	SOURCE	INFORMATION LACKING	

- Information used

=

The information you used to take the decision.
- Source

=

Where the information came from
e.g. the monthly accounts.
- Information Lacking

=

Any information you would have liked to have had to improve or confirm the decision.

This will be followed by a visit from the reviewer who will discuss the information on the Decision Record Sheet and attempt to complete a Key Decision Grid on which will be recorded the manager's decisions.

(See Figure 4)

KEY DECISION GRID			
MANAGER			
IMPACT SPECTRUM	Minor	Important	Vital
COMPLEX			
ROUTINE			
MECHANICAL			

FIGURE 4

The decision will be allocated a place on the grid by agreement and will reflect the emphasis placed on various decisions by the manager and his view on their type and impact. The type of decision, i.e. complex, mechanical and routine were set out earlier in these notes.

(See Pages 233/234)

For each of the decisions entered on the Key Decision Grid the reviewer will prepare a Decision Information Analysis which is the master document for the design of the system. On the Decision Information Analysis the information requirement is split into the four main types of information -

Objectives (Plans)

Technical

Control

Background

This will be used to define where the information comes from, the frequency, content, accuracy level, etc. All important points for effective systems design.

The data entered onto the Decision Information Analysis (Figure 5) will refer to main reports, i.e.

Sales Analysis by Product

Operating Cost Sheet etc.

The detail of what is contained on these reports, their distribution frequency and quality is then completed by the reviewer, using the Report Analysis Sheet.

The records will now allow the reviewer to analyse the individual manager's needs and to co-ordinate the various needs across the Region.

This will then provide a basis for a detailed report covering -

- I) The decision points.
- ii) The importance of each decision.
- iii) The information required.
- iv) The existing source, if any.
- v) The basis of the new system if one is required to provide information not currently available.

Throughout the above the researcher must act only as an adviser and analyst, it is imperative that the manager assesses his own information needs related to the decisions which he takes.

MANAGER		DECISION INFORMATION ANALYSIS	
DECISION			
TYPE	INFORMATION REQUIRED	class	Source
Objective			
Technical			
Control			
Background			

Class A available and used
 B available not used
 C not available

FIGURE 5

[illegible]

Developing Tilcon's Information Systems

The broad lines of development of information systems in the Group are suggested below.

- a) We are aiming to provide information which helps managers to achieve their given objectives more effectively. Obviously, a key requirement is to ensure each manager has clear objectives.
- b) The two main areas of information requirements which need a different approach are:
 - I) Decision making information which is of two broad types, namely urgent information required to make immediate decisions and background information to make better informed decisions.
 - II) Control information covering all information for control at Board level down to individual managers wishing to control their own performances.
- c) The information should be provided by the most efficient method. The alternatives could range from the manager recording it himself or having the benefit of the full use of computer techniques. Initially, the information should be tailor-made to his requirements and its effectiveness reviewed regularly. The cost of providing information will be assessed and it should be assumed that it will ultimately be charged out to the user. The degree of accuracy required should be consistently reviewed.
- d) Any system should be flexible to cope with change.

- e) The sources of information would be wider than at present accepting that the accounting system is not the only source and introducing more external information. Management information arising from the accounts would be integrated with the accounting systems.
- f) The computer offers a means of setting up a pool to supply information relevant to decision making. The pool would be fed from the accounting systems now being developed plus non-accounting information. While such ready access has many advantages for management, centralisation brings new risks which have to be provided against.
- g) There should be greater understanding of the importance of the timing of information, particularly with the better facilities available.
- h) An objective would be a reduction in clerical costs and the need to make the role of the Financial Controller and his assistant more effective in following up points arising from information provided rather than just creating that information.

These ambitions can be realised provided we work together to produce the best possible understanding of -

- a) Management's information needs, and
- b) How these can be met.

Tilcon's approach to meeting management's needs would be to balance the need for local records and information with the power of central computer based files. This approach can be called "Decision based system approach".

Decision based systems approach has several advantages:-

- 1) It is necessary to identify decision areas and then ensure that resources are available.
- 2) Management's information needs must be clearly defined and it is usually established that less but more relevant information is required.
- 3) Information is directly related to the task and thus ensures it is available in the right quantity, of the right quality, and at the right time.
- 4) More efficient use of the computer is possible when it is directed towards management needs.
- 5) The production of relevant information for making decisions should lead management, if they use this information correctly, towards making better decisions.

Computers and Management Information Systems

The term Management Information System is linked in most people's minds inexorably with computers. This link is understandable as all current literature on Management Information Systems concerns itself exclusively with computer based systems. It is not, of course, necessary to use computers when discussing information systems, they do have their place and it is part of the Management Accountant/System Designer's function to recognise when to use computers and when not to use computers. Unfortunately in the past this decision has been left mainly in the hands of those responsible for computer operations.

This had led primarily to systems designed to make the best use of the computer. The concentration has been on "How can we do it" rather than "Why should it be done" and "Is there an easier way?"

The computer's main strength lies in three areas.

- a) Routine Data Processing.
- b) High capacity fast access storage and retrieval facilities.
- c) Mathematical models for simulation.

Routine data processing is mainly concerned with accounting procedures and related analysis for information purposes. This is still the major application area, particularly in the U.K. The computer's ability to handle large volumes of routine data extremely quickly in batch mode has led to the wide development of such routine batch processing applications. They are not as glamorous as the so called "Integrated Management Information Systems", few of which exist have yet been successfully implemented.

The use of high capacity, fast storage and retrieval facilities has led to the growth of on-line and real-time operating systems, which however effective at controlling airline booking, do not provide much if any management information. A large holiday company uses real-time systems for booking control, and then batch processes the data for accounting and information purposes.

Simulation models are undoubtedly a valuable management tool and can aid decision making. However, their development requires a high degree of mathematical competence, and a profound understanding of the business problems. Attributes rarely possessed by the same manager. If models are to be used effectively then they must be -

- a) Small and relatively simple,
- b) Used regularly, and
- c) Built by managers.

One of the risks of using computers in decision making is that the model builder will attempt to construct programs containing value judgements, and it is here where failure must occur. In addition the social aspects of decision making cannot be programmed.

"Since no computer programs have yet been written which pick from an open-ended range of possible selections, it is now impossible to arrive at "managerial" decisions by automatic process". (5)

The systems designer must first assess the problems before he attempts to develop any single approach to the solution. I personally believe that the computer specialists have for too long been offering management a solution in search of a problem.

It would be of great benefit to most companies if the systems designer obtained answers to the following questions before computers were included in the plans.

- a) Is the existing non-computer system the best possible?
- b) Is there any other way?
- c) Do the system requirements fall within the strengths of the computer?
- d) Five reasons why a computer must be used over any other system.
- e) The importance of the system to the company.
- f) What will the company lose if the system fails?
- g) What are the benefits in £p from successful implementation?

Stages in Developing the Management Information System

As we have already seen the systems designer is faced with three major problems in designing a decision based information system.

- a) Obtaining an understanding of information and its importance to the managerial function.
- b) How to establish what information any particular manager requires in order to meet his decision making needs.
- c) The means by which this information can be collected, stored, processed and retrieved.

The systems designer, by using the approach suggested herein, should have obtained answers to the following questions.

- a) What are the key decision areas at each level of activity?
- b) What information is required to take the decisions?
- c) What information is lacking?
- d) How can it be obtained and at what cost?
- e) Does it require amending existing systems or introducing new ones?

A systems framework can be established which will indicate what work has to be done to provide the needs of management. Existing systems cannot be withdrawn and replaced overnight, so a plan has to be formulated. Rationalising existing systems based on this framework will produce the most immediate benefits. This is done in two stages:-

- a) Prepare improvement programme indicating the priority areas.
- b) Simplify existing procedures.

It would be wrong to predict that the manager's main needs can be met by computer based systems, but it would also be wrong to assume that a computer based system is not capable of helping with many of the manager's decision making problems.

In addition to regular reports three other forms of obtaining information could be provided.

- 1) Exception reports, produced when some pre-set criteria is reached which indicates that results are deviating from the norm or plan, e.g. In the transport system a maintenance report will be produced each time certain levels of maintenance are exceeded i.e. two similar repairs in the same month.
- 2) Management will have access to the files held on the computer to extract information as and when they need it rather than having detailed regular reports which they have to sift through for relevant information.
- 3) The creation of models to simulate certain decision problems, which will enable managers to test the theoretical results of various courses of action, thus making maximum use of the computer's analytical, logical and fast processing capabilities, and the manager's judgement and flair in arriving at a better decision.

The above changes constitute a radical new approach to the presentation of information and could mean the disappearance of the monthly accounts as they are now known. The reporting of results could be by deviation from plan with the courses of the deviations highlighted and supported by detailed explanatory statistics. Emphasis would be placed on the cumulative position with trends being calculated and extrapolated to show the meaning of a continuation of the trend. The graph over indicates the general principle.

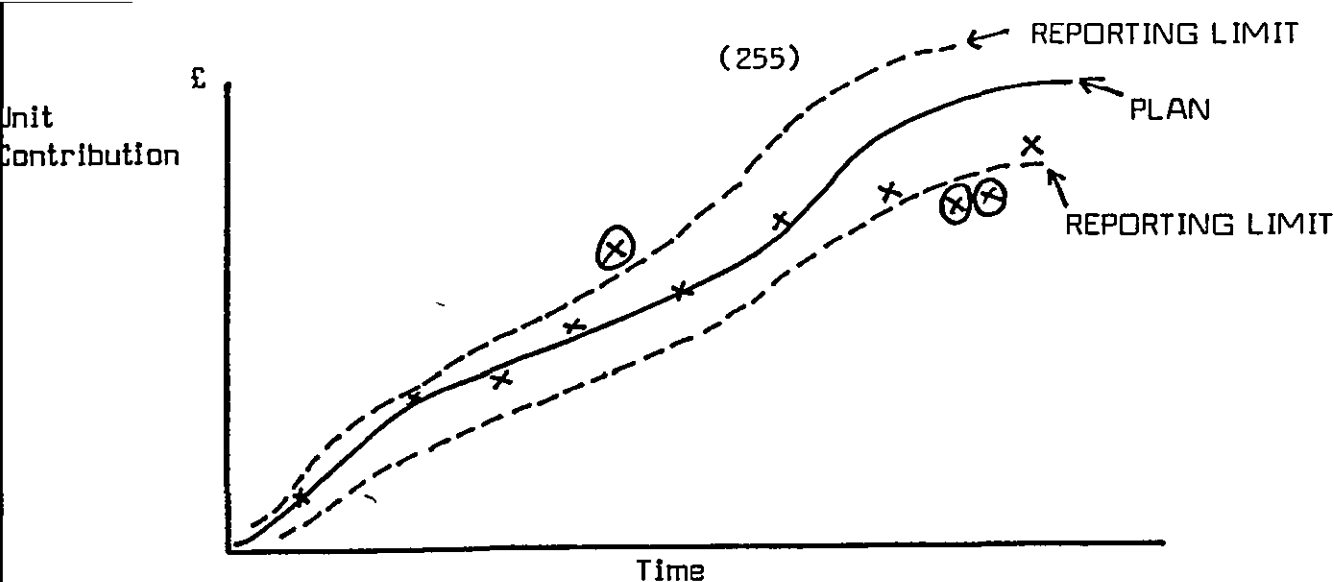


FIGURE 7

In each of the months marked (X) the cumulative result was outside the limit so it is highlighted and detailed information provided of costs and income to date with variations from plan.

The work involved in producing, reading and discussing monthly accounts would be considerably reduced, with management's attention being directed to those areas which need action. In addition, if required, other details could be asked for, even though the limits have not been exceeded.

Plans and reporting limits would be held on the computer for each unit and the details of actual costs and income would be picked up from the appropriate sub-system, together with any adjustments which would be entered as required.

The flow of information from computer based systems must be examined to ensure that the files hold data in the most useful form for meeting the information requirements of management. The conflict arises as follows and limits the effective use of the computer.

- a) Files are designed to hold information in the sequence most appropriate to the operation of the computer systems.
- b) Information required is seldom needed in the same sequence that facilitates rapid operation on the computer.

The possible solution is to create files based on information needs and secondary files or improved systems to handle the operational data needs.

The provision of an information system for management must be tackled slowly with the development of individual sub-systems linked together by the decision based reporting system.

Developing new systems should be one of evolution for the following reasons.

- a) Too many activities to be absorbed at one time.
- b) Human effects of change.
- c) Complexity of changes.
- d) Limitation of available man hours for effective systems design.

Conclusion

I am convinced that the provision of -

the right data, at
the right time, in
the right place, for
the right reasons,

is the principal aim of the systems designer, however, he cannot achieve this aim without a close involvement with management and a deep understanding of management decision making processes.

COMPANY or
DIVISION

--	--

TITLE

TITLE	
-------	--

DATE	DECISION TAKEN	REASON	• CODES			
			K	I	R	F

INFORMATION USED	SOURCE	INFORMATION LACKING

* CODES :- K = KEY DECISION I = IMPORTANT R = ROUTINE F= FREQUENCY (USE D = DAILY W = WEEKLY M = MONTHLY Q = QUARTERLY A = ANNUALLY).

First unmanned UK network

An unattended computer is being used to automatically dial up data entry terminals, in what is claimed to be the first UK instance of this technique.

The network is the property of Tilcon Construction Services, a Harrogate firm which provides materials to the construction industry. The system is based around a Univac 9480 (one of the old 90 series machines) small computer connected to 23 Olivetti DE523 terminals at 18 branch offices.

A Univac DCS4 communications controller is used to control incoming lines and standard Post Office (PO) equipment helps

with the dial up.

The DE523s record data, giving details of conveyance loads for lorries, on cassettes. By leaving the terminals switched on and in the 'send' mode at night, the 9480 then dials them up, collects the data and the 523s automatically switch back to receive when transmission is finished.

Tilcon has experienced considerable reduction in error rates (from 5% to 0.9%) at the central machine, due to a degree of pre-checking by the 523s.

Tilcon also uses the PO's special arrangement 'midnight line' facilities for further cost saving. †

Tilcon builds a Data Highway

Tilling Construction Services Ltd is a major subsidiary of the Thomas Tilling Group providing a variety of materials to the construction industry from 150 quarries and concrete and mortar plants. Currently turnover is around £75m.

A major O & M review of the sales and purchase accounting systems, then based on an ICL 1901A computer, proved that the introduction of more sophisticated hardware and a communications network would benefit management, customers and suppliers by providing more up-to-date information. In addition, the ability to process and transmit data more quickly would enable a wide variety of cost-justified applications to be installed.

When the ICL system was in use with conventional card punching techniques, delays of up to 10 days could be experienced before an invoice was created. The flow of data started at the quarry or site and passed in the form of a handwritten conveyance ticket to the area or regional office for pricing, and was then posted to the computer centre for punching, verifying and processing.

Once the decision to develop a completely new system had been taken, Olivetti worked closely with Tilcon to produce a terminal network that would provide the essential characteristics of clean data and fast responses to the UNIVAC 9480 computer, which was chosen to host the new system.

The solution was based on the use of Olivetti DE523 terminals, which were installed in each of 18 offices sited between Glasgow and London. Initially the sales data collection system was operated from mid-1974 using the terminals to validate at the time of entry the data thus captured on cassette was

then sent over public switchboard lines to a receiving Olivetti terminal at Harrogate, where the data was processed on the UNIVAC on the day following its receipt at a regional office.

A critical part of the system is the entry of a unique code which identifies the combination of customer, material, quarry/site, haulier rate and price.

Thus far the system uses well-established Olivetti techniques, and even at this level it is significant that Tilcon have reduced their error rate from 5% to under 0.9%, while the annual cost savings on staff reductions almost cover the initial cost of the terminals.

The next phase of the system is the implementation of an automatic dial-up service emanating from the computer. At midnight the computer, entirely unattended, powers up and (via the OS4 operating system, the DCS4 line control unit and a specially written communications handler) dials each terminal in turn. The terminals are set up in send mode and, through a specially modified automatic answering device, an answering tone is provided which enables connection. In this way unattended transmission at both ends operates over the Post Office midnight line service, at a cost of around £220 for a whole year's transmissions.

When the installation of the new auto-answer devices is complete, Tilcon will benefit from even further reduced operating costs.

This system is particularly significant as it is the first example in the UK – possibly in Europe – of an automatic dial-up auto-answer system in which the dial-up is generated by an *unattended* computer.

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DOCUMENTS OF POOR ORIGINAL HARD COPY

APPENDIX B

DECISION DEFINITIONS

APPENDIX B

Decision Definitions

"Key Decisions"

Introduction

The decision definition sheets were prepared from the detailed decision grids, information analysis sheets and interview notes. They bring together the information needs of each decision and the reason for the decision.

Content

The decision definition sheet shows on the front:-

- a) definition of the decision;
- b) importance of the decision using a decision grid recording each manager's assessment of the importance of the decision;
- c) the managers making the decision;

and on the reverse the information required within the four main flows - objective, technical, control and background.

The appendix contains the master file of key decisions. In addition to this file each function has a file of decision definitions.

Relevance to the Research

The decision definition brings together the information needed in such a way that the following analysis could be completed.

- a) identification of key decisions,
- b) analysis of information flows,
- c) preparation of functional inflow/outflow analysis.

The functional decision definitions form the first usable output from the research. Management have found them of use in assessing their own information needs in the light of what other managers have said. By bringing together the information needs expressed by a number of managers, each has found gaps in their own requirements which had become somewhat constrained within the bounds of what they thought they could get.

Cross Reference

This appendix is referred to in:-

Chapter 3, Section 3.8

Chapter 5, Section 5.1

DECISION DEFINITION

NO.

1

DECISION

CAPACITY VARIATIONS

DEFINITION

Deciding upon the capacity to be available to each unit by -

- a) controlling the manpower,
- b) controlling the level of mobile plant,
- c) deciding to optimise operating levels for the unit concerned.

This decision area will deal with -

- i the number of men,
- ii the hours worked,
- iii no. of items of mobile plant,
- iv the transfer of plant from one unit to another.

IMPORTANCE

IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX		////////	✓
ROUTINE		////////	
MECHANICAL			

MADE BY

W. Massey
W. Appleby
G. Williams
A. Lakin
N. Place
S. Philips
J. Bairstow

D. Hallsworth
A. Allen
D. Wingfield
H. Ginnis
A. Brown
L. Parry

M. Hopperton
W. Henderson
J. Hutton
P. Logan
J. Jamieson
B. Taylor
D. Brown

MANAGER	DECISION INFORMATION ANALYSIS		
DECISION	CAPACITY VARIATIONS	1	
TYPE	INFORMATION REQUIRED	class	cat
Objective	Budget. Stock limits. Longterm use of resources. Optimum operating level. Quarry breakeven level. Agreed working levels. Maximum permitted hours. Tonnes per hour.		
Technical	Discussion with manager. Current working conditions of face. Number of men needed. Plant capacity i.e. production per hour of each material. Variability of the plant. Ability to move materials. Safety levels. Blasting and drilling programme.		
Control	Stock levels. Demands for additional output : ships etc. Future demand. Stock values. Excess material production. (ie What is not wanted but has to be produced to get what you do want.) The effects on costs, output and profit of various production combinations. Daily report on production. Shortfall on orders in other units. Number of men working. Effects of breakdown on production. Output per man shift. Tonnes per hour.		
Background	General economic situation.		

DECISION DEFINITION

NO.

2

DECISION

REPLACEMENT OF PLANT

DEFINITION

The purchasing of new equipment to replace existing equipment.

This decision is in three categories.

(M) Mobile plant.

(F) Fixed plant.

(V) Vehicles.

* This decision is constrained within the finance approved by the board.

