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THE NEED FOR AND IMPROVEMENT OF BUDGETARY PLANNING IN A MULTINATIONAL CORPORATION

Volume II

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A Thesis, submitted for consideration for the award of Doctor of Philosophy

The University of Aston in Birmingham

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Volume II

APPENDIX A

Appendices Relating to Introduction and Review of the Research

APPENDIX A 1

List of U.K. Divisions

Division	Trading Group
U.K. Tyre Division (UKTD)	Tyre Group
National Tyre Service (NTS)	Tyre Group
Pirelli Ltd.	Tyre Group *
United Reclaim (URL)	Tyre Group
Aviation Division	Engineering Group
Plant and Equipment	Engineering Group
Redditch Mouldings	Engineering Group *
Suspensions	Engineering Group
Wheel	Engineering Group
Belting	Industrial Group
Fluid Seal (AFSD)	Industrial Group
General Rubber Goods (GRG)	Industrial Group
Industrial Hose (IHD)	Industrial Group
Hydraulic Hose (HHD)	Industrial Group
Oil & Marine (O & M)	Industrial Group
Polymer Engineering (PED)	Industrial Group
Precision Rubbers (PRD)	Industrial Group
Angus Fire Armour (AFAD)	Angus Fire Armour Group* (Industrial Group
International Sports (ISC)	Sports Group (Consumer Group)
Dunlopillo	Consumer Group+
Footwear	Consumer Group
Semtex	Consumer Group
Textiles	Consumer Group

* Divisions which are no longer part of Dunlop.

\+ Consumer Group no longer exists, however for purposes of simplicity, the category is used in this research.

APPENDIX A2

Nature of the research

1. Action research

The Dutch psychologist Van Leent (1963) (quoted by Hofstede P. 104) uses three dimensions to describe types of research. Theory building he terms research 'in-height'; research 'in depth' is the attempt to find the philosophical bases of the problem; and research 'in width' starts from the empirical world, which it investigates in detail applying relevant theory from all disciplines. Research 'in width' has certain similarities to the present approach in that theories from several disciplines are being applied. However, it has more in common with applied research, in which known theories are applied to an operating problem without attempts at theoretical development. The current project is viewed more as a type of action research than as a form of applied research.

Rapoport (1970) described action research as aiming

> '..... to contribute both to the practical concerns of the people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable ethical framework'.

Foster (1972), although satisfied with what Rapoport has said, wished to add:

> '..... and the intention of the parties, although with different roles, to be involved in a change process of the system itself'.

Action research is therefore concerned with solving an immediate practical problem, adding to the existing body of knowledge in that particular field, and instigating change. Whereas applied research would only produce a solution to the immediate problem, action research is also concerned with solutions which are broadly applicable to other similar situations.

Change is of great importance in action research. Lewin (1947), who is generally regarded to be its founder, put great stress on the client problem-solving change characteristics of the research in its natural setting. Similarly, Chein et al (1948) also stresses the change agent role of the action researcher by comparing him with the laboratory scientist whose task ends with the discovery without having to put it into practice.

Another distinguishing feature of action research is its 'collaborative/dialogic mode' (Cherns (1976)) whereby both the nature of the problem and the approach to the solution are jointly determined. Warr (1977) extended a typology used by Cherns which clearly indicates how the joint nature of action research differentiates it from other research types:

	Nature of the problem	Method to be used for solution	Role of external practitioner
1a	Predetermined by practitioner	Preselected by practitioner	Basic Researcher
1b	Predetermined by practitioner	Jointly determined	Applied Researcher
2a	Predetermined by the organisation	Preselected by the organisation	Technician
2b	Predetermined by the organisation	Jointly determined	Consultant
3	Open for joint examination	Jointly determined	Action Researcher

When the research is instigated the collaborating organisation may have no more than a 'feeling' than all is not well within the research area. It is then for the action researcher and the collaborating organisation to jointly diagnose and defined the problem area as well as jointly agreeing on how to tackle the problem.

Foster (1972) has distinguished four types of action research:

i Diagnostic, which may or may not lead to action.

ii Participative, which characteristically commits the client to action

iii Empirical, which is essentially applying change and recording what happened.

iv Experimental, which utilises control groups, comparative treatments and outcomes.

The present research is seen as falling somewhere between the first and second types. The initial period of the research and much of the output is of a diagnostic nature, yet certain parts of the research are essentially change oriented, to which Dunlop is committed.

Warr (1977) identified seven characteristics of action research which help to indicate how such research relates to the current project.

i. Action research is change oriented and places 'emphasis on intervention to alter and improve an operational system'.

A distinct similarity can be seen here because (as stated in Section 2.2) the objective of this research is to change the present management planning system such that planning methodology is improved.

ii. The action researcher is closely involved in the change process.

If the findings of the current research prove to be acceptable to Dunlop part of the the remit is to implement required changes.

iii. The action researcher has data available to him which would not normally be accessible.

Clearly the data available to the author is of a highly confidential nature and is only available to personnel within the Department and to top management.

iv. The research is theory oriented. The action researcher is

'not only a person trying to help change a situation; he wants to learn and generalise from that process.'

The objective of the present project, as will be explained in Section 2.3.2, is to solve the problem posed by the 'case study' in such a way that it also contributes to the existing body of knowledge in this area.

v. Roles and relationships change over time.

Increasingly over the research period the author has involved in the day to day departmental work. Similarly, members of the department, particularly the Industrial Supervisor, have increasingly been involved with the actual research itself.

vi. Action Research creates tension.

The author was occasionally aware that he was 'serving two masters'; those of the collaborating organisation and those in the academic world of Aston University. Sometimes decisions had to be made which were not in line with the desires of one or the other or indeed both. Also the recommendations, in that they suggest change, may also be viewed as having some tension creating properties.

vii. Action research reduces the gap between research and application.

As Warr puts it:

> 'the research is itself directly and immediately applied. The goal is one of learning and doing at the same time.'

As will be seen in Section 2.3.2 this is precisely the objective of this research. The reason for the existence of this research is that Dunlop desired a practical solution to a real problem and thus the whole project is geared up to fulfilling this desire.

Action research is therefore concerned with two components:

a. entering an organisation and observing a system within that organisation (participant observation).

b. Subsequently producing information which can be used to bring about change (intervention theory). The information produced should have an applicability both to the collaborating organisation and a wider audience.

a. Participant observation

Maticulous observation of the system in question is an essential pre-requisite of the production of valid information and change. Several stages of action research can be expected to involve some form of participant

observation, which has been defined by Schwartz & Schwartz (1955) as involving someone who:

> '..... is in a face to face relationship with the observed and, by participating with them in their natural setting, he gathers data. Thus the observer is part of the context being observed and he both modifies and is influenced by this context'.

Becker and Greer(1960) have divided participant observation into three types:-

i. where the observer is an integral member of the group (active observation)

ii. where the observer poses as a member but is not really one (pseudo-active observation),

iii. where the observer is simply passive

Part of the current research has involved direct active involvement in the system, but primarily the observation has been of a more passive nature.

b. Intervention theory

Both action research and the present research project are forms of interventionism where the researcher can be regarded as a'change agent'.

The role of the change agent has been defined by Argyris (1970) as:

> '..... to enter into an on-going system of relationships, to come between or among persons, groups, or objects for the purpose of helping them'

Argyris goes on to say that a further characteristic of intervention is that the system must exist independently of the intervenor. Thus, in the present research, the author (the change agent) is intervening into an existing management planning system for the purpose of obtaining beneficial change.

According to Argyris, above and beyond the problem itself, there are three essentials for objective intervention:

i. The generation of valid and useful information. Such information is that which describes the relationships between the factors which create the problem.

ii. The ability to excercise a free and informed choice.

iii. Internal commitment on the part of the sponsoring organisation to act on the choices made.

Simply producing change is not a sufficient criterion for judging the success of the intervention, as change for changes sake is often counter-productive. The primary objective of the change agent is to generate valid information. This information should be in a usable or manipuable form and should be available such that the sponsoring organisation can understand the relevant factors. It is obviously important that the cost of obtaining, using and understanding this information should not be beyond the capacity of the system.

A further criterion for evaluating the success of a change agent is that the problem should be solved and implemented in such a way that it does not recur. Similarly, the intervention must occur without deteriorating, and hopefully enhancing, the effectiveness of the problem solving, decision making and implementing processes within the organisation.

These criteria described by Argyris are similar to those conceived by the author for determining the success of the present research. That is, primarily that the research will produce valid information which Dunlop will wish to implement. Dunlop therefore must be convinced that the proposals achieve the projects primary objective of improving planning methodology. Subsidiary objectives are that there is an increase in efficiency of the present system which is at a 'price' not outside the scope of that system. Likewise the improvement in the planning system should not be detrimental to the effectiveness of the problem solving, decision making and implementing processes within

2. Case study approach

The sample which the research is concerned with is limited primarily to one organisation, that is Dunlop. The research being so limited has much in common with a case study approach, which implies that there are applicability problems of that research to similar problem areas. There are indeed certain problems with this type of action research in terms of applicability especially with a project concerned with planning theory. Planning has developed along pragmatic lines, with little generally applicable theory being established along the way. Because organisations are complex and varied in their nature, planning systems have been established on similar lines such that they 'fit' the requirements of the organisation. Thus much of the literature on planning is of a 'case study' type, applicable only to the type of organisation for which the study was written.