IMPORTANCE

IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX		////	///
ROUTINE			✓
MECHANICAL			

MADE BY

W. Appleby
R. Clare

D. Hallsworth
H. Ginnis

W. Henderson
J. Stewart

A. Lakin
J. N. Place

MANAGER		DECISION INFORMATION ANALYSIS		
DECISION	REPLACEMENT OF PLANT			2
TYPE	INFORMATION REQUIRED	class	cat	
Objective	<p>Replacement programme.</p> <p>Future demand.</p> <p>Maintenance of budgeted levels of output.</p>			
Technical	<p>Continuing need for resources.</p> <p>Plant specification.</p> <p>Age of machine.</p> <p>Type of machine.</p> <p>Maintenance history.</p> <p>Performance.</p> <p>Alternative equipment available.</p> <p>Throughput per hour.</p>			
Control	<p>Financial appraisal: including costs of replacement v need.</p> <p>Effects on production of not replacing: opportunity cost of downtime.</p> <p>Effects on costs of not replacing.</p> <p>Cost of maintaining v replacing.</p> <p>Availability of funds.</p>			
Background	<p>Needs in other quarries.</p> <p>Other similar plants.</p> <p>Who operates that make of plant.</p>			

DECISION DEFINITION

NO.

3

DECISION

OPERATING METHODS

DEFINITION

The original decision on how a unit is to be worked and subsequently deciding, of necessity, on changes to take place.

This will cover:-

- i Equipment used.
- ii Face taken.
- iii Materials produced.

Outside the quarry, that is in other activities such as transport and subsidiary companies, this will be taken to mean the programmes of work established and any changes thereto.

Summarised as - What will be done,
When it will be done,
Who will do it.

IMPORTANCE

IMPACT SPECTRUM			
	MINOR	IMPORTANT	VITAL
COMPLEX		////	////////
ROUTINE		////////	✓
MECHANICAL			

MADE BY

W. Appleby
R. Clare
J. Bairstow
S. Philips
W. Massey
G. Williams
A. Lakin
D. Armstrong

D. Hallsworth
H. Ginnis
A. Allen
D. Tomkinson
A. Brown
L. Parry
R. Bentley
P. Corner

D. Brown
P. Logan
M. Hopperton
J. Jamieson
B. Taylor
J. Stewart
J. Hutton
T. Harris
J. Smart
J. Aitken
J. Brown

MANAGER

DECISION INFORMATION ANALYSIS

DECISION

OPERATING METHODS

3

TYPE	INFORMATION REQUIRED	class	cat
Objective	Budget requirements. Environmental controls. Safety controls. Quality required. Operating breakeven. Tonnes per hour. Loads per hour.		
Technical	Alternative methods. Type of stone. Planning agreements. Equipment available and capability. Men available (especially drivers). Covers holidays sickness etc. Reasons for changes. Maintenance requirements. Plant and quarry layout.		
Control	Day to day levels of demand : demand pattern. Manpower available. Breakdowns. Stock levels. Vehicle programme. Actual vehicle working. Production and work levels. Cost of changes. Effect of changes. Results of existing approach.		
Background			

Class A available and used
B available not used
C not available

Cat A vital information
B desirable and economic
C desirable but not economic

DECISION DEFINITION

NO.

4 & 5

DECISION

EXPANSION OR CONTRACTION OF BUSINESS

DEFINITION

Decision on action to be taken to expand or contract the business.

*This is normally a board decision, primarily for funds.

IMPORTANCE

IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX		✓	✓✓✓✓✓
ROUTINE			
MECHANICAL			

MADE BY

W. Appleby
R. Clare
J. N. Place

D. Wingfield
R. C. Bishop

W. Henderson
J. Stewart

MANAGER

DECISION INFORMATION ANALYSIS

DECISION

EXPANSION OR CONTRACTION OF BUSINESS

4/5

TYPE	INFORMATION REQUIRED	class	cat
Objective	Budget requirements. Future levels of demand.		
Technical	Detailed technical appraisal. Planning requirements. Reserves of stone etc.		
Control	Contribution from existing levels. Anticipated contribution from planned levels. Financial appraisal. Market strategy attached to expenditure or dis- investment.		
Background	The effect on local environment ie contraction unemployment, expansion, pollution, etc.		

Class A available and used
B available not used
C not available

Cat A vital information
B desirable and economic
C desirable but not economic

DECISION DEFINITION

NO.

6

DECISION

APPOINTMENT OF STAFF (1)

DEFINITION

The decision to appoint.

This decision is taken at different levels. Level 4 indicates the level of Q. Manager, S. Manager, downwards.

IMPORTANCE

IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX		✓	✓✓✓✓
ROUTINE		✓✓✓✓	✓✓✓✓
MECHANICAL			

MADE BY

W. Appleby
R. Clare
D. Armstrong
B. C. Keys
S. Philips
J. Bairstow
K. Barker
J. N. Place

D. Hallsworth
D. Wingfield
R. C. Bishop
H. Ginnis

D. Brown
W. Henderson
J. Stewart
M. Hopperton

TYPE	INFORMATION REQUIRED	class	cat
Objective	Job profile : ie kind of person required. Age Experience Education Appearance etc.		
Technical	Requirements of the job indicating the minimum acceptable technical competence. Job specification : Who reports to. Supervises. Objectives. Scope. Current legislation. <div><div>BASIC TECHNICAL COMPETENCE</div><div>RELEVANT EXPERIENCE</div><div>SUITABILITY</div></div> <div>SELECTION</div>		
Control	Application form. Applicant's C.V. Costs of employment. Approval with functional managers. Opinion of immediate supervisor. Internal candidate with history : Knowing the abilities of your people is the key to success. References. Training courses, etc.		
Background	General information of the applicant. Salary levels in company. Salary levels outside.		

DECISION DEFINITION

NO.

8

DECISION

BUDGET APPROVAL (GENERAL)

DEFINITION

The decision of agreeing and approving the area profit budget for the following period.

This level is subject to regional and main board approval only.

IMPORTANCE

IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX		✓✓	✓✓
ROUTINE		✓✓✓✓✓✓	✓✓
MECHANICAL			

MADE BY

W. Appleby
R. Clare

D. Hallsworth
D. Wingfield
R. C. Bishop

A. McHattie
M. Hopperton

S. Philips
J. Bairstow
J. N. Place

D. Brown
W. Henderson
J. Stewart

MANAGER		DECISION INFORMATION ANALYSIS		
DECISION	BUDGET APPROVAL	8		
TYPE	INFORMATION REQUIRED	class	cat	
Objective	Profit required. Previous levels. Knowing what you want to do. Return on funds required.			
Technical	Inflation levels. Programme of work. Plant capacity. Estimating degree of error. Manpower required to achieve levels. Materials that can be produced. Haulage available. Decide vehicle earnings required to cover costs and adjust rates.			
Control	Review of sales plans. Review of production plans. Individual manager's budget. Current cost levels. Current performance levels. Stock levels. Current age of vehicles. Market trends. Current competitors' activities. Orders available. Level of customers' activities. Production cost per tonne. Sales tonnages within customer and market sector. People available - cost per hour. Future pay levels. Time Table. Estimated future costs (ie current + inflation factors)			
Background	Economic environment. Funds available.			

Class A available and used
 B available not used
 C not available

Cat A vital information
 B desirable and economic
 C desirable but not economic

DECISION DEFINITION

NO.

11

DECISION

LARGE CONTRACTS - PRICING

DEFINITION

In cases where large contracts occur and the price is outside the budget level, and/or where special changes are necessary to the capacity and operation of the quarry.

Can be considered in two sections (P) Pricing
(W) Working

IMPORTANCE

IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX		✓✓✓	✓
ROUTINE		✓✓	
MECHANICAL			

MADE BY

W. Appleby
S. Philips
J. Bairstow

J. Winnard
P. Corner

J. Carrick

MANAGER

DECISION INFORMATION ANALYSIS

DECISION

PRICING LARGE CONTRACTS

11

TYPE	INFORMATION REQUIRED	class	cat
Objective	Service and profit.		
Technical	Effect on unit re. availability/materials, " transport, other orders. Quality requirements. Timing.		
Control	Contribution from contract. Comparison with schedule. Effect on other business. Procedure for quoting and chasing. Discussion with production and distribution on price. Stock levels. Alternative sources of supply. Customer relations.		
Background	Competitors' prices. Other orders to suppliers. Competitors in the area.		

Class A available and used
B available not used
C not available

Cat: A vital information
B desirable and economic
C desirable but not economic

DECISION DEFINITION

NO.

12

DECISION

PRICE LEVELS

DEFINITION

Establishing and maintaining price levels in the local market within the market strategy.

This decision covers the approval of price increases in terms of -

- a) the amount,
- b) the timing.

Establishing a competitive position is also covered.

IMPORTANCE

IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX		\\\\\\\\\\\\\\	\\\\\\ \\\\\\
ROUTINE			
MECHANICAL			

MADE BY

W. Appleby
S. Philips
J. Bairstow
F. Lumby
D. Kirkham

D. Hallsworth
D. Wingfield
R. C. Bishop
J. Winnard
S. Joberns
D. Wright
P. Corner
C. Ovens

W. Henderson
G. Stewart

DECISION	DEVIATIONS FROM PRICE LEVELS
----------	------------------------------

DEFINITION	
<p>Where local manager wishes to go outside the price levels to obtain business or even retain business.</p>	
<p>*Note this normally only occurs with major customers.</p>	

IMPORTANCE			
IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX		✓✓✓✓	✓✓
ROUTINE		✓	✓
MECHANICAL			

MADE BY		
W. Appleby F. Lumby D. Kirkham	J. Winnard S. Joberns P. Corner C. Ovens	J. Carrick G. Stuart

MANAGER

DECISION INFORMATION ANALYSIS

DECISION

PRICES OFF SCHEDULE

13

TYPE	INFORMATION REQUIRED	class	cat
Objective	Obtain or retain business.		
Technical	Quality required. Nature of product. Timing.		
Control	Customer : present levels of sales, present prices, contribution. Product : availability, present levels of demand. Distribution considerations, regular orders, easy run, etc. Necessity of obtaining work at lower margins. Alternative sources of supply - contribution created. Possible effect on other business. Preparation of local authority tenders. Major customer contracts and tenders.		
Background	Other possible competitors' prices. General level of demand.		

DECISION

ACCEPTING ORDERS.

DEFINITION

The decision to accept an order can involve a consideration of current production levels, stocks, etc. as well as the commercial problem of customer creditworthiness, etc.

IMPORTANCE

IMPACT SPECTRUM			
	MINOR	IMPORTANT	VITAL
COMPLEX		✓✓	✓✓
ROUTINE		✓	✓✓
MECHANICAL			

MADE BY

W. Appleby
O. Burgess

R. Bentley
S. Joberns

D. Brown
J. Aitken
D. Ross

MANAGER		DECISION INFORMATION ANALYSIS		
DECISION	ACCEPTING ORDERS			15
TYPE	INFORMATION REQUIRED		class	cat
Objective	<p>To take orders which can be met within the acceptable delivery time.</p> <p>THERE IS NO POINT TAKING ORDERS WHICH CANNOT BE SUPPLIED.</p>			
Technical	<p>Qualities.</p> <p>Materials.</p> <p>Timing.</p> <p>Location.</p> <p>Size of load.</p> <p>Plant and vehicle capabilities.</p>			
Control	<p>Monitor shortfall.</p> <p>Total orders on any one unit.</p> <p>Total orders of materials.</p> <p>Stock levels.</p> <p>Daily flow of information from quarries on capacity, breakdowns, etc.</p> <p>Forward programme for deliveries.</p> <p>Availability of materials and products.</p> <p>Ability to handle orders, etc.</p>			
Background	<p>General level of demand.</p>			

DECISION DEFINITION

NO.

16

DECISION

SPECIAL CUSTOMERS

DEFINITION

The strategic approach with regard to negotiation and treatment of specific large, important and/or influential customers.

This would cover special situations appertaining to :-

- a) Lime-British Steel.
- b) Bitumen tenders.
- c) Local authority tenders.
- d) British Rail, etc.

IMPORTANCE

IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX		✓	✓✓
ROUTINE		✓	✓
MECHANICAL			

MADE BY

W. Appleby
S. Philips
R. Clare

J. Carrick
W. Henderson

MANAGER	
---------	--

DECISION INFORMATION ANALYSIS

DECISION	SPECIAL CUSTOMERS	16
----------	-------------------	----

TYPE	INFORMATION REQUIRED	class	cat ²
Objective	Maintenance and development of good relations with specific customers of value, i.e. high contributors.		
Technical	Quality of service. Agreed contracts, tenders, etc.		
Control	Level of business. Contribution from business. Products taken and trend. Level of credit taken by customer. State of account. Level of service to customer. Future value of customer. Calls made on customers. Credit rates usual notes issued. Complaints made. Shortfall on orders. Negotiations with British Steel. Specific monitoring of certain customers		
Background	Customers other dealings with competitors. Dependence on customer's business. Quality of customer over financial standing.		

DECISION DEFINITION

NO.

17

DECISION

DIRECTION OF MARKET EFFORT

DEFINITION

The strategy concerned with the way in which the market will be attacked, covering such items as:-

Sale of excess stocks.

Pressure to sell output from new units,
newly acquired units, or depots.

New accounts.

New products.

NB Though assistance is sought from marketing personnel, this is not considered to be a marketing decision but a management decision.

IMPORTANCE

IMPACT SPECTRUM			
	MINOR	IMPORTANT	VITAL
COMPLEX		✓✓✓✓	✓✓✓✓
ROUTINE			
MECHANICAL			

MADE BY

W. Appleby
R. Clare
S. Philips
J.N. Place

D. Hallsworth
R. C. Bishop
S. Joberns

W. Henderson
G. Stewart

MANAGER		DECISION INFORMATION ANALYSIS										
DECISION	DIRECTION OF MARKETING EFFORT		17									
TYPE	INFORMATION REQUIRED	class	cat									
Objective	<p>Products which need to be sold. Stock levels to be reduced. Customer demand trends. To maintain and if possible increase profits from a given market.</p> <table border="1"> <tr> <td>MAR ^{PROD-}UCT</td> <td>PRESENT</td> <td>NEW</td> </tr> <tr> <td>PRESENT</td> <td>INCREASE SHARE</td> <td>INNOVATE</td> </tr> <tr> <td>NEW</td> <td>EXPAND</td> <td>DIVERSIFY</td> </tr> </table>	MAR ^{PROD-} UCT	PRESENT	NEW	PRESENT	INCREASE SHARE	INNOVATE	NEW	EXPAND	DIVERSIFY		
MAR ^{PROD-} UCT	PRESENT	NEW										
PRESENT	INCREASE SHARE	INNOVATE										
NEW	EXPAND	DIVERSIFY										
Technical	<p>British Standards changes etc. Construction Industry developments. New product work. Market research reports. Market size. Market potential. Present market share.</p>											
Control	<p>Cost volume relationships. Individual units' reserves and production rates. Economic planning information. Historical sales trends. What are our customers buying and why? (End use.) Contribution and price trends. Representatives' reports. Planned profit to market share ratio. (Contribution). Market sector performance. Price increases, amount and timing.</p>											
Background	<p>Our competitors' activities. Other Tilcon divisions. The economy - general. The economy - industry.</p>											

Class A available and used
B available not used
C not available

Cat: A vital information
B desirable and economic
C desirable but not economic

DECISION DEFINITION

NO.

19

DECISION

TECHNICAL CONTROL

DEFINITION

This is the decision concerned with taking action to maintain the technical specification of the material. This is also referred to as quality control. There are three ways in which this decision comes about.

- (I) Initiated by the technical manager via the routine technical monitoring procedures.
- (R) Requested by technical for specific non-routine needs requiring special action.
- (P) New project work where technical levels must be established.

To do this requires a decision on the standards to be observed, the testing programme to be followed, deciding on the type and frequency of tests.

The results from the tests lead to a decision to adjust the machines to correct the deviations from standard.

IMPORTANCE

IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX		✓✓	✓
ROUTINE		✓✓✓✓✓✓✓✓	✓
MECHANICAL			

MADE BY

W. Massey
W. Appleby
G. Williams
A. Lakin
E. Eustace
M. Anson

D. Hallsworth
A. Allen
B. Hartley
D. Tomkinson
A. Brown
L. Parry

D. Brown

DECISION DEFINITION

NO.

23

DECISION

SALES BUDGET APPROVAL

DEFINITION

The approval of the anticipated levels of sales for each unit for the next year. This is the budget against which activities will be judged. It is not the forecast of likely business.

IMPORTANCE

IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX		✓✓	✓✓
ROUTINE		✓✓	✓
MECHANICAL			

MADE BY

F. Lumby
D. Kirkham

C. Ovens
J. Winnard
S. Joberns
D. Wright
P. Corner

J. Carrick
G. Stewart

DECISION	APPOINTMENT OF STAFF (2)
----------	--------------------------

DEFINITION
The appointment of staff at all levels below sales manager, quarry manager and equivalent.

IMPORTANCE			
IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX			✓✓
ROUTINE		////////////////	//////////////// ✓
MECHANICAL			

MADE BY		
W. Massey	A. Allen	A. McHattie
F. Lumby	C. Ovens	P. Logan
G. Williams	B. Hartley	J. Smart
J. Brown	D. Bentley	J. Brown
A. Lakin	P. Edwards	J. Aitken
E. Eustace	S. Joberns	
D. Kirkham	D. Wright	
K. Barker	K. Brown	
B. Howarth	P. Corner	
	B. White	
	G. Clarke	

MANAGER

DECISION INFORMATION ANALYSIS

DECISION

STAFF APPOINTMENT

24

TYPE	INFORMATION REQUIRED	class	cat
Objective	The right man: job profile.		
Technical	Qualifications. Experience. Personal data. Salary level. Training programme, required or desired.		
Control	References. Personal knowledge. Aptitude tests. (Can he do what he says?) Knowledge of the job : job specification. Application form. Interview, comparison with others available. Potential.		
Background	General area into which individual will fit.		

Class A available and used
B available not used
C not available

Cat: A vital information
B desirable and economic
C desirable but not economic

DECISION

CUSTOMERS' COMPLAINTS

DEFINITION

This area covers the decisions concerned with all queries from customers concerning service etc. The decision at commercial manager level is concerned with those complaints of a significant nature that have not already been dealt with. There are four main areas:-

1. Quality of materials.
2. Service.
3. Administration.
4. Charges.

IMPORTANCE

IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX		✓✓✓✓✓✓✓✓ ✓✓	✓
ROUTINE		✓✓✓✓✓✓✓✓	
MECHANICAL			

MADE BY

F. Lumby
D. Kirkham
M. Anson
S. Philips
J. Bairstow
O. Burgess
D. Armstrong
E. Eustace

C. Ovens
J. Winnard
S. Joberns
D. Wright
P. Corner
L. Parry
B. Hartley

✓ J. Carrick
G. Stewart
D. Ross
D. Brown
J. Aitken

MANAGER	
---------	--

DECISION INFORMATION ANALYSIS

DECISION	CUSTOMER COMPLAINTS	25
----------	---------------------	----

TYPE	INFORMATION REQUIRED	class	cat
Objective	Satisfaction of customer. Correction of fault.		
Technical	Details of order. i.e. Material. Delivery time. Specification required. Previous deliveries. Technical log showing sales, samples and results.		
Control	Test of material delivered. Complaint report. Vehicle work sheet. Details of work done. Time load left quarry. Responsibility. Committee meeting. Customer's report of complaint. Customer history records. Short fall reports.		
Background	General information on customer. Agreed industry practice.		

Class A available and used
B available not used
C not available

Cat: A vital information
B desirable and economic
C desirable but not economic

DECISION

PRODUCTION BUDGET APPROVAL

DEFINITION

The preparation and approval of production levels for the next 12 months. This covers both tonnages and cost.

IMPORTANCE

IMPACT SPECTRUM			
	MINOR	IMPORTANT	VITAL
COMPLEX		✓	✓✓
ROUTINE		✓✓✓	✓✓✓
MECHANICAL	✓		

MADE BY

W. Massey
G. Williams
A. Lakin

D. Hallsworth
A. Allen
H. Ginnis
D. Tomkinson
A. Brown
L. Parry

P. Logan
J. Hutton

MANAGER	DECISION INFORMATION ANALYSIS		
DECISION	PRODUCTION BUDGET APPROVAL		29
TYPE	INFORMATION REQUIRED	class	cat
Objective	Produce the planned production level.		
Technical	Unit production levels (throughput). Stock levels. Manpower required to meet levels (historical). Materials available. Tonnes per hour. Extraction levels. Current state of plant. Predicted inflation rate.		
Control	Production required by sales (quantities and types). Pay levels. Indirect costs. Hours to be worked. Discussions with production staff. Comparison with other units. Comparison with historic information. Breakdown history. Weekly hours worked on maintenance. Previous accounts.		
Background	Other budgets.		