However, the aim of this research is not only to solve the problem posed by the sponsoring organisation, but also to draw generalities which will be applicable to the body of planning theory.

There is a high demand for the research in this area to be of a practical nature as much of planning theory is still viewed by line managers as an academic exercise. The case study part of the research should therefore be of a practical and applicable nature if it is not to be rejected as being theoretical by the managers who are to implement it.

One of the benefits of the case study type research is the unique opportunity it offers for empirical data gathering in an area that would not normally be accessible to the researcher. Likewise it offers a chance for research in a practical situation thus helping to ensure that any theory building is of a practical nature and applicable in other similar situations.

Glaser and Strauss (1970) believed that action research produces results which are applicable to organisations displaying similar characteristics. In planning theory, this is the most a researcher can hope to achieve, primarily because of the necessarily pragmatic nature of that theory. Indeed for conclusions in this area to be broadly applicable they should ideally be presented in the form of a range of possibilities. Such a range would allow organisations to select solutions to fit their particular organisational characteristics.

Similarly, Warr (1977) is aware that the goals of action research, to satisfy both the demands of scientic advancement and provide a satisfactory solution to the problem, are not easy ones to jointly achieve.

> 'The collaborative nature of the project means that neat experimental designs and completely systematic data collection methods are not always possible'.
>
> Nevertheless,
>
> '..... there is a great deal that can be done in the way of structured observation and quantitative data gathering'.

The present research has accepted that traditional scientific methods are not always applicable. However, it has consistently attempted to approach the problem in a structured, and where possible quantitative, manner.

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10 September 1980

Mr T J Kelsall
University of Aston in Birmingham
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Birmingham B4 7ET

Dear Mr Kelsall

I have seen a reference in the Guide to British Research to your work on :

'Analysis of patterns of error in yearly operating plans of a multi-national company' (SRC.1977-)

This work is of particular interest to me and I would like to know whether you have any published papers which you could send me.

Yours faithfully

D A Leibling
Group Strategy Manager

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APPENDIX B

Appendices Relating to Dunlop's Planning System

APPENDIX B1

Outline of Dunlop Safety Glass

Dunlop Safety Glass is a fictitious Strategic Plan in the form of a model on which divisions are asked, although not mandatorily, to base the structure of their S-Plans. The actual content of the Plans is, however, left entirely in the hands of the divisions.

The following headings give some indication of the content of the Safety Glass Model.

1. The business - This gives a broad description of the type of business and markets the division sees itself operating in.

2. Past Performance - This is a five year analysis of past key indicator data plus a brief description of the divisions past fortunes.

3. Business Category - This is the centrally allocated category for use in funding decisions. Divisions are asked to indicate their classification of the various businesses within their unit.

4. Key Strategic Issues - Divisions outline the key issues in their external and internal environments which are deemed to be of strategic significance. This will normally include a comprehensive analysis of the market and market share.

5. Objectives and Strategy - This section isolates the strategic objectives and outlines the chosen strategy to achieve them.

6. Impact of strategy - This is a quantification of key financial indicators over the five year strategic period.

7. Funds allocation - This gives the funds requirement over the first three years of the Plan period.

8. Key dates - This broadly indicates the timing of the key strategic actions in the Plan.

APPENDIX B2

CATEGORISATION OF DUNLOP DIVISIONS

Objective

Categorisation ensures there is a systematic approach to the assessment of a business, for the evaluation of investment and divestment priorities. For Dunlop to flourish, scarce resources must be allocated to divisions with long term profitability and faster growth, while constraining the low growth/profitability divisions.

Requirements for a System

One method of allocating funds in an autonomous Group like Dunlop is via the forecasts of expected rate of return on investment. However, where divisions are 'bidding' for scarce resources, these forecasts tend to be optimistic, and forceful managers may get a disproportionate share of the investment. This optimism cannot be successfully isolated by the "removed" Head Office sanctioning procedure.

Categorisation avoids this problem by taking a broad look at the present business and its probable future. It is however no more than a useful tool or guide for the funds allocation.

Divisional or Market Categorisation?