Class A available and used
 B available not used
 C not available

Cat: A vital information
 B desirable and economic
 C desirable but not economic

DECISION	IMPROVING OPERATIONS
----------	----------------------

DEFINITION	
<p>Improvements in operations are of two distinct types.</p> <p>(M) Minor changes particularly of a working or engineering nature.</p> <p>(MJ) Major changes which are normally referred to the engineering department for advice and assistance.</p>	

IMPORTANCE			
IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX		///	///
ROUTINE		✓	
MECHANICAL			

MADE BY	
W. Massey G. Williams A. Lakin M. Anson	D. Brown J. Stewart M. Hopperton

MANAGER		DECISION INFORMATION ANALYSIS	
DECISION	IMPROVING OPERATION	30	
TYPE	INFORMATION REQUIRED	class	cat
Objective	Improve throughput or performance.		
Technical	Technological developments. Product development. New specifications. Type of plant - engineering specifications. Production per hour. Technical reports. Engineering reports.		
Control	Maintenance costs. Breakdowns, cause and effect. Cost per tonne. Complaints. Observation. Quarry reports. Budgeted expenditure levels.		
Background	Similar plants, throughput, quality.		

DECISION

MAINTAINING OPERATIONS

DEFINITION

Keeping the unit working and avoiding the loss of productive capacity. This area is primarily concerned with operational efficiency and the effective maintenance of plant, equipment and people.

IMPORTANCE

IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX		✓✓	
ROUTINE		✓✓✓✓✓✓✓✓ ✓✓✓	✓
MECHANICAL			

MADE BY

W. Massey
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D. Cocker
L. Parry

P. Logan
M. Hopperton
J. Haddow
J. Jamieson
J. Stewart
J. Hutton

TYPE	INFORMATION REQUIRED	class	cat
Objective	Budget level - output, costs.		
Technical	Equipment manual per unit - fixed, mobile. Maintenance schedule. Inspection procedures. Engineering characteristics. Safety requirements. Plant breaking point. Expected life in hours. Production processes. (Flowchart.) Maximum production level. (Planning authority) Maintenance resources. (men etc.)		
Control	Throughput per hour. Hours lost. Maintenance costs. Production cost of each material. Cost of lost production (ie tonnes of material lost x contribution.) Plant history of breakdown and costs. Manager's diary. Movement of plant. Total operating hours. (Life) Individual plant record. Daily plant inspection. Future work schedule. Monthly maintenance report. Outstanding maintenance schedule. Monthly programme. Major repair reports.		
Background	Manufacturing performance figures. Other similar plants - internal, external.		

DECISION

RE-ALLOCATION OF ORDERS

DEFINITION

Moving orders to optimise profits, to meet production budgets and to utilise transport facilities.

IMPORTANCE

IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX			✓
ROUTINE		✓	✓
MECHANICAL			

MADE BY

O. Burgess

D. Bentley

D. Ross

MANAGER

DECISION INFORMATION ANALYSIS

DECISION

RE-ALLOCATION OF ORDERS

34

TYPE	INFORMATION REQUIRED	class	cat
Objective	To supply customer from best source. Budgeted output.		
Technical	Materials available. Vehicles available. Sources of materials - ranked in priority. Prices. Timing of orders. Overall level of orders. Haulage rates. Distances		
Control	Breakdowns) - Vehicles Delays) Breakdown - Plants Customers' Problems Quantity delivered.		
Background	Competitors' operations.		

DECISION

HAULAGE RATES

DEFINITION

Fixing haulage schedules and deciding upon variations from these schedules.

IMPORTANCE

IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX		✓	✓
ROUTINE		✓✓	✓✓
MECHANICAL			

MADE BY

O. Burgess
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D. Bentley
B. White

T. Harris
J. Smart



DECISION	ALLOCATION OF VEHICLES
----------	------------------------

DEFINITION
Deciding the basic allocation and then moving them to where the work is.

IMPORTANCE			
IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX		✓	
ROUTINE		//////	✓
MECHANICAL			

MADE BY		
O. Burgess D. Armstrong J. Brown	R. Bentley B. White	J. Smart D. Brown J. Aitken D. Ross

MANAGER

DECISION INFORMATION ANALYSIS

DECISION

ALLOCATION OF VEHICLES

36

TYPE	INFORMATION REQUIRED	class	cat
Objective	Full days work. Budget for working day.		
Technical	Vehicles available. Orders available. Vehicles required. Trumix orders. Basic fleet of Tilcon. Approved hauliers.		
Control	Information from quarries on requirements. Normally based at quarries and moved on demand. Orders for day. Location of drivers.		
Background			

Class A available and used
B available not used
C not available

Cat A vital information
B desirable and economic
C desirable but not economic

DECISION

VEHICLE MAINTENANCE

DEFINITION

- (S) Servicing procedures that are to be followed, deciding at what frequency the work is to be done.
- (R) Replacement or repair of major parts.
- (W) Working methods, that is, how and when work will be done. This decision is basically a planning decision.
- (SV) Special vehicle maintenance and related problems.

IMPORTANCE

IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX		✓✓	
ROUTINE		✓✓✓✓	✓
MECHANICAL			

MADE BY

D. Armstrong
J. Brown
S. Philips

R. Bentley
B. White

T. Harris
J. Smart
J. Aitken

MANAGER	
---------	--

DECISION INFORMATION ANALYSIS

DECISION	VEHICLE MAINTENANCE	49
----------	---------------------	----

TYPE	INFORMATION REQUIRED	class	cat
Objective	1. Maximum availability of vehicles. 2. Meeting all statutory requirements.		
Technical	Statutory requirements. Vehicle manuals. Manufacturer's recommendations. Servicing plans. Technical details. M.O.T.) Programme. Plates) Planned life of parts (age, mileage). Performance study. M.P.G. Oil, etc.		
Control	Repair records. Major repairs separate sheets. Full maintenance details, costs, (actual) etc. Vehicle history (LIFE COSTS & PERFORMANCE) Service reports. Monthly reports. V.P.R. Tyre use (miles). Fuel consumption. Purchases. Overtime analysis. Replacement parts and repaired parts. Defect reports. Body repair reports. Damage reports. Vehicle downtime (HOURS).		
Background	Other vehicle details in group. Other vehicle details external to group.		

DECISION	CAPITAL EXPENDITURE
----------	---------------------

DEFINITION
<p>The decision to spend funds on capital projects, whether of a replacement, or development nature.</p> <p>This covers the preparation of the budget and the decisions involved in saying which particular projects will be included and what they will cost.</p>

IMPORTANCE			
IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX		✓	✓✓✓✓✓
ROUTINE		✓✓✓	✓✓
MECHANICAL			

MADE BY		
R. Clare S. Philips B. Keys J.N. Place B. Howarth	D. Hallsworth H. Ginnis D. Wingfield R. C. Bishop D. Edwards G. Clarke	W. Henderson A. McHattie

MANAGER	
---------	--

DECISION INFORMATION ANALYSIS

DECISION	CAPITAL EXPENDITURE	52
----------	---------------------	----

TYPE	INFORMATION REQUIRED	class	cat
Objective	<p>Return on capital employed. Priority levels - Essential, Desirable, Special.</p> <p>Perhaps the most essential factor is the discussion which surrounds the importance of the investment for the future. This is often subjective once the financial appraisals have been studied.</p>		
Technical	<p>Technical Drawings. Planning Permission (where necessary). Detailed financial appraisal, including project costs and benefits.</p>		
Control	<p>Existing projects. Existing financial commitments. Accounts. Detailed discussion on requirements. Capex returns.</p>		
Background	<p>General economic climate. Plans for overall growth.</p>		

Class A available and used
B available not used
C not available

Cat: A vital information
B desirable and economic
C desirable but not economic

DECISION

ENVIRONMENTAL

DEFINITION

Any decisions which might affect environmental considerations, whatever they might be.

IMPORTANCE

IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX		✓✓	✓✓
ROUTINE		✓	
MECHANICAL			

MADE BY

R. Clare
M. Anson
B. C. Keys

D. Wingfield
A. Brown

MANAGER	
---------	--

DECISION INFORMATION ANALYSIS

DECISION	ENVIRONMENTAL	53
----------	---------------	----

TYPE	INFORMATION REQUIRED	class	cat
Objective	Improvement required in environmental control.		
Technical	Statutory requirements. Engineering requirements, drawings, etc. Equipment requirements. Restoration requirements.		
Control	Complaints. Measurements of pollution levels. Inspections. Visits from - Environment Officer - Mines and quarries inspector. Safety reports.		
Background	General public opinion.		

DECISION	VEHICLE REPLACEMENT
----------	---------------------

DEFINITION
Choosing which vehicle to replace in the fleet within the financial constraint.
i.e. Limit on amount to be spent on replacement, so choice of where money is spent.

IMPORTANCE			
IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX			///
ROUTINE		✓✓	✓
MECHANICAL			

MADE BY		
J. Brown	B. White	J. Smart
S. Philips	D. Hallsworth	
D. Armstrong		

MANAGER

DECISION INFORMATION ANALYSIS

DECISION

VEHICLE REPLACEMENT

57

TYPE

INFORMATION REQUIRED

class

cat

Optimum life cycle cost of vehicles. (The point at which replacement and continual operation break even).

Objective

Vehicle life.
Total costs.
Operating costs.
Performance record.
Petrol and oil consumption.
General condition.
Vehicles available and cost.
Vehicle type - cab, body, engine, etc.
Total miles.
Written down value.

Technical

Vehicle performance records.
Maintenance records.
Availability records.
Level of requirements. (Policy on requirements to do the work rather than invest and find the work).

Control

Vehicle manufacturers' records.

Background

Class A available and used
B available not used
C not available

Cat: A vital information
B desirable and economic
C desirable but not economic

DECISION

BUDGET APPROVAL (TRANSPORT)

DEFINITION

Agreement of the Transport budget.

IMPORTANCE

IMPACT SPECTRUM			
	MINOR	IMPORTANT	VITAL
COMPLEX			✓✓
ROUTINE		✓	✓✓
MECHANICAL			

MADE BY

J. Brown
D. Armstrong

R. Bentley
B. White

J. Smart

MANAGER		DECISION INFORMATION ANALYSIS		
DECISION	BUDGET APPROVAL - TRANSPORT			58
TYPE	INFORMATION REQUIRED	class	cat	
Objective	Transport budgeted return on investment.			
Technical	Fleet size. Future license costs. Drivers' increases in pipeline. Tonnages to be carried.			
Control	Previous costs. VPR's - take inflated cost values. Average load size. Average haul. Breakdowns. Availability etc. Calculate required earnings to cover all costs and make the necessary return. Convert this to p per mile then use for rating.			
Background	Sales levels. Policy - i.e. profits, service.			

Class A available and used
 B available not used
 C not available

Cat. A vital information
 B desirable and economic
 C desirable but not economic

DECISION

ALLOCATION OF RESOURCES

DEFINITION

- (L) The long term allocation of resources, covering manpower, materials and equipment.
- (S) Short term allocation to specific tasks.

IMPORTANCE

IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX			✓
ROUTINE		//////	
MECHANICAL			

MADE BY

E. Eustace
B. C. Keys

J. Jamieson
B. Taylor
T. Harris
J. Aitken
J. Brown
W. Henderson

MANAGER

DECISION INFORMATION ANALYSIS

DECISION	ALLOCATION OF RESOURCES	64
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TYPE	INFORMATION REQUIRED	class	cat
Objective	Requirement for resources.		
Technical	Resources available. Work content of resources. (Value in producing outputs.)		
Control	Work programme from activities. Calculation of resources required. Plan of resources and their allocation. Priorities related to benefits created. Project approval to determine inputs required and benefits.		
Background	Resource capabilities in other fields.		

DECISION DEFINITION

NO.

66

DECISION

PREVENTATIVE MAINTENANCE

DEFINITION

The decision associated with establishing a system for recording and acting in such a manner as to avoid unexpected plant breakdown.

IMPORTANCE

IMPACT SPECTRUM			
	MINOR	IMPORTANT	VITAL
COMPLEX		✓	✓
ROUTINE		✓✓✓	
MECHANICAL			

MADE BY

A. Allen
D. Cocker
L. Parry

J. Jamieson
B. Taylor

MANAGER

DECISION INFORMATION ANALYSIS

DECISION

PREVENTATIVE MAINTENANCE

66

TYPE

INFORMATION REQUIRED

class

cat

Objective

Avoidance of breakdowns.

Technical

Plant technical literature.
Manufacturer's recommended life.
Breaking point of all plant in terms of throughput
or life on estimation.
Detailed maintenance programme.
Planned engineering time for maintenance.
Plant flow diagrams.

Control

Cost of lost production.
Inspection programme.
Historical information on performance.
Breakdown history.
Parts supplied.
Life costs.
Throughput levels.
Anticipated future use of plant.
Plant records: use of equipment.
Machine's diary for following week.
Large jobs listed for next month.

Background

Other companies' experience.

Class A available and used
B available not used
C not available

Cat: A vital information
B desirable and economic
C desirable but not economic

DECISION	MARKETING STRATEGY
----------	--------------------

DEFINITION
What products or customers to concentrate on to increase the share of the market.

IMPORTANCE			
IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX			✓✓
ROUTINE		✓✓	
MECHANICAL			

MADE BY		
D. Kirkham	C. Ovens P. Corner	G. Stuart

MANAGER

DECISION INFORMATION ANALYSIS

DECISION

MARKETING STRATEGY

68

TYPE	INFORMATION REQUIRED	class	cat
Objective	Where does the contribution originate?		
Technical	Product developments. Product availability. Pricing structures. Customer demand patterns. End use analysis. Potential customers. New reserves. Local authority plans.		
Control	Contribution analysis by - market, product, customer, end use, etc. Historical sales. Trends. Future probabilities. Stock levels. Plant capabilities. Distribution capabilities. Inter-divisional analyses. Market size. Market share.		
Background	Industry developments. Competitors' activities.		

Class A available and used
B available not used
C not available

Cat: A vital information
B desirable and economic
C desirable but not economic

DECISION DEFINITION

NO.

69

DECISION

CREDIT CONTROL

DEFINITION

- (1) The decision on which customers to give credit to.
- (2) The monitoring of customers' credit.

IMPORTANCE

IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX		✓✓✓	
ROUTINE		✓✓✓✓✓	✓
MECHANICAL		✓	

MADE BY

D. Kirkham
J. Bairstow
O. Burgess

C. Ovens
S. Joberns
K. Brown
R. C. Bishop
G. Clarke

A. McHattie
J. Carrick
E. Robb
J. Brown

MANAGER	
---------	--

DECISION INFORMATION ANALYSIS

DECISION	CREDIT CONTROL	69
----------	----------------	----

TYPE	INFORMATION REQUIRED	class	cat
Objective	Target month's credit (2.0)		
Technical	Customer credit rating : Outside sources, Timber Trades, etc.		
Control	Level of sales. Payment frequency. Credit limits. Stop list customers. Analysis of debtors by size and category. Bad debt potential. Trends of sales to customers. Stop lists. Court Actions. Financial Press. New customer control procedures - new customer report. Monitoring invoice procedures. Monitoring customer queries. Monitoring credit rates.		
Background	Other competitors' ratings of customers. General economic climate. Local customer knowledge.		

DECISION DEFINITION

NO.

71

DECISION

OBTAINING FINANCE

DEFINITION

Deciding what financial resources are required and ensuring these are made available from two sources.

a) H.O.

b) Banks.

For subsidiary companies there is only one, namely the bank.

IMPORTANCE

IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX		✓✓✓	
ROUTINE		✓	
MECHANICAL			

MADE BY

B. Howarth

G. Clarke

A. McHattie

J. Brown

MANAGER	
---------	--

DECISION INFORMATION ANALYSIS

DECISION	OBTAINING FINANCE	71
----------	-------------------	----

TYPE	INFORMATION REQUIRED	class	cat
Objective	Financial requirements from cashflow.		
Technical	Sources of finance (mostly via HQ) Interest levels. Finance for subsidiary companies usually with own banks. Current tax situation - in case leasing is desirable.		
Control	Preparation of cashflow statements. Exceptional requirements planned ahead. Control of Debtors, Creditors and stock investments. Accounts. Debtors and Creditors reports.		
Background	General Economic Climate.		

DECISION

ACQUISITIONS

DEFINITION

Financial advice on acquisitions with a decision on the price that should be paid.

IMPORTANCE

IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX		✓✓	✓
ROUTINE			
MECHANICAL			

MADE BY

B. Howarth

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A. McHattie

MANAGER	
---------	--

DECISION INFORMATION ANALYSIS

DECISION	ACQUISITIONS	72
----------	--------------	----

TYPE	INFORMATION REQUIRED	class	cat
Objective	Suitability for acquisition - return on investment potential.		
Technical	<div>Technical appraisal of assets. Financial approval of prospect.</div> <div>Proposal Survey Recommendation Board TT</div> <div>●—————●—————●—————●—————●</div> <div>Need for resources and/or market.</div>		
Control	<div>Success of acquisition. Review of profits against forecast. Detailed financial approval i.e. valuation of balance sheet, survey of profitability.</div> <div>Depending on type of acquisition, bid, merger, sale etc. discussions may or may not take place with company concerned. In most of Tilcon's cases negotiations are involved rather than bids.</div>		
Background	Competitors' activities. Share interest situation.		

DECISION

(FINANCIAL) PROJECTS APPRAISAL

DEFINITION

Financial justification for projects calling for funds. These are mainly future capital projects for replacement and development.

SEE DECISION 52

IMPORTANCE

IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX		✓	✓✓
ROUTINE			
MECHANICAL			

MADE BY

B. Howarth

G. Clarke

A. McHattie

DECISION	LEGISLATION
----------	-------------

DEFINITION
Deciding what action to take to ensure the company's activities conform to current legislation.

IMPORTANCE			
IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX		✓✓	
ROUTINE			
MECHANICAL			

MADE BY	
B. Howarth	A. McHattie

MANAGER

DECISION INFORMATION ANALYSIS

DECISION

LEGISLATION

74

TYPE	INFORMATION REQUIRED	class	cat.
Objective	Ensuring statutory requirements are met.		
Technical	Finance acts. Green papers. White papers. Development regions and which activities were covered. Legislation on grants and employment subsidies.		
Control	Discussions at MICC. HQ recommendations on action. Discussions with local offices. Discussions with auditors. Analysis of purchases for grants. Record of grants received and claims.		
Background			

Class: A available and used
B available not used
C not available

Cat: A vital information
B desirable and economic
C desirable but not economic

DECISION DEFINITION

NO.

79

DECISION

SAFETY

DEFINITION

Deciding on action to meet the safety requirements as specified by the safety committee.

IMPORTANCE

IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX		✓✓✓✓	✓
ROUTINE		✓	
MECHANICAL			

MADE BY

D. Tomkinson
A. Brown

J. Haddow
J. Jamieson
B. Taylor
T. Harris
D. Brown

MANAGER	
---------	--

DECISION INFORMATION ANALYSIS

DECISION	SAFETY	79
----------	--------	----

TYPE	INFORMATION REQUIRED	class	cat
Objective	Safety requirements.		
Technical	Statutory requirements for quarry.		
Control	Safety committee minutes. Safety inspector's report. Repair records for safety. Costs of materials and labour. Monthly Safety report.		
Background			

Class A available and used
 B available not used
 C not available

Cat: A vital information
 B desirable and economic
 C desirable but not economic

DECISION DEFINITION

NO.

80

DECISION

HANDLING MEN

DEFINITION

The decisions involved regarding working conditions and the attitudes and performance of subordinates.

IMPORTANCE

IMPACT SPECTRUM			
	MINOR	IMPORTANT	VITAL
COMPLEX			✓✓✓ ✓✓✓
ROUTINE			
MECHANICAL			

MADE BY

H. Ginnis
D. Tomkinson
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B. Taylor
J. Hutton

MANAGER

DECISION INFORMATION ANALYSIS

DECISION

HANDLING MEN

80

TYPE	INFORMATION REQUIRED	class	cat
Objective	Motivation and performance. Recognition of the security, dignity and satisfaction of each individual.		
Technical	Individual performance standards. Rules and regulations. Individual's capabilities. Individual job responsibilities. Safety rules.		
Control	Actual individual performance. Bonus schemes (where operational) Works council meetings general information.		
Background	Outside payscales. General political environment.		

Class A available and used
 B available not used
 C not available

Cat: A vital information
 B desirable and economic
 C desirable but not economic



DECISION	TRAINING
----------	----------

DEFINITION

Deciding the training that subordinates should receive to:-

- a) Perform their correct duties more effectively.
- b) Move on to more skilful tasks.

IMPORTANCE

IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX			✓
ROUTINE			✓
MECHANICAL			

MADE BY

K. Barker

J. Hadow

MANAGER

DECISION INFORMATION ANALYSIS

DECISION

TRAINING

81

TYPE	INFORMATION REQUIRED	class	cat
Objective	Adequate job performance. Job requirements. Training plans.		
Technical	Job details broken down into tasks. Knowledge required. Experience required. Training needs		
Control	Tests: Written Practical Training records. Training schedule. Monitor Training costs against budget. Training returns. (ITB)		
Background			

DECISION DEFINITION

NO.

82

DECISION

SHOP STEWARDS COMMITTEE (INDUSTRIAL RELATIONS)

DEFINITION

Deciding on action to meet the demands of the men as expressed by the union representative.

In addition the handling of union negotiations is included.

IMPORTANCE

IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX		✓✓	✓✓✓
ROUTINE			
MECHANICAL			

MADE BY

K. Barker

H. Ginnis
D. Tomkinson
A. Brown
L. Parry

J. Jamieson
J. Stewart

MANAGER	
---------	--

DECISION INFORMATION ANALYSIS

DECISION	SHOP STEWARD COMMITTEE	82
----------	------------------------	----

TYPE	INFORMATION REQUIRED	class	cat
Objective	Constitution and responsibilities.		
Technical	Procedure at meetings. Legislation. Current pay levels.		
Control	Minutes. Grievances raised and dealt with.		
Background	General political environment.		

DECISION

APPOINTMENT OF MEN (3)

DEFINITION

Taking on operatives.

IMPORTANCE

IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
			✓
COMPLEX			✓
ROUTINE		✓✓	✓
MECHANICAL			

MADE BY

D. Tomkinson
L. ParryJ. Jamieson
B. Taylor

MANAGER

DECISION INFORMATION ANALYSIS

DECISION

TAKING ON MEN

83

TYPE	INFORMATION REQUIRED	class	ca
Objective	Job description.		
Technical	Details of tasks for men. Knowledge required. Experience required.		
Control	Interview records. Application. General knowledge of the man.		
Background	General pay levels. References.		

Class A available and used
B available not used
C not available

Cat A vital information
B desirable and economic
C desirable but not economic



DECISION	SUBSIDIARY OVERALL POLICY
----------	---------------------------

DEFINITION
Agreeing the overall policy of operating subsidiaries.

IMPORTANCE			
IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX		✓✓	
ROUTINE			
MECHANICAL			

MADE BY	
J. N. Place	W. Henderson

MANAGER		DECISION INFORMATION ANALYSIS		
DECISION	SUBSIDIARY POLICY			89
TYPE	INFORMATION REQUIRED	class	cat	
Objective	The overall target of subsidiary.			
Technical	Levels of desired operations. Areas of activities. Products.			
Control	Plans. Detailed budgets. Actual accounts which show performance against plan. Monthly meetings.			
Background	Local environment. Economic climate.			

DECISION

PLANNING REQUIREMENTS

DEFINITION

The need for services concerned with placing planning applications and other planning requirements.

IMPORTANCE

IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX			
ROUTINE			✓
MECHANICAL			

MADE BY

W. Henderson

MANAGER

DECISION INFORMATION ANALYSIS

DECISION

PLANNING REQUIREMENTS

91

TYPE

INFORMATION REQUIRED

class

cat

Objective

Planning permission for continuing or increasing
quarry activities.

Technical

Detailed plans.
Local bye-laws.
Planning authority procedures.
Geological surveys.
Operating considerations.
Type of plant.
Materials.
Roads - access.
Throughput.
Effect on local employment.

Control

Records of planning agreements.
Applications.
Monitoring position.
Following requirements.

Background

Competitors' activities.
Local feelings.
Pollution aspects.

Class A available and used
B available not used
C not available

Cat: A vital information
B desirable and economic
C desirable but not economic

DECISION DEFINITION

NO.

93

DECISION

PROJECT CONTROL

DEFINITION

Making sure the project is carried out effectively and efficiently and covers:-

- a) Monitoring of expenditure (use of resources).
- b) Programming the project to meet the required deadline.
- c) Appraisal of the project in the first phase to decide upon its feasibility.

IMPORTANCE

IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX		✓✓	✓
ROUTINE		✓	
MECHANICAL			

MADE BY

B. C. Keys
K. Barker

P. Cocker
D. Edwards

MANAGER

DECISION INFORMATION ANALYSIS

DECISION

PROJECT CONTROL

93

TYPE	INFORMATION REQUIRED	class	cat
Objective	Project resources and time scale.		
Technical	Resources required in men, equipment, money, time. Priority rating - (some system for deciding priority - essential, important, desirable.		
Control	Project ledger - orders and costs recorded. Project cards. Resource consumption. Monthly project report. Weekly verbal reports. Monthly meetings - minutes from meetings. Monthly list of committed capital expenditure. Project schedule. Project file with all documents. Cost to date related to progress.		
Background			



DECISION	PROJECT PRIORITIES
----------	--------------------

DEFINITION

Assessing the priority for individual projects prior to programming them.

SEE DECISION 93

IMPORTANCE

<div>IMPACT</div> <div>SPECTRUM</div>	MINOR	IMPORTANT	VITAL
COMPLEX		✓	
ROUTINE			
MECHANICAL			

MADE BY

B. C. Keys



DECISION	COMMISSIONING PLANT
----------	---------------------

DEFINITION

The detailed check that the plant meets the requirements for production, safety and the environment before handing over to production.

IMPORTANCE

IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX			✓
ROUTINE			
MECHANICAL			

MADE BY

B. C. Keys

MANAGER

DECISION INFORMATION ANALYSIS

DECISION

COMMISSIONING PLANT

98

TYPE	INFORMATION REQUIRED	class	cat
Objective	Performance requirements.		
Technical	Drawings. Technical specifications. Legal requirements, safety etc.		
Control	Inspection. Operation. Records of throughput etc. Quality of materials.		
Background	Technical information from manufacturers.		



DECISION	ENGINEERING POLICY
----------	--------------------

DEFINITION
The organisation and methods of the engineering function. Including the standards that will form the basis for technical decisions.

IMPORTANCE			
IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX			✓
ROUTINE			
MECHANICAL			

MADE BY
B. C. Keys

MANAGER

DECISION INFORMATION ANALYSIS

DECISION

ENGINEERING POLICY

99/100

TYPE	INFORMATION REQUIRED	class	cat
Objective	Standards required.		
Technical	Industrial standards. Technical standards. Legal requirements.		
Control	Method of organising engineering. Regular reports from managers and engineers on efficiency of service. Resource planning for project requirements.		
Background	General standards. Competitors' approach.		



DECISION	ACCOUNTING SYSTEMS
----------	--------------------

DEFINITION
Deciding how the accounting system will operate and when the data will be collected etc.

IMPORTANCE			
IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX		✓✓✓	
ROUTINE			
MECHANICAL			

MADE BY		
B. Howarth	G. Clarke	A. McHattie

MANAGER	
---------	--

DECISION INFORMATION ANALYSIS

DECISION	ACCOUNTING SYSTEMS	108
----------	--------------------	-----

TYPE	INFORMATION REQUIRED	class	cat
Objective	Provide information to management.		
Technical	Grants. Legislation. Facilities for providing information.		
Control	Performance of existing systems. MICC reports on developments. Discussion on how various administrative steps can be taken.		
Background	What other divisions are doing.		

DECISION

ADMINISTRATIVE POLICY

DEFINITION

Deciding the way in which the Regional and Area activities will be administered.

SEE DECISION 108

IMPORTANCE

IMPACT SPECTRUM	MINOR	IMPORTANT	VITAL
COMPLEX		✓✓	
ROUTINE			
MECHANICAL			

MADE BY

B. Howarth

G. Clarke

APPENDIX C

DECISION LISTS

APPENDIX C

Decision Lists

Introduction

The decision lists were produced as a means of reference and analysis.

Content

The lists have been produced at two levels:-

- a) Master list,
- b) Key decision list,
- c) Functional list.

The list shows the following information.

- a) Decision Title,
- b) Brief Description,
- c) Whether or not it is a Key Decision,
- d) Function Making the Decision.

Relevance to the Research

The decision lists enabled the detailed information needs of each decision to be sorted into function categories, as well as indicating possible functional overlaps and contradictions. The functional lists also act as a contents sheet for the functional decision definitions.

Cross References

This appendix is referred to in:-

Chapter 3, Section 3.8

Chapter 5, Section 5.1

Master List of Decisions

This lists some seventy decisions that were identified during the research. These decisions were considered to be the main decisions made by the managers interviewed. Numerous "minor" decisions such as establishing the switchboard rota, were excluded from the information analysis.

The master list was the basis from which the individual functional lists were prepared. At this stage in the research it was considered essential to maintain the record of which functions claimed to take the decision, so that overlapping responsibilities could be followed up later.

Some decisions are common to all functions, this does not necessarily mean that responsibilities overlap, but that the decision is made within the function. Decisions 3, 6 and 9 are examples of this.

No	DECISION TITLE	BRIEF DESCRIPTION	KEY	FUNCTIONS										
				P	D	S	G	T	Fe	F	E	Tr		
1	CAPACITY VARIATIONS	Changing levels of capacity by adjusting hours worked on plant.	✓	✓			✓							
2	REPLACEMENT OF PLANT	What should be replaced and when.	✓	✓			✓							
3	OPERATING METHODS	Original decision and changes thereto.	✓	✓		✓	✓	✓		✓				
4	EXPANSION	Decision to expand Activities.	✓				✓							
5	CONTRACTION	Decision to contract activities.	✓				✓							
6	STAFF APPOINTMENT (SNR)	Appointment of staff above Quarry Manager.	✓	✓			✓	✓			✓	✓		
7	EXPENDITURE CONTROL	Authority to spend.		✓		✓	✓	✓		✓	✓			
8	BUDGET APPROVAL	General approval of budgets.	✓				✓			✓				
9	PAY LEVELS	For all staff.		✓		✓	✓	✓		✓		✓		
10	DEPARTMENTAL INTERACTION	Resolution of conflict.					✓							
11	PRICING LARGE CONTRACTS		✓			✓	✓							
12	PRICE LEVELS	Maintaining the levels in the local market.	✓			✓	✓							
13	DEVIATION FROM PRICE LEVELS	Where it is necessary to obtain or retain business.	✓			✓	✓							
14	AUTHORISING CREDIT NOTES					✓	✓							
15	ACCEPTING ORDERS	Decision requires agreement on production and transport.	✓		✓	✓	✓	✓						
16	NEGOTIATIONS (CUSTOMERS)	Strategic approach to take with customers.	✓			✓	✓							
17	DIRECTION OF MARKET EFFORT	Changing plans to suit demand.	✓			✓	✓							
18	MONITORING PERFORMANCE	Action on results.		✓		✓	✓	✓		✓				
19	TECHNICAL CONTROL	Maintain quality of products.	✓	✓			✓		✓					
20	DISTRIBUTION STRATEGY						✓							
23	SALES BUDGET APPROVAL		✓			✓								
24	STAFF APPOINTMENT (MIDDLE)	Below Q. Manager	✓	✓		✓		✓	✓	✓	✓	✓	✓	
25	CUSTOMER COMPLAINTS	Deciding upon the action to be taken to resolve the query.	✓	✓	✓	✓	✓	✓	✓					
29	PRODUCTION BUDGET APPROVAL		✓	✓										
30	IMPROVING OPERATIONS	Deciding to make improvements in the operating environment.	✓	✓										
31	MAINTAINING OPERATIONS	Decision on action to maintain plant in working order.	✓	✓								✓		
33	ALLOCATING ORDERS	Allocation of orders to specific quarries.			✓		✓							

Key Decision List

DECISION TITLE	BRIEF DESCRIPTION	KEY	FUNCTIONS										
			P	D	S	G	T	Te	F	E	Tr		
CAPACITY VARIATIONS	CHANGING LEVELS OF CAPACITY BY ADJUSTING HOURS WORKED ON PLANT.	✓	✓			✓							
REPLACEMENT OF PLANT	WHAT SHOULD BE REPLACED AND WHEN.	✓	✓			✓							
OPERATING METHODS	ORIGINAL DECISION AND CHANGES THERETO.	✓	✓		✓	✓	✓		✓				
EXPANSION	DECISION TO EXPAND ACTIVITIES.	✓				✓							
CONTRACTION	DECISION TO CONTRACT ACTIVITIES.	✓				✓							
STAFF APPOINTMENT (SNR)	APPOINTMENT OF STAFF ABOVE QUARRY MANAGER.	✓	✓			✓	✓			✓	✓		
BUDGET APPROVAL	GENERAL APPROVAL OF BUDGETS.	✓				✓			✓				
PRICING LARGE CONTRACTS		✓			✓	✓							
PRICE LEVELS	MAINTAINING THE LEVELS IN THE LOCAL MARKET.	✓			✓	✓							
DEVIATION FROM PRICE LEVELS.	WHERE IT IS NECESSARY TO OBTAIN OR RETAIN BUSINESS.	✓			✓	✓							
ACCEPTING ORDERS	DECISION REQUIRES AGREEMENT ON PRODUCTION AND TRANSPORT	✓		✓	✓	✓	✓						
NEGOTIATIONS (CUSTOMERS)	STRATEGIC APPROACH TO TAKE WITH CUSTOMERS.	✓			✓	✓							
DIRECTION OF MARKET EFFORT	CHANGING PLANS TO SUIT DEMAND.	✓			✓	✓							
TECHNICAL CONTROL	MAINTAIN QUALITY OF PRODUCTS.	✓	✓			✓		✓					
SALES BUDGET APPROVAL		✓			✓								
STAFF APPOINTMENT (MIDDLE)	BELOW QUARRY MANAGER	✓	✓		✓		✓	✓	✓	✓	✓		
CUSTOMER COMPLAINTS	DECIDING UPON THE ACTION TO BE TAKEN TO RESOLVE THE QUERY.	✓	✓	✓	✓	✓	✓	✓					
PRODUCTION BUDGET APPROVAL		✓	✓										
IMPROVING OPERATIONS	DECIDING TO MAKE IMPROVEMENTS IN THE OPERATING ENVIRONMENT.	✓	✓										
MAINTAINING OPERATIONS	DECISION ON ACTION TO MAINTAIN PLANT IN WORKING ORDER	✓	✓								✓		
RE-ALLOCATION OF ORDERS	CHANGES IN ORIGINAL ALLOCATION.	✓		✓									
HAULAGE RATES	DECIDING WHAT TO CHARGE FOR HAULAGE.	✓		✓			✓						
ALLOCATION OF VEHICLES	BASIC ALLOCATION TO QUARRIES.	✓		✓			✓						
VEHICLE MAINTENANCE	HOW AND WHEN TO MAINTAIN VEHICLES.	✓					✓						
CAPITAL EXPENDITURE	DECISION ON WHICH ITEMS WILL BE INCLUDED IN BUDGET.	✓	✓			✓			✓	✓			
ENVIRONMENTAL	DECISION ON MATTERS AFFECTING THE ENVIRONMENT, POLLUTION, DUST, ETC.	✓	✓			✓				✓			
VEHICLE REPLACEMENT	WHICH VEHICLES SHOULD BE REPLACED AND WHEN.	✓				✓	✓						

DECISION SCHEDULE

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[illegible]

Functional Decision Lists

The functional lists have been prepared for each of the main functions.

P	-	Production
D	-	Distribution
S	-	Sales
G	-	General
T	-	Transport
Te	-	Technical
F	-	Finance
E	-	Engineering
Tr	-	Training

They have been prepared from the master decision list and form the contents pages for the functional Decision Definition files.

[illegible]

DECISION TITLE	BRIEF DESCRIPTION	KEY	FUNCTIONS									
			P	D	S	G	T	Tc	F	E	Tr	
CAPACITY VARIATION	Changing levels of capacity by adjusting hours worked on plant.	✓	✓			✓						
REPLACEMENT OF PLANT	What should bereplaced and when.	✓	✓			✓						
OPERATING METHODS	Original decision and changes thereto.	✓	✓		✓	✓	✓		✓			
EXPANSION	Decision to expand activities.	✓				✓						
CONTRACTION	Decision to contract activities.	✓				✓						
STAFF APPOINTMENT (SENIOR)	Appointment of staff above Quarry Manager.	✓	✓			✓	✓			✓	✓	
EXPENDITURE CONTROL	Authority to spend.		✓		✓	✓	✓		✓	✓		
BUDGET APPROVAL	General approval of budgets.	✓				✓			✓			
PAY LEVELS	For all staff.		✓		✓	✓	✓		✓		✓	
DEPARTMENTAL INTERACTION	Resolution of conflict.					✓						
PRICING LARGE CONTRACTS		✓			✓	✓						
PRICE LEVELS	Maintaining the levels in the local market.	✓			✓	✓						
DEVIATION FROM PRICE LEVELS	Where it is necessary to obtain or retain business.	✓			✓	✓						
AUTHORISING CREDIT NOTES					✓	✓						
ACCEPTING ORDERS	Decision requires agreement on production and transport.	✓		✓	✓	✓	✓					
NEGOTIATIONS (CUSTOMERS)	Strategic approach to take with customers.	✓			✓	✓						
DIRECTION OF MARKET EFFORT	Changing plans to suit demand.	✓			✓	✓						
MONITORING PERFORMANCE	Action on results.		✓		✓	✓	✓		✓			
TECHNICAL CONTROL	Maintain quality of products.	✓	✓			✓		✓				
DISTRIBUTION STRATEGY						✓						
CUSTOMER COMPLAINTS	Deciding upon the action to be taken to resolve the query.	✓	✓	✓	✓	✓	✓	✓				
ALLOCATING ORDERS	Allocation of orders to specific quarries.											
STORES LEVELS	Which items to hold in stock and the levels.		✓			✓	✓			✓		
CAPITAL EXPENDITURE	Decision on which items will be included in budget.	✓	✓			✓			✓	✓		
ENVIRONMENTAL	Decision on matters affecting the environment, pollution, dust, etc.	✓	✓			✓				✓		
RAIL MOVEMENTS	What to move and when.					✓						
VEHICLE REPLACEMENT	Which vehicles should be replaced and when.	✓				✓	✓					

[illegible]

[illegible]

[illegible]

[illegible]

Tr

[illegible]

APPENDIX D

INFORMATION FLOWS

APPENDIX D

Functional Information Flows

Introduction

The individual sheets for information inflows and outflows were compiled from the decision definitions within each functional section. As explained in Section 3.8 the inflows were analysed in detail showing for each function:-

Item of Information	System

This enabled an INFLOW sheet to be prepared for each function showing the inflows from each source. By reversing this and showing the course as a function, and the receiving function as a destination, it was possible to show outflows.

Content

This appendix contains the INFLOW and OUTFLOW sheets for the production function produced in the above way.

Inflows

The inflows show the information coming into the function and the source of the information, if known. A query (?) indicates that the information is not available, or if it is available, it is not reaching the production function, in which case the source is listed as unknown. The system which does, or should, produce the information is indicated by the sub-system code (Page 105).

Outflows

The outflows are produced for the function (which was a source of information on the Inflow sheets) and shows the destination of the information. The items of information are listed and the sub-system which does, or should, produce the information is shown.

Relevance to Research

By analysing the information required from each sub-system (see over) by referring to the sub-system code on the inflows and outflows, it is possible to show the information demands on any sub-system. This, when linked to the functional information flows, provides a full schedule of information needs.

Cross References

This appendix is referred to in:-

Chapter 3, Section 3.8

Chapter 5, Section 5.1

PLANT MAINTENANCE (PO3)

<u>Item of Information</u>	<u>Engineering</u>	<u>General</u>	<u>Finance</u>	<u>Production</u>
Maintenance Schedule	✓			✓
Inspection Procedures	✓			✓
Maintenance Resources	✓			✓
Hours Lost	✓			
Maintenance Costs	✓			
Movement of Plant	✓			✓
Plant Inspection Reports	✓			
Outstanding Maintenance				
Schedule	✓			✓
Major Repair Reports	✓			
Type of Plant	✓			
Mobile Plant Servicing				
Plans	✓			
Maintenance History		✓		✓
Breakdowns		✓	✓	
Life Costs				✓
Plant Breaking Point				✓
Expected Life				✓
Total Operating Life				✓
Major Repairs				✓

INFLOWS

(336)
INFORMATION FLOWS

FUNCTION	PRODUCTION
----------	------------

INFLOWS

SOURCE	PRODUCTION
--------	------------

INFORMATION	SYSTEM
Maintenance Schedule Inspection Procedures Stocking Facilities Re-crushing Facilities	P03 P03 P02 P04

(337)
INFORMATION FLOWS

FUNCTION	PRODUCTION
----------	------------

INFLOWS

SOURCE	SUPPLIERS
--------	-----------

INFORMATION	SYSTEM
Supplier Prices	-

(338)
INFORMATION FLOWS

CTION	PRODUCTION
-------	------------

INFLOWS

URCE	GEN. MAN.
------	-----------

INFORMATION	SYSTEM
Budgets	PP1
Stock Limits	P02
Use of Resources - Minerals	PP1
Agreed Working Levels	PP1
Availability of Funds	PP2
Capital Expenditure Projects	PP2
Restoration	PP2
Plant Replacement Programme	PP2

FUNCTION	PRODUCTION
SOURCE	?

INFLOWS

INFORMATION	SYSTEM
Optimum Operating Level	PA1
Quarry Breakeven	PA1
Plant Capacity (of each Material)	PP1
Variability of Plant	PO4
Excess Materials	PO2
Production Mix Costs	PA1
Output per Man Shift/Hour	PR1
Tonnes per Hour (Actual)	PR1
Maintenance History	PO3
Performance	PO4
Effects of not Replacing 2 Production	PR2
Effects of not Replacing - Costs	PA1
Needs in other Quarries	PR2
Similar Installations in Other Units	PR2
Loads per Hour	DO2
Vehicle Programme (Loadplan)	DO2
Actual Vehicles Working	DR1
Cost of Changes	PA1
Cost of Lost Production	PA1
Life Costs	PA1/PO3
Individual Performance Standards	PP1
Productivity Calculations	PR1
Exception Reports	PA1
Contribution Reports	PA1
Manager of the Month	PR2
Maintenance Schedule	PO3
Inspection Procedures	PO3
Plant Breaking Point	PO3
Expected Life	PO3
Production Processes (Flowchart)	PO4
Production Cost Each Material	PA1
Total Operating Life	PO3
Maintenance Report (Monthly)	PR2
Vehicles Available	DR2
Approved List of Hauliers	DR2
Tilcon Fleet	DR2
Cost of Stocking	PA1
Pollution Levels	-
Cost of Lost Time	PA1
Inspection Reports	PR2
Monthly Programme	PP1

(340)
INFORMATION FLOWS

FUNCTION	PRODUCTION
----------	------------

INFLOWS

SOURCE	QUARRY MANAGER
--------	----------------

INFORMATION	SYSTEM
Discussion Q. Manager	-
Current Face Conditions	PR1
No. of Men Needed	P04
Blast and Drill Programme	P04
Stock Levels	P02
Daily Report - Stock Movements	PR1
No. of Men Working	PR1
Effects of Breakdown on Production	P04
Actual Operating Levels	PR1
Effect of Changes	P04
Purchase Requirements	P02
Goods Received	P02
Resource Availability, Men, Equipment, etc.	PR1
Hopper Contents	P01
Loading Facilities	D02
Rules and Regulations	P04
Bonus Schemes in Operation	PA2
Performance and Bonus Records	PA2
Daily Production	PR1
Extraction Levels	P04
Maintenance Resources	P03
Hours Lost	P04
Manager's Diary	PR1
Movement of Plant	P03
Outstanding Maintenance Schedule	P03
Major Repairs	P03
Materials Available	P01
Suppliers	P02
Union Agreements	-
Monthly Programme	PR1
Inspection Reports	PR2

(341)
INFORMATION FLOWS

UNCTION	PRODUCTION
---------	------------

INFLOWS

SOURCE	PLANNING PERMISSION
--------	---------------------

INFORMATION	SYSTEM
Max. Permitted Hours	-

(342)
INFORMATION FLOWS

FUNCTION	PRODUCTION
----------	------------

INFLOWS

SOURCE	ENGINEERS
--------	-----------

INFORMATION	SYSTEM
Alternative Equipment Available Plant and Quarry Layout Plant Specification Plant Developments Engineering Characteristics	PP1 PO4 " " "

(343)
INFORMATION FLOWS

FUNCTION	PRODUCTION
----------	------------

INFLOWS

SOURCE	QUARRY
--------	--------

INFORMATION	SYSTEM
Tonnés per Hour Daily Order Sheet	PR1 PR1

(344)
INFORMATION FLOWS

UNCTION	PRODUCTION
---------	------------

INFLOWS

SOURCE	INSPECTOR (QUARRY DOE)
--------	------------------------

INFORMATION	SYSTEM
Safety Levels Environmental Controls	- -

(345)
INFORMATION FLOWS

FUNCTION	PRODUCTION
----------	------------

INFLOWS

SOURCE	DISTRIBUTION
--------	--------------

INFORMATION	SYSTEM
Demand Shortfall Daily Order Sheet Complaints	D01 DR2 D01 -

(346)
INFORMATION FLOWS

FUNCTION	PRODUCTION
----------	------------

INFLOWS

SOURCE	SALES & MARKETING
--------	-------------------

INFORMATION	SYSTEM
Future Demand	PP1

INFORMATION FLOWS

CONNECTION	PRODUCTION
------------	------------

INFLOWS

SOURCE	ACCOUNTS
--------	----------

INFORMATION	SYSTEM
Stock Values	AR1
Financial Appraisal	AR2
Cost of Maintaining v Replacing	AR2
Cost per Tonne	AR1
Prices	AR1
Profits	AR1
Maintenance Costs	AR1
Stores Values	AR1
Salary - Wage Levels	A02
Suppliers	AA1
Wage Differentials	A02
Accounts	AR1
Age of Machine	AA4
Type of Machine	AA4

INFORMATION FLOWS

INCTION	PRODUCTION
---------	------------

INFLOWS

SOURCE	PRESS
--------	-------

INFORMATION	SYSTEM
Economic Situation	-

(349)
INFORMATION FLOWS

FUNCTION	PRODUCTION
----------	------------

INFLOWS

SOURCE	MANUFACTURER
--------	--------------

INFORMATION	SYSTEM
Plant Specification	-

(350)
INFORMATION FLOWS

UNCTION	PRODUCTION
---------	------------

INFLOWS

SOURCE	CUSTOMER
--------	----------

INFORMATION	SYSTEM
Complaints	-

(351)
INFORMATION FLOWS

FUNCTION	PRODUCTION
----------	------------

INFLOWS

SOURCE	SALES
--------	-------

INFORMATION	SYSTEM
Complaints	MR2

(352)
INFORMATION FLOWS

FUNCTION	PRODUCTION
----------	------------

SOURCE	BSI
--------	-----

INFLOWS

INFORMATION	SYSTEM
BSI Standards	-

INFORMATION FLOWS

FUNCTION	PRODUCTION
----------	------------

INFLOWS

SOURCE	STORES
--------	--------

INFORMATION	SYSTEM
Stores Records Stores Levels Usage of Stores	P02 P02 P02

INFORMATION FLOWS

FUNCTION	PRODUCTION
----------	------------

INFLOWS

SOURCE	UNION REP.
--------	------------

INFORMATION	SYSTEM
Union Agreements	-

(355)
INFORMATION FLOWS

FUNCTION	PRODUCTION
----------	------------

INFLOWS

SOURCE	PAYROLL
--------	---------

INFORMATION	SYSTEM
Man Hours worked each section Wage Differentials	PA2 PA2

(356)
INFORMATION FLOWS

FUNCTION	PRODUCTION
----------	------------

INFLOWS

SOURCE	WORKS COUNCIL
--------	---------------

INFORMATION	SYSTEM
Works Council Minutes Grievances	PR2 PR2

(357)
INFORMATION FLOWS

UNCTION	PRODUCTION
---------	------------

INFLOWS

SOURCE	SAFETY INSPECTOR
--------	------------------

INFORMATION	SYSTEM
Safety Inspector's Report	PR2

(358)
INFORMATION FLOWS

FUNCTION	PRODUCTION
----------	------------

SOURCE	SAFETY COMMITTEE
--------	------------------

INFLOWS

INFORMATION	SYSTEM
Safety Committee Minutes	PR2

INFORMATION FLOWS

FUNCTION	PRODUCTION
SOURCE	APPLICANT

INFLOWS

INFORMATION	SYSTEM
Man's Abilities Man's Qualifications Interviews	- - -

(360)
INFORMATION FLOWS

FUNCTION	PRODUCTION
----------	------------

INFLOWS

SOURCE	PERSONNEL
--------	-----------

INFORMATION	SYSTEM
Job Requirements	P04

INFORMATION FLOWS

FUNCTION	PRODUCTION
----------	------------

INFLOWS

SOURCE	TECHNICAL
--------	-----------

INFORMATION	SYSTEM
Quality Required Product Standards New Products Technical Reports Complaints	P01 PP1 P01 P01 P01

OUTFLOWS

INFORMATION FLOWS

FUNCTION	PRODUCTION
----------	------------

OUTFLOWS

DESTINATION	ENGINEERING
-------------	-------------

INFORMATION	SYSTEM
Maintenance Schedule	P03
Inspection Procedures	P03
Production Processes	P04
Production Levels	P04
Maintenance Resources - Manpower	P03
Throughput per Hour	P04
Hours Lost	P03
Maintenance Costs	"
Movement of Plant	"
Plant Inspection Reports	"
Outstanding Maintenance Schedule	"
Major Repair Reports	"
Type of Plant	"
Mobile Plant Servicing Plans	"
Complaints	PR1
Safety Reports	PR1
Performance Requirements	P04
Production Records	P04

(364)
INFORMATION FLOWS

FUNCTION	PRODUCTION
----------	------------

OUTFLOWS

DESTINATION	TRAINING
-------------	----------

INFORMATION	SYSTEM
Training Requirements Gradings Union Agreements Committee Minutes	PR1 P04 P04 PR2

INFORMATION FLOWS

UNCTION	PRODUCTION
DESTINATION	SALES AND MARKETING

OUTFLOWS

INFORMATION	SYSTEM
Daily Production	PR1
Weekly Production and Sales	PR1
Safety Controls	PR1
Tonnes per Hour	PR1
Breakdowns	PR1
Stock Levels	P02
Production Levels	P04
Availability of Materials	P02
Discussions on Price	-

(366)
INFORMATION FLOWS

FUNCTION	PRODUCTION
----------	------------

OUTFLOWS

DESTINATION	GENERAL
-------------	---------

INFORMATION	SYSTEM
Programme of Work	PR2
Material Availability	P02
Monthly Management Reports	PR2
Restoration Requirements and Plans	PP2
Work Programme (Budget)	PP1
Production Budget	PP1
Tonnes per Hour	PR1
Current Working Conditions	PR2
Number of Men	PR2
Plant Capacity	PR2
Variability of Plant	PR2
Blast & Drill Programme	PR2
Stock Levels	P02
Daily Production	PR1
Effects of Breakdown on Production	PR2
Age and Type Plant	PR2
Maintenance History	P03
Performance	P04
Alternative Equipment	-
Other Units Needs	PR2
Breakdowns	P03
Expenditure Budgets	PP1
Operating Considerations	PP1

INFORMATION FLOWS

FUNCTION	PRODUCTION
----------	------------

OUTFLOWS

DESTINATION	TECHNICAL
-------------	-----------

INFORMATION	SYSTEM
New Products	PR2

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INFORMATION FLOWS

FUNCTION	PRODUCTION
----------	------------

OUTFLOWS

DESTINATION	FINANCE
-------------	---------

INFORMATION	SYSTEM
Budget Requirements	PP1
Environmental Controls	PR2
Safety Controls	PR2
Tonnes per Hour	PR1
Alternative Methods	PR2
Type of Store	PR2
Planning Agreements	PP1
Equipment and Capacity	PP1
Men Available	PR1
Material Requirements	PP1
Plant & Quarry Layout	PP1
Breakdowns	P03
Stock Levels	P02
Expense Sheets	PA2
Production Plans	PP1
Managers Reports	PR1 & 2
Daily Production	PR1

APPENDIX E

ACTION REPORT - 7.7.77

APPENDIX E

Action Report

Introduction

The aim of this report was to set out the action which needed to be taken to meet management's information needs. The appendix shows the report produced for the Northern Region of the quarries division. The report was accepted by the management of the region in September 1977 for implementation in 1978 and 1979.

Content

The report deals with the specific requirements of the Northern Region and produces suggestions on how these can be met.

Relevance to the Research

This report stems from the research and is one of the tangible results of the research work. It also sets out some areas where further work is required, particularly in the need to establish meaningful performance standards.

Cross Reference

This appendix is referred to in:-

Chapter 3, Section 3.8

Management Information Systems
Northern Region

Management Information Systems

Information Flows - Northern Region

1. Introduction

- 1.1 Following the collection of detailed information requirements from the managers concerned, a general report was prepared detailing those areas where there were information needs. That report was considered too generalised for specific recommendations to be made.
- 1.2 This report provides a more detailed analysis, showing the information flows and the areas where needs are not being met or where duplication occurs. The report is in five sections.
 - a) The Present Systems.
 - b) Synopsis of the way the information has been assembled.
 - c) The North East Area organisation structure.
 - d) The Information flows.
 - e) Recommendations.
- 1.3 By its very nature such an examination is complex, taking into account not only basic reporting procedures, but also the less obvious and somewhat more important day to day transfers of unrecorded information. In order to make this whole process more manageable and more relevant to the Division's requirements I have concentrated on key decisions and the principal information flows.

2. Present Systems

2.1 There are four major systems in operation at the present time within the Area, these are:-

- a) Day to day operating information.
- b) Routine management reporting and control.
- c) The accounting system.
- d) The budgeting and planning system.

2.2 Operations

On a day to day basis much of the information required to operate the company is received and communicated verbally.

Basic records are maintained of the routine information such as customer orders, output, breakdowns, etc. This system relies upon individuals knowing clearly what their responsibilities are and who to communicate with regarding any particular decision.

The back-up for this system is the routine paperwork required to deal with the four administrative data flows.

- a) Purchases
- b) Payroll
- c) Sales
- d) Cash

The majority of the information flowing day by day is concerned with variations to routine, customer complaints, machine failure, etc. Whilst the basic administrative systems are well established the existing records of non-routine data have been developed in an ad hoc manner and do not always provide a full picture of the events and decisions taken. The main records produced at present are:-

- a) Daily production report (several variations at quarry level.)
- b) Weekly production report.
- c) Weekly sales reports.
- d) Managers' diaries and files.
- e) Correspondence.
- f) Customer order sheets.
- g) Vehicle daily work sheets.

2.3 Routine Reporting and Control

The existing system is based on a monthly reporting time scale, though ad hoc meetings are called as required. The basis of this system is the manager's written report prepared for the monthly meeting.

This report is prepared by each manager in a style which he thinks is relevant and contains information from the daily records on production and sales. In addition, and forming the bulk of the contents are facts and opinions gathered together from the day to day activities which are mostly verbal.

These monthly reports and the meeting which takes place are the principal form of control. They are prepared in the first week after the month end for a meeting on approximately the tenth working day. The accounts for the preceeding month are not available at this time and the Area General Manager prepares his report after the meeting and usually before receiving the accounts.

2.4 The Accounting System

The data collected from the four basic administrative flows is used as a basis for the accounts. The use or otherwise of the computer should be seen at the present time as a means of handling the masses of data produced within the routine procedures. In Northern Region the purchases, payroll and sales systems are all computer based, with the cash system being controlled at Thornton le Dale.

The production of the accounts stems from these prime inputs together with adjustments which concern information from operating units on stocks, goods received not invoices, inter-quarry transfers, central stores issues, work in progress, etc. All this information flows through an existing network. There is some duplication with the day to day information but on the whole the system is efficient and accurate.

2.5 The Budgeting and Planning System

The existing systems for preparing budgets and plans is based on an initial budget, prepared in detail some six months in advance of the following year. This forms the basis of comparison for the first six months of the accounting year. At the half-way stage a revision takes place which starts the second six months with the actual accumulative results at the half year.

Each month the actual results are compared with the budget on the accounts and significant variances are examined. This is a level of control on top of the monthly management control which works mainly in terms of sales and production tonnages.

The detailed work involved in preparing budgets requires a considerable effort on the sales and marketing activities where

records are maintained of future orders, anticipated orders and general sales levels.

2.6 These four systems form the basis of the present information flows.

Within each of the four main systems there are functional sub-systems dealing with, for example, the operation of transport and the appropriate records this requires. The picture of the present system can be seen as a matrix with each box representing an almost unique sub-system.

FUNCTION BASE SYSTEM	PRODUCTION	DISTRI- BUTION	SALES & MARKETING	ADMINIS- TRATION
OPERATING				
REPORTING				
ACCOUNTING				
PLANNING				

2.7 The specific information summaries included as Appendix A are based on this matrix with each record sheet dealing with one of the main functions.

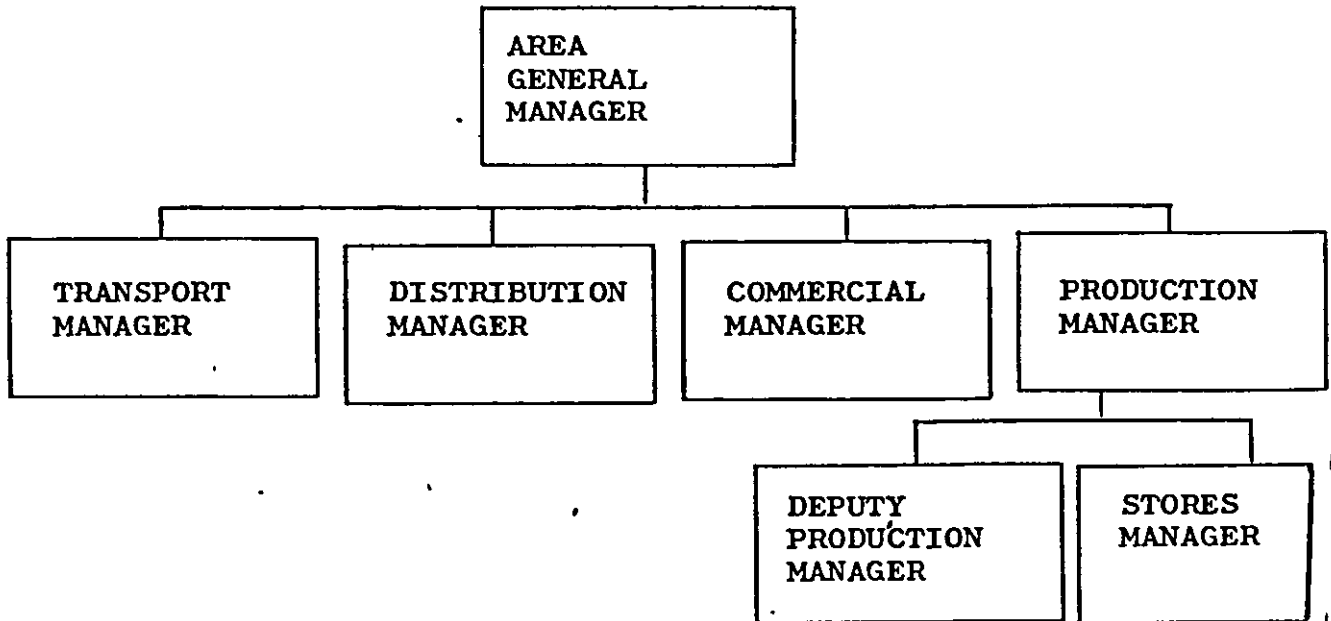
3. Synopsis of Information Assembly

- 3.1 The information upon which this report is based was collected in four stages. Each stage was a necessary step in the full analysis of the information needs of the managers concerned.
- 3.2 Stage 1 involved detailed interviews with the managers in Northern Region from which both verbal and documented comments were received. Each manager was asked to discuss the source of his information, the information he provided others, and the decisions which he took. An individual decision analysis was prepared for each manager.
- 3.3 Stage 2 was a process of collating all the relevant information requirements for each decision and producing a Decision Definition and analysis sheet. Each of these records then showed the information required for each decision.
- 3.4 Stage 3 concerned the analysis of the Decision Definition information onto individual functional information flow records. These showed the information that should flow into each functional manager, the source of that information and the information flowing out and its destination.
- 3.5 Stage 4 meant comparing the functional flows with the existing systems to identify areas where needs were being overlooked and where duplication might exist.
- 3.6 The recommendations set out in this report stem from the pragmatic analysis of the information collected as indicated above. The information fell quite clearly into the four main divisions of -

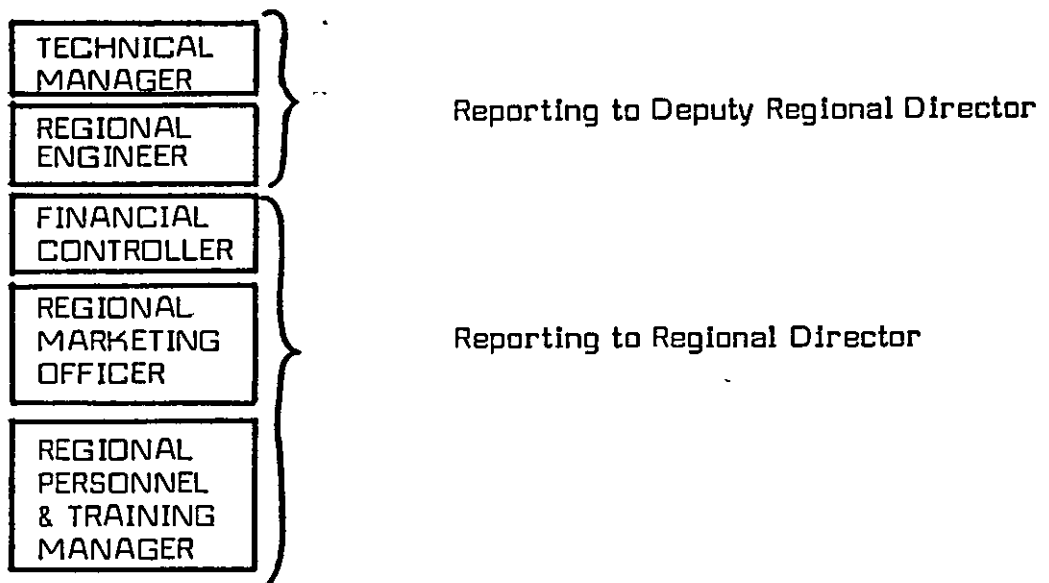
- | | |
|---------------|---------------|
| a) Objectives | c) Control |
| b) Technical | d) Background |

4. North East Area Organisation Structure

4.1 The management structure of the North East Area of Northern Region as it was during the collection of the information in this report is indicated below.



4.2 In addition to the above the following managers were also interviewed who, though not directly responsible to the Area General Manager, are none the less concerned with work in the Area.



- 4.3 It has also been necessary to gather information from the quarries. This has been done at the same time as the Vehicle Utilisation pilot scheme has been introduced. For purposes of analysis the information flows have been sub-divided into these main functional area, i.e.

General

Production

Distribution

Sales & Marketing

Transport

Technical

Engineering

Finance

Training

5. The Information Flows

- 5.1 The information flows have been analysed in detail for each function (as above). From this detailed analysis it has been possible to extract the information required by management which is not available from the existing systems. The detailed analysis has been summarised in the individual functional records (Appendix A). These records show for each of the principal systems both the present information produced and the suggested improvements.
- 5.2 To enable a direct comparison to be made with the existing systems the summary has been prepared in a "side by side" format. In addition the summary has been prepared for each of the four main information systems.

5.3 The information summaries are related to the key decisions taken within each function and for the sake of simplicity the separate functional areas indicated in paragraph 4.3 have been grouped as follows.

Production:-	Production
	Technical
	Engineering
Distribution:-	Distribution
	Transport
Sales & Marketing	
Administration:-	General
	Finance
	Training

5.4 The key decisions applicable to each of the four main groups are set out in Appendix B.

6. Recommendations

6.1 The present information flows fall into four main sections. As has been indicated these sections are concerned with:-

- a) Operational activities,
- b) Reporting procedures,
- c) Accounting systems, and
- d) Planning.

Each of these main sections has been developed over a long period and there are a number of overlaps and discrepancies. The only sections which have been formalised are the accounting and planning sections.

It is recommended that each of the four is examined to establish whether the objectives of each are being achieved, to make good any discrepancies, and to eliminate any unnecessary overlaps. Each of the four sections is examined in Appendix A, sub-divided into the principal functional groups as indicated in Section 5 above.

- 6.2 The regular reporting system at present in operation in Northern Region overlaps the operating and accounting systems. This is necessary at the present time because of the timing of the accounting flows and the need to operate on a continuing basis, without pauses whilst the accounts are produced.

The present reporting structure could, I believe, be expanded and improved and thus reduce the need for the more comprehensive accounting reports to be produced on a monthly basis. The basic accounting procedures would still be balanced and controlled monthly and facilities would exist for extracting detailed accounts where the routine reports indicated major deviations. This recommendation presupposes the use of the computer with local access to the accounting files.

The detailed comments in Appendix A indicate the main areas of overlap and improvement which I believe could be made.

- 6.3 The basic recording system which forms the prime input to the reporting and accounting systems has developed in an ad hoc way. I believe that a number of significant improvements could be made in the timing, frequency and number of records emanating from the quarry.

In addition, these records could be re-designed so that apart from recording actual results there was a comparison with the standards of performance expected. These performance standards, e.g. tonnes per man hour, lost time, overtime, etc., though generally measured, are not part of the formal control system, nor linked directly to the accounts.

- 6.4 I believe it is generally considered desirable to improve the marketing information systems to provide information on products, customers, units, markets and end use, which will enable comparison with plans and calculation of trends. The addition of contribution analysis into these main sections would, I believe, add considerably to the present information available to the managers concerned.

The principal reports that could be produced are indicated in Appendix A. This is one system where management have expressed a need to be able to request information in any form and for any period they require without being restricted by the programs available.

- 6.5 From discussion with production and the general manager it was apparent that the information available on a daily basis could be linked to the basic accounting information to produce regular up-dated reports covering:-

- a) Unit operating levels, indicating which levels produced the best results in terms of cost per tonne and contribution.
- b) Breakeven point of each quarry in terms of throughput of various product mixes.

- c) The incremental costs of production with the operating levels indicated in a) and for the product mixes indicated in b).

The data necessary to produce such information on a regular basis is already available from the present systems, but is only extracted and analysed in retrospect and for specific decisions. The development of a reporting system covering the above information would reduce the present dependence on monthly accounts.

- 6.6 The present records on maintenance information are produced from the quarry reports and do not necessarily provide a full inventory of the plant, its costs and performance. (See Appendix A). The proposal here is to examine the systems to derive a means of recording the information in such a way that the daily reports and accounts were linked to produce full performance records for all plant with particular emphasis on mobile plant and vehicles. Such a system could be related to production to show the effects of breakdown not only in the cost of repairs but also in the cost of lost production. It should be possible to extract from such a system information which might help production management to plan the maintenance of equipment and to judge performance on fact rather than opinion. Whether or not such a system made use of the computer would depend entirely on the nature of the problem and the volume of data involved.
- 6.7 The present accounting system has been developed to provide comprehensive information on a monthly basis. This information compares costs with the budget and indicates the variances. This information is intended for control purposes, and on an accumulative

basis for monitoring performance. The basic procedures used in creating the accounts are essential to the effective administration of the company. It is in the area of control that perhaps the accounts fail to serve a purpose commensurate with the cost of producing them.

With improved operating control and reporting procedures it should not be necessary to produce the accounts monthly. The operating control system measuring against performance standards would provide the daily and weekly information needed for action. The monthly reporting system would convert these basic reports into a comparison of resources consumed and the outputs created. From this information anticipated contribution could be calculated. The accounts in a similar form to the present accounts could be produced quarterly as a check that the basic levels of input and output being checked weekly and monthly, were producing the required financial returns. Where necessary the system should provide for regular access to the accounting records to examine major deviations.

- 6.8 The revised systems suggested above would lead to an examination of the present budgeting system. With the continual assessment of actual results against performance standards, outputs and the quarterly accounts, the forward budgets would require continuous revision to make the comparisons more meaningful. The trends indicated by the marketing information system would indicate areas for revision, as would current operating levels. Perhaps the idea of budgeting for one year, then reviewing at the half way stage would be superseded by a quarterly report indicating:-

- a) Last quarter's results against budget.
- b) The year to date.
- c) Next quarter's budget.
- d) The following quarter. (Broad terms)
- e) The next half year. (Even broader terms)

I suspect that more attention might be paid to the comparison of last quarter's forecast with this quarter's forecast than last quarter's actual results.

7. Conclusion

- 7.1 The recommendations set out above and the details shown in Appendix A do not imply the computerisation of any of the systems discussed. How the information would be collected and processed is incidental to the decision on why it should be done. Fortunately Tilcon are well placed to take any approach considered suitable.
- 7.2 The suggestions made in this report stem from my detailed analysis of the information provided by managers. I have considered the information requirements thus identified and produced here suggestions and ideas for improvements. These are by no means exhaustive but should provide a basis for considering priorities in the region.

System	Comment	Present	Suggested
Operating		<p>Daily reports which cover the principal information of weather, manpower, hours, production, breakdown, time and reasons for repairs, condition of plant, sales. Each week a report is produced showing overtime.</p> <p>Monthly - the quarries report on maintenance, production, stock movements. Verbal communication takes place between the quarry and production on major items.</p> <p>In addition the routine purchasing, payroll and sales systems are in operation. The daily production figures for the Area Report are generally obtained verbally. No reason why this should not continue.</p>	<ol style="list-style-type: none"> 1) A weekly report combining the present daily and monthly reports and adding the comparison between actual and performance standards. 2) By coding individual items or groups of plant it will be possible to produce detailed analyses of lost time, repair and maintenance costs and performance. This information would be picked up from - <ul style="list-style-type: none"> Purchase Orders Weekly Reports Time Sheets <p>NB Items or groups of plant can be as large or as small as considered desirable.</p>
Reporting		<p>Present monthly report to the AGM, contains details of production, tonnages, both actual and budget. A report on each unit is given showing variations from budget, repairs, costs (under or over budget.)</p> <p>Transport (Good, bad fair) Contribution (Over, below budget).</p> <p>Monthly stock report is produced from the last week's quarry reports.</p> <p>In addition to the above there is a weekly liaison meeting for which minutes are produced.</p>	<ol style="list-style-type: none"> 1) That the existing system be improved so that figures can be inserted for costs, repairs, contribution on a basis which will aid control. Such figures would be related to the current trends adjusted by any major events that have occurred. <p>This report would be sent to the accountants and used in account preparation.</p>
Accounting		<p>The present detailed accounts are in three sections -</p> <ul style="list-style-type: none"> Profit Statement Cost Sheet Sales Analysis <p>These are produced monthly for every unit and summarised. The details of actual and budget are shown.</p> <p>There are additional supplementary reports which do not reach the production management.</p>	<ol style="list-style-type: none"> 1) To use the routine reporting system to highlight major areas of deviation from the plan and to produce the accounts as required on an exception basis. 2) To produce a full set of Management Accounts once a Quarter in a similar form as the present accounts. 3) Cost schedules would be maintained for each unit showing the cost changes (net of inflation) due to levels of production, this would enable the reports produced monthly to be at an acceptable level of accuracy. 4) Purchases, sales, payroll and cash would all be balanced monthly and a cash flow report produced.
Planning		<p>Twice a year - Original</p> <p>Revised budgets are prepared. In Northern Region this is done in considerable detail with every manager involved in the calculation of the cost rates per tonne of throughput. From this the budgeted costs are calculated when production tonnages are agreed.</p>	<ol style="list-style-type: none"> 1) The quarterly report would compare - <ol style="list-style-type: none"> a) this quarter's actual with the budget, b) next quarter's budget (in detail) with previous forecast, c) the next but one quarter's budget with previous forecasts. <p>Explanations would be given for variations between actual and budget (as at present) and in addition variations between next quarter's budget and the previous forecast would be explained.</p> <p>The answer to why our plans are changing is perhaps more important than why actual deviated from budget.</p>

System \ Comment	Present	Suggested
Operating	<p>Order office procedures are based on verbal receipt and dissemination of order information.</p> <p>Vehicles are arranged according to the apparent needs of the quarry. The work content involved for the vehicles is not planned in detail.</p> <p>Daily driver records are sent to Transport Section.</p> <p>Workshop completes job sheets and material requisitions for work done, these are analysed and used to produce the VPR's.</p> <p>Vehicle earnings received from the computer analysis of sales documents.</p>	<ol style="list-style-type: none"> 1) Formal order sheets which are then transmitted to the quarries by facsimile copiers. 2) Introduction of load planning using new order sheets and the new Loadplan system. 3) Monitor vehicle work from Distribution Records. 4) Possible revision of maintenance record system to use analysis facilities on computer (pilot scheme in operation in Concrete Division).
Reporting	<p>There is no Distribution Report at present.</p> <p>There is a Transport Report based on the Vehicle Performance Records (VPR's) produced by the transport department.</p>	<ol style="list-style-type: none"> 1) Introduction of a monthly Distribution Report clearly indicating the outcome of the Loadplan system. This would be in addition to the existing VPR's for transport. This would eventually include reports on external haulage. 2) Revise the VPR system insofar as the report should show the vehicle contribution and relate directly to the distribution report.
Accounting	<p>Monthly transport accounts which compare actual with budget.</p>	<ol style="list-style-type: none"> 1) Improved reporting each month would eliminate the need for monthly accounts. Transport management are more concerned with the VPR's. Quarterly accounts would be perfectly effective provided the basic controls were checked monthly and where necessary exception reports produced.
Planning	<p>The existing budgeting system is based on a simple calculation of the number of vehicles available and the earnings required to make the appropriate return. As Tilcon vehicles only carry a proportion of the total tonnages there is always enough work, in theory.</p>	<ol style="list-style-type: none"> 1) The utilisation of vehicles, the fleet size and fleet structure all depend on the individual units pattern of demand. This will be recorded in the Loadplan system. From these records it will be possible to directly plan the need for vehicles as an extension of the market forecasts of output per unit. This should have a significant effect on vehicle replacement and development plans.

System \ Comment	Present	Suggested
Operating	<p>Sales data collection from quarries and the related procedures for quotations etc. have been fully developed over the past few years. This covers the following aspects.</p> <ul style="list-style-type: none"> Re-designed tickets Price files Price changing procedures Sales Invoicing Sales Ledgers Sales Accounting Reports 	<ol style="list-style-type: none"> 1) The existing systems be reviewed and amended where necessary to link in with the distribution systems, particularly Loadplan.
Reporting	<p>Existing sales reporting has been fully examined and the outcome of a detailed review in 1976 is being developed at present.</p> <p>The current reports from the computer are received monthly and supplement the regular weekly reports received by the sales managers.</p> <p>The sales manager produces a monthly report in which he sets out the overall sales levels and then expands upon this, quarry by quarry. The figures produced in this report are all tonnages.</p>	<ol style="list-style-type: none"> 1) A new marketing information system providing information by product, customer, market, end use, etc. which will provide a basic file for access by management. 2) An extension of actual sales into the calculation of trends if considered of value. 3) The addition of a link between the basic unit cost schedules (from the production systems) which will enable the contribution to be calculated for any level and mix of products sold. <p>This report could be produced weekly if desired.</p>
Accounting	<p>The present accounts produce a sales sheet for each unit.</p> <p>This is only separated into main products for which average prices are calculated.</p> <p>Variances from budget are calculated.</p> <p>There are so many swings and roundabouts in the summary of sales that sales management tend to rely on the sales analysis which is in more detail, but less accurate.</p>	<ol style="list-style-type: none"> 1) To produce sales accounts as part of the quarterly accounting system. But ensuring that the sales controls are maintained on a monthly basis. 2) The contribution reports would be linked to the accounts to ensure the same base data was being used.
Planning	<p>The present budgeting and forecasting procedure is carried out twice a year. The problem here is quite simply the difficulty sales have in predicting beyond three months with any accuracy.</p> <p>Trends are calculated manually and used together with local knowledge of customers, plans, etc.</p> <p>General guidance on local economic trends is produced by Strategic Planning, but this is usually too late to be used in the basic budget.</p>	<ol style="list-style-type: none"> 1) From the marketing information system trends can be produced which when adjusted for local knowledge could produce relatively accurate three month forecasts against which actuals could be compared. 2) This three monthly horizon would fit into the Quarterly Planning and Accounting systems and allow previous forecasts to be checked with latest forecasts and differences explained.

System \ Comment	Present	Suggested
Operating	<p>The present systems for payroll, salaries and purchases are well developed and provide the majority of the information needed at all levels. Procedures for managing the cashflow in the Region are well established and require no further work other than ensuring the new systems meet the necessary control requirements.</p> <p>The personnel record system in operation at the present time is maintained manually and although this could be linked to payroll and salaries, there are sound reasons for not doing this.</p>	<p>1) The systems are amended where necessary to provide information for the other functional requirements. This is only of a minor nature as the new purchase system already provides facilities for coding the individual items of plant etc.</p>
Reporting	<p>The present reports on administration activities tend to be covered in the accounts and apart from special projects and discussions there is no other formal reporting system.</p>	<p>1) That all department heads in administration prepare a monthly report indicating their staffing, workload and activities. This could then be related to the quarterly accounts. Simply because there is no material output such departments should not escape being measured on their contribution.</p> <p>2) A monthly cashflow report could be produced indicating by unit if desired the generation of cash. Whether there is a need to go beyond a Regional and Area analysis is debatable.</p>
Accounting	<p>The present accounting system produces full details of administrative costs, actual against budget on a monthly basis.</p>	<p>1) Monthly statistics of cost are not necessary if these areas are controlled monthly as above and accounted for quarterly.</p> <p>2) The system of indicating an over or under recovery would disappear if contribution reporting is used.</p>
Planning	<p>The present work involved in preparing and co-ordinating the budgeting activities creates a heavy pressure on administration staff. The level of detail means considerable effort in revising the budgets if changes are made. This task twice a year is considerable and to consider doing it more often seems wasteful.</p>	<p>1) The budgeting procedure can be considerably reduced if budgets are maintained on a continuous basis. There are many aspects which can be updated automatically with little problem. There are a number of specific amendments that would be required, each time, and these would be picked up from the monthly reports.</p> <p>2) There is the possibility of extending the above systems to the point of creating a financial model which would enable senior management to see the effect on profit of various predictions of future levels of business.</p>

Key Decision Schedule - Production

<u>Title</u>	<u>Description</u>
Capacity Variations	Changing levels of capacity by adjusting hours worked on plant.
Replacement of Plant	What should be replaced and when.
Operating Methods	Original decision and changes thereto.
Staff Appointment (Snr.)	Appointment of staff above quarry manager.
Technical Control	Maintain quality of products.
Staff Appointment (Middle)	Below quarry manager.
Customer Complaints	Deciding upon the action to be taken to resolve the query.
Production Budget Approval	Self-explanatory
Improving Operations	Deciding to make improvements in the operating environment.
Maintaining Operations	Decision on action to maintain plant in working order.
Capital Expenditure	Decision on which items will be included in budget.
Environmental	Decision on matters affecting the environment, pollution, dust etc.
Allocation of Resources	Allocating people and money to specific activities.
Preventative Maintenance	Establishing and maintaining a preventative maintenance system.
Safety	Ensuring all safety requirements are met.
Handling Men	Self-explanatory.
Industrial Relations	Dealing with all aspects of the working situation.

Appointment of Operatives	Selecting operatives.
Project Control	Action to control specific projects.
Project Priorities	Deciding priority of work.
Commissioning Plant	Decision to release a new plant for production.
Engineering Policy	How engineering will be organised and the standards to be used.

Key Decision Schedule - Distribution

<u>Title</u>	<u>Description</u>
Accepting Orders	Decision requires agreement on production and transport.
Staff Appointment (Middle)	Below quarry manager.
Customer Complaints	Deciding upon the action to be taken to resolve the query.
Re-allocation of Orders	Changes in original allocation.
Haulage Rates	Deciding what to charge for haulage.
Allocation of Vehicles	Basic allocation to quarries.
Vehicle Maintenance	How and when to maintain vehicles.
Vehicle Replacement	Which vehicles should be replaced and when.
Transport Budget Approval	Self-explanatory.
Allocation of Resources	Allocating people and money to specific activities.

Key Decision Schedule - Sales & Marketing

<u>Title</u>	<u>Description</u>
Operating Methods	Original decision and changes thereto.
Pricing Large Contracts	Self-explanatory.
Price Levels	Maintaining the levels in the local market.
Deviation from Price Levels	Where it is necessary to obtain or retain business.
Accepting Orders	Decision requires agreement on production and transport
Negotiations (Customers)	Strategic approach to take with customers.
Direction of Market Effort	Changing plans to suit demand.
Sales Budget Approval	Self-explanatory.
Staff Appointment (Middle)	Below quarry manager.
Customer Complaints	Deciding upon the action to be taken to resolve the query.
Marketing Strategy	Which products and customers to develop.
Credit Control	All aspects of controlling credit given to customers.

Key Decision Schedule - Administration

<u>Title</u>	<u>Description</u>
Capacity Variations	Changing levels of capacity by adjusting hours worked on plant.
Replacement of Plant	What should be replaced and when.
Operating Methods	Original decision and changes thereto.
Expansion	Decision to expand activities.
Contraction	Decision to contract activities.
Staff Appointment (Snr)	Appointment of staff above quarry manager.
Budget Approval	General approval of budgets.
Pricing Large Contracts	Self-explanatory.
Price Levels	Maintaining the levels in the local market.
Deviation from Price Levels	Where it is necessary to obtain or retain business.
Accepting Orders	Decision requires agreement on production and transport.
Negotiations (Customers)	Strategic approach to take with customers.
Direction of market effort.	Changing plans to suit demand.
Technical Control	Maintain quality of products.
Staff Appointment (Middle)	Below quarry manager.
Customer Complaints	Deciding upon the action to be taken to resolve the query.
Capital Expenditure	Decision on which items will be included in budget.
Environmental	Decision on matters affecting the environment, pollution, dust, etc.
Vehicle Replacement	Which vehicles should be replaced and when.

Key Decision Schedule - Administration

<u>Title</u>	<u>Description</u>
Allocation of Resources	Allocating people and money to specific activities.
Credit Control	All aspects of controlling credit given to customers.
Obtaining Finance	Deciding what is needed and where it is to come from.
Acquisitions	Deciding what action to take.
Financial Projects	Financial justification.
Legislation	Ensuring that current legislation is observed and followed.
Training	Maintaining training records and deciding who should receive training.
Industrial Relations	Dealing with all aspects of the working situation.
Operating Policy for Subsidiaries	Agreeing overall policy with sub MD.
Planning Requirements	Action with regard to obtaining planning permission.
Project Control	Action to control specific projects.
Systems Development	Deciding how information will be collected etc.
Administrative Policy	Deciding how the operations will be administered.

I.I.S DEVELOPMENT PLAN

Items in boxes - Already dealt with.
 Items underlined - In progress.
 Other items - Suggestions.

APPENDIX C

STEM \ FUNCTION	PRODUCTION	DISTRIBUTION	SALES & MARKETING	ADMINISTRATION
Operating	<u>Material Control (Concrete)</u> <u>Stock Control (Concrete)</u> Plant Maintenance Costing Production Control	<u>Loadplan</u> <u>Vehicle Maintenance reports</u> (Concrete)	<u>Sales Data Collection</u> <u>Price Files</u> <u>Price Changes</u> <u>Sales Invoicing</u> <u>Sales Ledger</u> <u>Sales Ledger - Tilcon Travers</u> <u>Sales Analysis</u>	<u>Payroll</u> <u>Salaries</u> <u>Purchases - Payments</u> <u>Purchase Ledger</u> <u>Purchase Analysis</u>
Reporting	Weekly Quarry reports Monthly Control reports	<u>Vehicle Earnings</u> <u>Vehicle Utilisation</u>	Marketing Information System	Monthly Contribution Statements Monthly Cashflow Reports
Accounting	Quarterly Unit Cost Schedules	Quarterly Fleet Costs	Quarterly Contribution Analysis	Regular Quarterly Management Accounts Exception reporting on major deviations
Planning	Production capacities and resources Replacement and development programme	Fleet size Fleet structure Replacement and development programme.	Product and Market Trends and forecasts.	Company Profit Forecasts Financial Model

APPENDIX F

PLANT MAINTENANCE INITIAL REPORT - 28.4.78

APPENDIX F

Plant Maintenance Review

Introduction

This report was prepared as part of the systems development stemming from the research. (See Para. 6.6 on Action Report Appendix E)

Content

The report sets out the results of an interim survey to establish the difficulties that would have to be faced in meeting management's information needs. The report contains suggestions on how to tackle the difficulties.

Relevance to the Research

The report has been included because it shows how management react to the recognition that information is lacking in key decision areas, and also how the work done in the research in identifying information needs has led directly to action to meet those needs.

Cross Reference.

This appendix is referred to in:-

Chapter 9, Section 9.4

Plant Maintenance ReviewInterim Report1. Introduction

1.1 This report has been produced as a basis for discussion. It sets out the initial outcome of the survey carried out to establish present operating procedures for the maintenance of plant. The emphasis throughout the survey was on mobile plant, but it was necessary to examine fixed plant as the administration procedures overlap.

2. Scope of Survey

2.1 The survey was carried out during March and April and meetings were held with the Area General Managers, the Production Managers and Quarry Managers in both areas of Central Region. Visits were made to all but three quarries, namely -

Cadeby,

Meriden,

Petty Pool.

At all the other units visited the staff responsible for the paper-work were also interviewed.

2.3 The reason for this stage of the survey was to gether information about present attitudes and procedures. As might be expected there was a wide variation of opinions as to both the necessity and value of any maintenance system. I was informed that several systems had been tried in the past and had failed because they were not -

a) Simple,

b) Practical, and

c) Helpful,

for the people being asked to carry out the work.

3. Present Situation

- 3.1 Quite naturally the present situation is different at nearly every unit. The overall variation across the region is considerable. From one small unit where no records are kept at all, to another large unit where detailed records are maintained including a large wall chart on servicing plans.
- 3.2 The present situation can be summarised by dealing with the information in three main sections:- (See Appendix A)
- a) planned maintenance,
 - b) maintenance records, and
 - c) administrative procedures.

4. Discussion Points

- 4.1 There are a number of points which need full discussion before further work is done on designing a maintenance information and control system. These points fall into three categories:-
- a) The need for a system.
 - b) The form the system should take.
 - c) The problems of data collection.

4.2 The Need for a System

- 4.2.1 At the present time there appears to be a need to improve the procedures for recording information on maintenance. There is little, if any, information on items of plant, either in terms of the cost of maintenance or on reliability. When plant is moved, the recipient knows nothing about the plant's previous history, except for what he might gather in a telephone conversation with the previous user. Costs of maintenance are brought together under the process heading, with some of the

allocation, e.g. labour costs, being allocated to the process in an arbitrary way.

4.2.2 There is no information at present, which allows the performance of plant of one make to be compared with similar or different makes. This lack of comparative information does not allow replacement decisions to be made with confidence.

4.2.3 It would seem that there are two specific types of information required for decision making.

- a) Performance and reliability, covering frequency of breakdown, fuel consumption, ease of maintenance, etc.
- b) Life cycle costs, the costs of keeping the plant operational throughout its working life.

4.3 The Form of a New System

4.3.1 Any new system would have to be:-

- a) Simple,
- b) Practical,
- c) Useful to those doing the work.

This draws out the problem of designing a system which meets the needs of the managers responsible for operating the system. As most managers know what is happening on a day to day basis, without writing it down, it is difficult to persuade them that the effort is worthwhile.

4.3.2 It is possible to overcome most of the problems of keeping records locally, if the task is moved to the area office. This could be done by the use of a simple weekly report, linked to the prime documents used in the wages and purchases systems. By collecting most data from the prime documents, which have to go to the area office, the task at the quarry is simplified. The weekly report would deal with information other than cost information and cover lost time, reason for breakdown, transfers, fuel consumed, tyres used, etc.

4.3.3 The area office would extract the information from the three prime documents and key it onto the computer terminal. The data entering the system would be transmitted to the computer where a life history would be filed for every piece of plant. By approaching data collection in this way it would be possible to reduce the work at quarries to the minimum and yet produce comprehensive records of plant performance, reliability and costs. These records could then be used to produce reports which would be linked to the accounts and provide detailed management information.

4.4 The Problems of Data Collection

4.4.1 The three prime sources of data referred to above are:-

- a) time record,
- b) purchase order/goods received sheet,
- c) weekly report.

4.4.2 The problem with a time record is that it has to be completed by the operator, fitter, etc. as they complete their work. This causes problems in terms of the desire and the ability of the men to do it. Neither lack of desire nor lack of

ability can be easily overcome. One approach which usually works is to link the recording of time with the payment of wages. If a single time record is used for both purposes it is usually filled in. The only problem still remaining is whether the data recorded means anything or not. Unless the man concerned has sufficient, usually financial, motivation to complete the record it will not be done. I do not believe that it is possible to use disciplinary action to obtain a time record that even approaches 60% accuracy.

- 4.4.3 The collection of information from goods received sheets is not such a problem as labour. By using every item of plant with its own unique number (as on the new assets system) it is possible to allocate every purchase directly to that item of plant. It only needs the number to be entered on the order and goods received sheets.
- 4.4.4 The weekly report could be produced as a pre-printed document with the items of plant listed and columns for the recording of basic information such as working, broken down, etc. The design of this document would be important but it could be designed to reduce the work of completing it.
- 4.4.5 In some quarries the above suggestions would reduce work, in others, mainly the smaller ones, it would involve some increase. If as suggested above the system was linked to the payment system, I believe it would operate effectively.

5. Possible Action

5.1 There are three main courses of action that can be followed.

5.1.1 Accept that the problems are greater than the benefits and stop further work on the idea of a maintenance information system.

5.1.2 Agree that a system is needed and proceed with the detailed systems design phase of the project.

5.1.3 Test the degree of the data collection problems by designing a basic data collection system and putting it into operation before proceeding with the development of a full computer-based system.

5.2 I believe that the most beneficial course of action would be 5.1.3 above. By taking this first step, which I believe is the most crucial, we would be able to overcome the most difficult problems before we went too far with the design of the system. In addition it would be possible to assess data volumes more accurately and to make realistic assessments of the degree of accuracy with which data is recorded.

5.3 If this stage is successful then we would have an excellent basis on which to build the remainder of the system.

6. Conclusion

6.1 If the above suggestion is accepted it would, I believe, be of benefit in terms of better basic systems, even if it was decided to go no further. In making this suggestion I am bearing in mind the very real problems which exist at units in terms of manpower and the pressure to operate at minimum cost levels. Any new system would have to prove itself at the quarry before any real value could be gained elsewhere.

6.2 I must record that in carrying out the survey, I have received the full co-operation of everyone concerned, and this occurred in spite of the many pressures and problems which the quarry personnel have to cope with. The success of any system depends on the people who operate it. If we can meet their criteria for a simple, practical system, I am sure it will be effective.

Present Situation1. Planned Maintenance

- 1.1 The general view is that formal planned maintenance, though desirable, was just not practical. I was given numerous examples where plans were "thrown to the wind" because of breakdowns, changes of equipment, shortage of trained fitters, and other local problems. Even so, in several units managers have persevered with their attempts to plan their activities. I attempted to see whether those units that tried to plan had a better record than those that did not. Unfortunately the inadequacy of the basic data held in the records made this a wasted exercise. It would seem from discussions with area managers that those unit managers who concentrated on the practical side of maintenance rather than on maintaining records, had a better performance history.
- 1.2 It was clear that in many cases, though no visible records are produced, the managers are mentally planning maintenance and making sure it is done. In most units operatives are charged with responsibility for routine oiling and greasing and in one or two units are paid a fixed maintenance bonus.
- 1.3 In those units fortunate enough to have skilled foreman fitters it is usually a part of their duties to know when items of plant are due for an overhaul and to see that they receive it. In some units this is made straightforward by having spare plant available. It is not always possible to check whether regular maintenance is being done because few records are being kept.

2. Maintenance Records

2.1 Maintenance records consist of three main types:-

- a) Diaries,
- b) Record Cards,
- c) Job Sheets.

2.1.1 Diaries are maintained by several quarry managers and by some operators. The content varies but usually consists of the date and a brief description of what was done. e.g.

23.11.76 - Changed jaws.

21.4.77 - New bearings installed.

This information is rarely entered on any other record, although in some cases it is referred to when daily production reports are prepared.

2.1.2 Record cards are maintained in several units, usually the larger ones where staff are available to deal with the clerical work. Several units were able to produce record cards but they were only up-to-date at two units. The reason given for the inadequacy of these records was the need to complete them from memory as time permitted.

2.1.3 Job sheets are prepared in those workshops which also service road vehicles and are a spin off from the transport maintenance system.

2.2 None of these records are transferred with mobile plant as it moved from unit to unit. It was not possible to establish a full history of the maintenance of plant due to periods of enthusiasm, when the records were completed, being interspersed with even longer periods of depression when they were not.

2.3 In all cases where records are kept, no details of cost of either labour or material are recorded. In fact it is virtually impossible at the present time to associate costs with individual items of plant, as all basic documents are coded to processes.

3. Administrative Procedures

3.1 Administrative procedures for maintenance are dealt with in three basic systems -

- a) Wages,
- b) Purchases,
- c) Daily Reports.

3.2 Wages

3.2.1 Wages procedures differ to some extent between units, with the main difference being in the way labour is recorded.

There are three main basic records in operation:-

- a) Time Sheets,
- b) Clock Cards,
- c) Job Cards.

3.2.2 In some units all three are used, in others only clock cards are used. The attitude to basic time recording was fairly consistent. It can be summed up by one manager's comment, "We don't employ fitters or operators to do paperwork", which is perfectly true, but in those instances where the basic record was required to calculate pay, the men did not seem to complain.

- 3.2.3 At most quarries labour costs are allocated to processes on an arbitrary basis using experience as a guide. No manager believed that detailed time recording of maintenance work was worth the effort. One manager commented, "If you managed to get them to do it, which you won't, it would not be accurate, they'd write anything down."
- 3.2.4 In some units time paid to operators for oiling and greasing, and maintenance bonuses, is not allocated to maintenance, but included with the normal operating costs. This could amount to 15% of gross wages.

3.3 Purchases

- 3.3.1 All the quarries operate the basic Tilcon system of raising orders for supplies and preparing goods received sheets for receipts.
- The procedure varies between those units which operate stores and those which do not. In the former detailed records are maintained for stores receipts and issues; in the latter all purchases are charged direct to the process.
- 3.3.2 In all quarries it is possible to record which item of plant the supplies are for, either on the order or the issues sheet. Normally only the process code is entered onto the paper-work, but some storemen prefer to enter full details of the plant.
- The purchase procedures are the most consistent and well-organised of all the procedures concerning maintenance.
- The attitude towards the control of expenditure on supplies is one of the strong points in the systems. For some reason this attitude does not exist in regard to the control of labour costs.

3.4 Daily Reports

- 3.4.1 The procedure for daily reporting varies between the Western and Midland areas. The relevance of this to maintenance is due to the need or otherwise of quarry managers to record lost time and breakdowns. Where this is done it usually requires a reason which is either based on some form of record or is recorded from memory.
- 3.4.2 Views on the value of daily reports varied but in most cases it was accepted that there is a need for some form of report.

APPENDIX G

MANAGEMENT INFORMATION SYSTEMS - ACCOUNTS - 3.10.78

APPENDIX G

Management Information Systems - Accounts

Introduction

This report has been included because it stemmed from work done earlier in the research and included in the General Action Report (Appendix E) reference paras. 6.2 and 6.3.

Content

The report is included in the Appendix in full, and sets out the objectives for what has become a major systems project in the company, together with suggestions for various courses of action that might be taken.

Relevance to Research

This is the latest report in a series of reports aimed at obtaining agreement for action to be taken to implement the findings of the research project. This shows how virtually all the findings have been implemented by the company to ensure that the information needs of management, now that they have been defined, are met.

Before this research was carried out it is true to say that the company moved in an atmosphere that can be best described as "Ignorance is bliss".

Cross Reference

This appendix is referred to in:

Chapter 9, Section 9.4

Management Information Systems

- Accounts

T.J. BENTLEY

3.10.78

1. Introduction

- 1.1 This report has been prepared as a basis for discussion and deals with the development of the present accounting systems, including the introduction of a group coding system. The report sets out the broad systems requirements and indicates how these can be met.

2. Objectives

- 2.1 With several accounting machines in the Divisions needing an early replacement, the next stage of the development of the Tilcon Information systems is due to be carried out. This stage centres around the area of information which is normally input through the nominal ledger and cash book. The objectives of computerising this area will be to move towards a situation where we:

- a) Improve the accuracy and time in which the information is available and reduce the pure clerical effort. (The clerical effort that has formerly gone into the production of the accounts would be transferred to a closer consideration of the results.)
- b) Achieve a higher level of information availability to assist in management decision making. This would be achieved initially through more relevant reports being made available but ultimately through access to the information directly from the terminal with a consequential reduction in paperwork.

In this objective we should seek to have easy access to information in the division or area where it is required by having effective terminals sited there.

- c) Bearing in mind that all the internal accounting information would be on the computer, we could provide an opportunity to test the various alternatives available to management through models built into the machine and related to actual costs.

3. Present Position

- 3.1 At the present time each division operates an accounting system designed to meet the needs of the division and using a different coding system and different methods of producing the accounts. The differences are historical and though quite significant, will not prevent a single accounting system being developed for the group, if this is desirable.

- 3.2 The present approach taken by each division is as follows.

Quarries Central - Operate an NCR accounting machine nominal ledger with detailed analysis for Purchases, Sales and Assets being provided by computer systems. Detailed information on stocks and adjustments are fed in by Area Administration Offices based at Cheltenham and Ballidon. The accounts department is based at H.H.

Quarries Scotland - Produce the accounts from a computer based nominal ledger, which is updated automatically by the computer based sales and purchases systems. They have recently started to operate the group asset system and all accounting work is done at the regional office at Alexandra Parade.

Quarries Northern - The accounting system is based on an NCR nominal ledger to which the sales and purchases data are posted from computer reports. At this time a manual assets system is operated locally but work is in hand for transfer to the Computerised Assets System. Detailed information for the accountants is passed direct from operating units and there are no area accounts systems.

The new Yorks/Lancs region now part of Quarries Northern will initially use an NCR accounting machine using procedures similar to the Quarries Central Region.

Concrete - The assets system is computerised and although the computer based nominal system is operated, Concrete use a different coding system incorporating a number of variations to the basic system used by Quarries Scotland. In addition the division is sub-divided into six areas, each of which is administered by an office manager with the accounts produced by an area accountant.

With the exception of Scotland, the area accountants are based in Harrogate.

Mortar - The assets system is computerised but although using the same basic nominal system as Quarries Scotland and Concrete, the coding is different and again there are several variations. The Division is sub-divided into areas and specialist activities and all accounting is carried out at Harrogate.

Contracting - Now absorbed into Quarries Division, operates an NCR accounting machine based accounting system with the bulk of the detailed accounting being carried out at the regional offices. Quarries Scotland are using the Tilcon computer for contracting nominal ledger.

HQ and Others - A variety of approaches are used to deal with HQ, Industrial Minerals and subsidiaries, incorporating NCR, computer and manual systems.

3.3 The brief summary given above provides an indication of the variety of systems in operation at the present time. They all have one aspect in common. This is the preparation of the accounting reports which are hand-written and then typed. In some divisions, they are then reproduced by photocopying, in others by spirit duplication. The accounts preparation stage includes the manual calculation of variances from budget and the application of CCA adjustments.

3.4 All divisions are making increasing use of computer systems for detailed analysis, particularly with regard to sales and purchases information. In addition some investigations into the use of financial models for budgeting purposes are being carried out.

- 3.5 Currently equipment used for the preparation of accounts including contract costing is obsolete and rapidly approaching a stage where it will not be possible to guarantee maintenance. New developments in business machines mean that much better, more efficient and more reliable equipment is available. The use of such equipment together with the re-design of basic accounting systems could bring considerable benefits.

4. Developments In Business Machines

- 4.1 It is worthwhile commenting upon recent developments in the design of what were once called accounting machines. These developments have occurred in two ways.
- a) Accounting machine manufacturers have developed accounting machines using the new micro processors for programming and control rather than the mechanical control bars. They have also replaced visible record cards with new forms of magnetic storage known as "floppy disks". These two changes have converted the accounting machine into a small, or mini-computer.
 - b) Computer manufacturers have recognised the development of small computers, and have themselves produced smaller versions of their computers in a form of mini-computer.
- 4.2 The two paths by which mini-computers have emerged have created certain basic advantages and disadvantages in the equipment. However, because of the wide range of equipment available, choice can be made entirely on the basis of the particular needs of the business. For example, I do not believe that one particular machine is necessarily suitable for quarry accounting and contract costing.
- 4.3 The developments towards magnetic "invisible" storage of information means that a different view has to be taken of the way information is stored; retrieved and used. On most mini-computers the data held on magnetic files can be viewed on a visual display screen and printed if required. Very often it is sufficient to read the information without taking a copy. For this approach to be as flexible as the old accounting machines, it must be possible to look at part of the file whilst the rest is being used to update information. Not all the equipment available allows the files to be used in this way.
- 4.4 The new machines are very accurate and reliable but require disciplines not normally associated with accounting machines. Some even require special temperature and humidity controls.
- 4.5 The ability of the machines to be programmed to carry out a wide variety of tasks together with the size of files that can be stored and used makes them an excellent replacement of accounting machines.

5. Group Coding

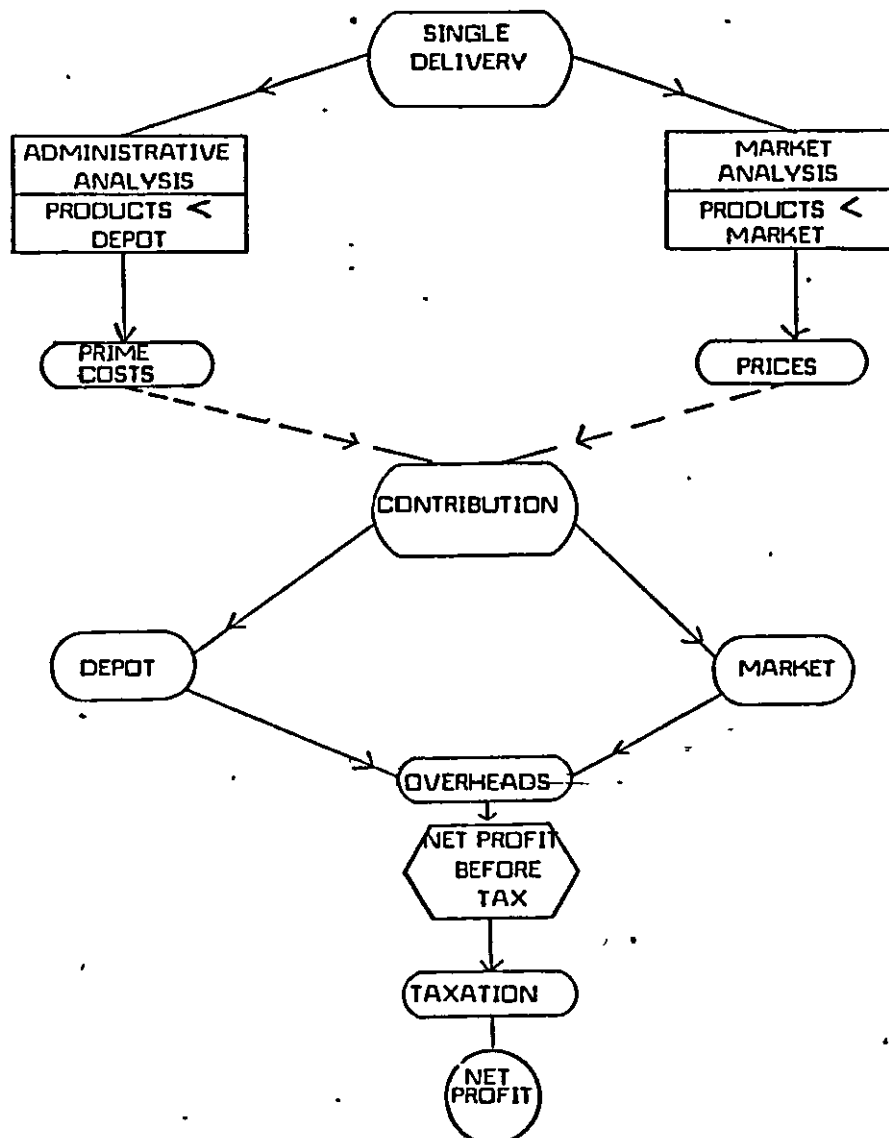
5.1 The development of comprehensive information systems depends to a large extent on the coding structure used to classify data. Such a coding structure should be considered from perhaps the two most important viewpoints.

- a) Administration
- b) Sales and Marketing

Administration is concerned with collecting information to assess the performance of the various activities making up the business and also for directing the flow of information to the persons responsible.

Marketing Information is concerned with collecting data across administrative boundaries so as to see clearly what is sold, to whom, where and what for.

5.2 It is important, therefore, that any coding structure should cater for this separate data collection function in such a way that both needs are met from the same data source. This can be shown diagrammatically. (See below.)



5.3 Work is well under way with the design and implementation of a coding structure which will meet the administration and marketing needs of the entire Group. The actual structure can be shown diagrammatically. (See below.)

ADMINISTRATION

Division



Area & Depot



SALES AND MARKETING

Division



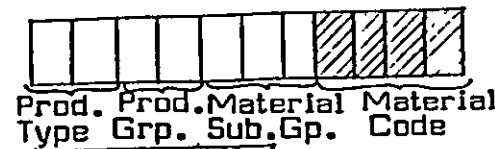
Area & Depot



Datacode



Product



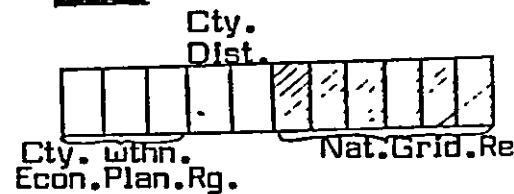
Customer



Customer Class



Location



Market Segment



End Use/Site
Class



*Account Code




*Process/Function Code



Subsidiary Code



 Accounts code input for each transaction, except for sales where it is generated from product code.

* Some divisions may wish to reverse the order of Account and Process Codes. The system will allow this.

Coding action Identification key



Input per new customer.



Input per delivery.



Input per batch.



Input per new datacode.



Computer generated.



Check digit.

- 5.4 All new computer programs are being designed to ensure maximum flexibility in the sorting and handling of data for the production of routine, regular and "ad hoc" reports.

6. Systems Requirements

- 6.1 Any management information and accounting system must be able to provide -

- i) Flexibility to meet future requirements.
- ii) Reliability in the production of regular and routine reports.
- iii) Economy in operation.
- iv) Simplicity in design and operation to ensure effectiveness.
- v) Help to management and accounting staff in carrying out their work.
- vi) Acceptability to both local and Head Office personnel.
- vii) Security in the systems operation and the maintenance of accurate data files.
- viii) Audit by both internal and external staff.:-

- 6.2 Specifically the future MIS - (Management Accounts) system will be designed to provide:-

- 6.2.1 Information for accounting and operational staff at:-

- a) Group H.Q.
- b) Divisional H.Q.
- c) Operating Units.

- 6.2.2 Routine, regular and ad hoc (interrogation) reports at levels "actionable" by the user. - Such reports would include customer invoice and supplier's payment cheque preparation.

- 6.2.3 Information to facilitate compilation of monthly, quarterly, half yearly and annual accounts. Much of the "balancing" and "extensions" currently undertaken manually would be undertaken within the system and output would be in the format of the present management accounts so further reducing accounting, clerical and typing effort. :-

- 6.2.4 Budget, actual and variance information for:-

- a) Each month (or any designated trading period).
- b) Cumulative each month for up to twelve months.

- 6.2.5 The meeting of CCA requirements in the presentation of information as historic and CCA based; and, for certain reports, will show the difference in value (£) between the two methods.

6.2.6 Facilities for continuous access for file update, and information reading/extraction.

Continuous update will ensure a certain basic continuing accounting discipline such as customer invoicing shortly after delivery, and the monitoring of cash flow. The requirement for regular and routine reports as "hard copy" would be augmented by an "ad hoc" interrogation facility presented on a VDU with screen-copying facilities.

6.3 The development of a new system will enable computer applications for stock control, total plant costing and the preparation of monthly management accounts, not hitherto attempted in the Group, to be carried out. In addition there is a possibility of a reversal of the present policy of using bureaux to process payroll and asset accounting routines by bringing such operations "in house".

6.4 Financial modelling in the form of budgetary information in management accounts format on a "what if" basis might also be considered desirable by:-

- i) Month for up to twelve months individual and cumulative;
- ii) Half year up to five years individual and cumulative.

7. Suggested Approach

7.1 It is recommended that a detailed review be carried out starting from the point that the approach we should take is to retain the existing terminals and provide two mini-computers at the remote locations at Quarries Scotland and Quarries Northern. Divisions based at Harrogate could have a direct terminal link to the computer instead of their own mini-computer. This will depend largely on the specification of needs. The facilities available would be as shown in Appendix 1.

7.2 The above approach is being suggested for several reasons.

- a) The control of data input, and access to computer files must be located in the Regional and Divisional offices.
- b) The locations which operate remote from Harrogate House have to be equipped with either:-
 - i) terminals linked directly to the computer at Harrogate all the time;
 - ii) a mini-computer available for local use during the day but which can be linked overnight to the computer at Harrogate.

The second of these alternatives is considered to be the most economical and the most flexible.

- c) Those regions and divisions based at Harrogate can have terminals linked direct to the computer and thus have the full power of the computer available.

(continued)

(7.2 contd.)

- d) The present accounting machine cannot be replaced with similar machines and so we have to face the problem of changing our approach to utilise the best equipment for our needs.

7.3 It is suggested that the re-design of the present accounting system is approached in four stages.

- a) The full Implementation of the Group assets system and the completion of the Quarries re-organisation.
- b) The introduction of the new Group coding structure.
- c) The specification of equipment to replace existing accounting machines together with the development of accounting procedures up to the nominal ledger stage.
- d) The design of procedures for producing the monthly accounting reports direct from the machine based nominal ledger. This would include the facility to update budgets and do "what if" exercises. This will also include the development of a contract cost accounting system.

7.4 In making the above suggestion we have taken into account the necessity to replace our existing computer and terminal network in 1981. The present system should cope with the developments indicated here, but will be seven years old at the end of 1980. The terminals, though robust, reliable and very effective, will not last for ever, and we should be aware of the eventual need to change.

When the developments outlined here are complete we will be in a very good position to specify our needs for a new computer network based on the latest available technology.

8. Implications of the Suggested Approach

8.1 There are several implications in following the approach suggested. These can be regarded as three types;

- a) Technical,
- b) Systems,
- c) Human.

8.2 Technical Implications

The technical implications of making a significant change in accounting systems as suggested here are very important.

- a) It is important that whichever machine is acquired to replace the existing accounting machines it is compatible with the present computer equipment, including terminals.

(continued)

(8.2 contd.)

- b) The levels of security must be very high. Changing over from one system to another is never easy and it is important to ensure that the new system is secure, and will not fail.
- c) The ability to provide flexible systems which are easy to change depends upon the company's ability to carry out its own programming rather than rely on outside services. This may well require additional training for management services staff.

8.3 Systems Implications

As we are aware from the developments in the last four years, any systems changes require co-operation and additional work. The changes suggested above will mean:-

- a) New forms of input and accounting controls will have to be developed.
- b) Accounting procedures based on the use of ledger cards will have to be re-examined as it is unlikely that ledger cards will form part of the new system.
- c) Coding requirements will become more important and call for greater discipline than present systems.

8.4 Human Implications

Perhaps the most far-reaching implication for people will be the change in procedures and documents which will require them to re-learn methods which had become second nature. This problem can be overcome by training at three levels.

- a) Management training will need to be carried out to explain how the system works and what the effects will be on staff.
- b) Supervisor training is perhaps the most important because unless the supervisors know all there is to know about the system, they will not be able to guide the staff.
- c) Staff training in new procedures with new paperwork will be needed in addition to the operation of new machines.

9. Benefits

9.1 The benefits of the proposed development would be -

- a) Reduction in the manual effort in producing monthly accounts.
- b) Improved access to information both in terms of scope and speed.
- c) Consistency throughout the Group.
- d) More reliable equipment.
- e) The ability to develop simple financial models.
- f) Improved controls more readily auditable.

9.2 These benefits will only be obtained if the implications of the developments can be fully catered for in the way the changes are implemented.

10. Timescale

10.1 The stages of development outlined in para. 7.1 could be carried out as follows.

Stage 1	7.3a)	Complete present work	by end 1978.
Stage 2	7.3b)	New Code	by mid 1979.
Stage 3	7.3c)	Equipment specification and design of nominal ledger	by June 1979.
Stage 4	7.3d)	New Accounting Pro- cedures	starting Jan. 1980.

10.2 This programme will incorporate many detailed changes during which the basic systems must continue to function effectively. This will call for considerable effort on the part of the project team in close co-operation with systems users.

11. Conclusion

11.1 These broad proposals will be examined in more detail by December, 1978 if the general approach is considered to be the right one. It is important that we recognise the need to make careful plans and to approach the development in practical steps, each of which will create a firm foundation for the next.

11.2 The success of this project will depend entirely on the help, advice and co-operation of Divisional and Regional accounting staff. The role of Management Services staff will be to act as a catalyst and to co-ordinate activities.

Appendix 1

1. The facilities for each division or region are depicted on the attached flowcharts. They fall into two categories.

- a) Local Accounting System (Flowchart 1)
- b) Central Accounting System (Flowchart 2)

2. Local Accounting System

- 2.1 The local accounting system is designed to allow the offices remote from Harrogate to operate without being linked directly to the central computer to obtain information from the files. This means that the local machine must have sufficient processing power to hold large files locally and to input and retrieve information from these files.
- 2.2 The equipment needed for the local computer facility would be:-
 - a) Input and output devices, probably visual display units.
 - b) Medium speed serial printer (a line printer could be used if the output qualities demanded it.)
 - c) Disk file unit, probably two disk packs containing about 60 M characters.
 - d) A remote terminal in the contracting office for the contract cost control system.
- 2.3 The local computer facility would be linked to the central computer via a private land line and would send information for processing and receive updated files from the central computer. This would complement the limited processing power of the local machine.

3. Central Accounting System

- 3.1 For economic reasons it is not considered feasible to provide the same facilities for divisions and regions based in Harrogate and Knaresborough. Similar facilities can be provided without the expense of large disk file units and line printers which are available in the central computer. Instead it is proposed that the approach set-out on Flowchart 2 is followed. This would provide:-
 - a) Input and output devices, probably visual display unit.
 - b) Medium speed serial printer.
 - c) Remote terminal for contract cost control.

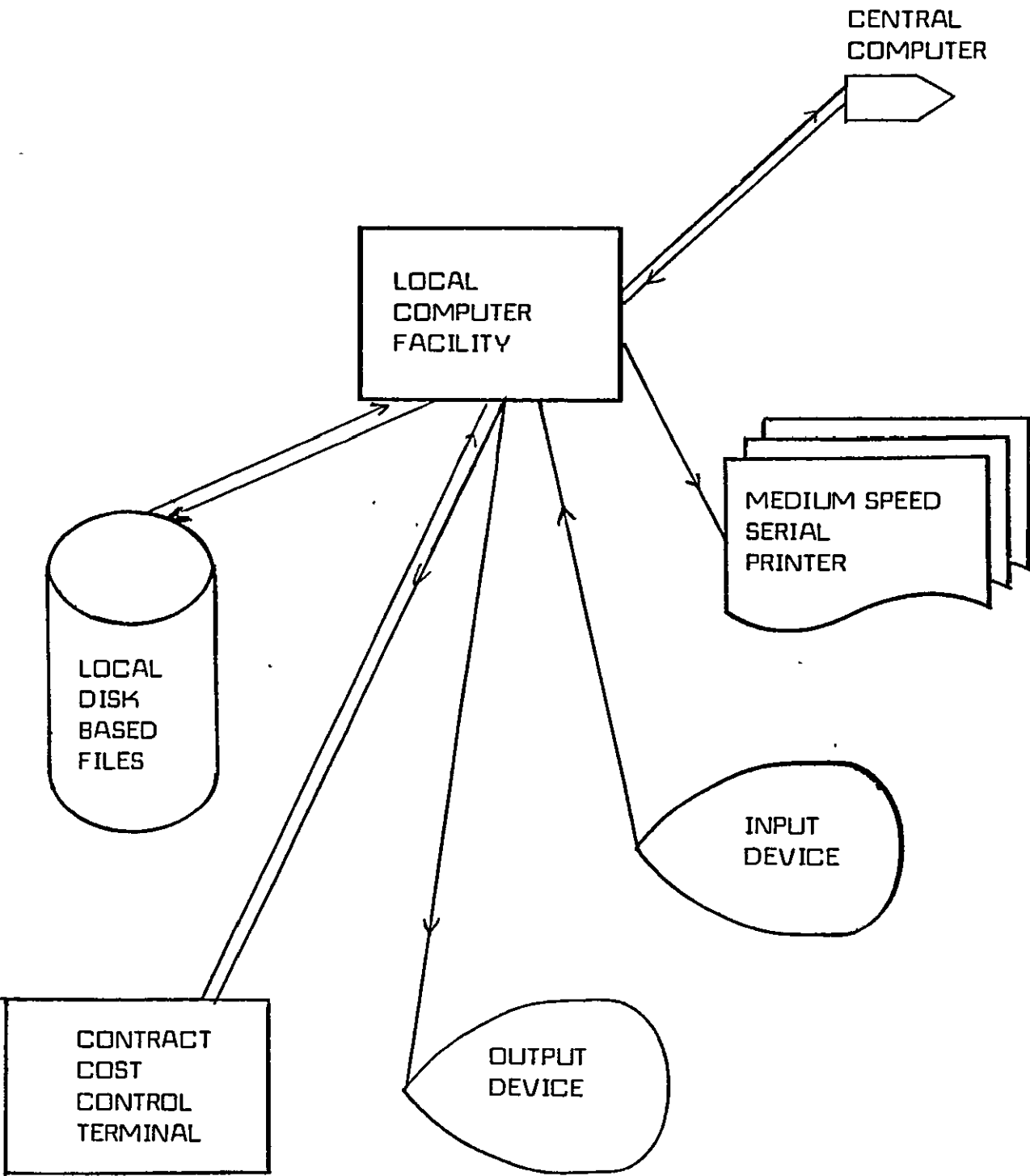
- 3.2 It is probable that the input - output devices would be an integral part of the "Intelligent" terminal which could be considered as a more powerful up-to-date version of the DE523 with larger storage and programming capacity.
4. The output from either of the above systems would be the same or equivalent, and only the amount of equipment would be different. Both approaches would be used in the same way. The main difference would be the way in which they are linked to, and use, the central computer.
5. Both approaches are tentative suggestions based on an examination of the present equipment available and the most cost effective way of meeting our predicted needs. When our needs are fully evaluated we will be able to define the equipment needs more carefully and may decide to change the above suggestions.



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