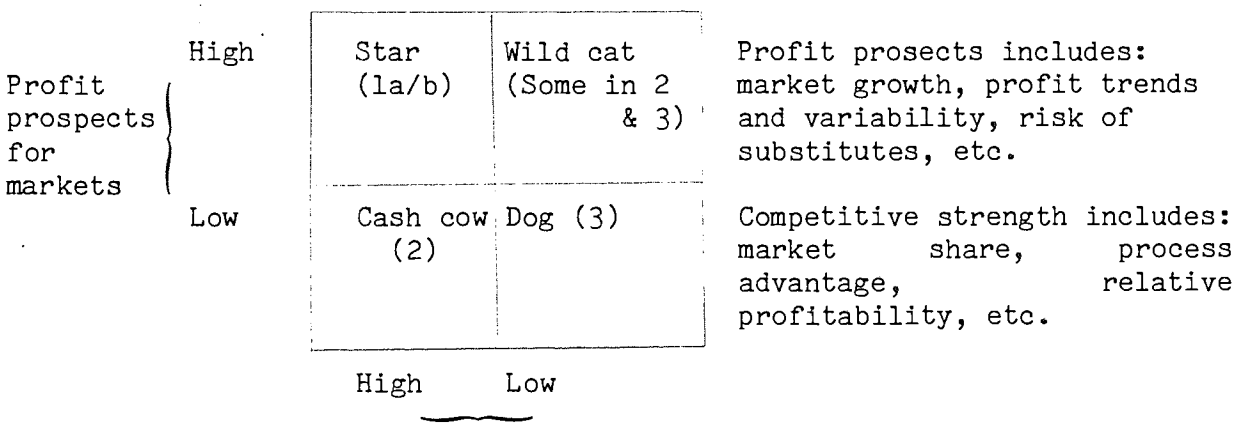
As many divisions in Dunlop are multi-product units, it would be desirable if the system categorised each major market. This is not viable; the required data not being easily available, and it would be an encroachment on divisional autonomy. Corporate Planning leaves any market categorisation to divisional managers.

The System

Categorisation is regarded as an aid to funds allocation rather than a decisions making device. The criteria used for the categorisation remain unknown to the divisions thus preventing, to a certain extent, them "playing the system".

To appreciate the system, it is helpful to look at its developments. It was first introduced in 1973 - 1974, and was based very loosely on the Boston Consulting Group Matrix. This is described by a quantified approach to market share and market growth. However, as Corporate Planning was not in a position to obtain the detailed information on markets, Dunlop's version relied more heavily on intuition than quantification.

The need for a more quantified approach to the problem caused Dunlop to change to the Shell Directional Policy Matrix. This matrix is defined by profit prospects and competitive strengths, which more adequately describe future profitability than the Boston Matrix. It also utilises a systematic approach to quantifying the various factors to reduce the dependence on intuition.



The Categories

1a. Star divisions with high organic growth and earnings potential. They are expected to have a rigorous expansionist strategy, with a real return on funds of 15%+ over the next five years. Some new high potential ventures may fall into this category.

Subject to funds being available, these divisions can expect to receive all they require, in line with previously agreed strategy.

1b. As 1a, but slightly lower growth/profitability or higher risk. They are expected to have slightly more cautious expansion policies and consequently may receive slightly less than 1a divisions.

2. Cash cows are divisions in need of profitability improvement and/or product rationalisation. Some businesses are capable of category 1, but do not qualify because of uncertain long term prospects or the need to re-orientate the business.

   Cash cows are mainly regarded as a source of funds; although this policy is very flexible in Dunlop. They are expanding with caution, or are simply less profitable, and therefore receive a working capital allocation to take account of inflation, and some capital expenditure for depreciation and perhaps selective modernisation.

   (Wild cats may be fund in this category and to a lesser extent, in other categories. These are embryonic units within divisions, which may possibly become separate divisions at the 'star' stage of development. Because units within divisions are not categorised, wild cats are not specified by this system. It is important, therefore, that special attention is paid to these units to ensure they are not stifled through lack of funds).

3. Dog divisions tend to fall into the following types

   a) in need of rationalisation to move category 2

   b) fairly profitable businesses but poor prospects or high risk (short term cash providers)

   c) divestment candidates (rare)

   d) closure candidates (rare)

As these are lowest in potential, they receive only what funds are left. This should causes real contraction and thus rationalisation, leaving only the more prosperous units.

The New Categorisation Procedure

Dunlop's new categorisation procedure extends the Shell Matrix by including additional criteria to meet the individual needs of Dunlop's funding process. Twelve separate criteria are identified in the system; each one given a score between 3 and +3, and weighted according to a predetermined system.

The criteria can be split into three main headings:

1) Strategy - fit and base for diversification.

2) Return on funds - Past and future : profit, profitability and cash flow (including a probability range).

3) Various adjustments -forecast credibility (including an assessment using Theil's Coefficient), industrial relations, economic factors and lastly competitive strengths and attraction of the market. (N.B. The latter two were parameters in the old system).

The new categorisation system is far from fully developed and certain internal logistics problems still have to be ironed out before it can operate efficiently. However, Corporate Planning still used the sytem as a guideline for their allocation proposals.

APPENDIX C

Appendices Relating to the Variance Analysis

APPENDIX
C1.1

Example of Variance Computer Program Output

Turnover

INTERNATIONAL SPORTS CO. - TURNOVER

	ACTUAL	FORECAST	ERROR	PERCENT	MODPERC	NM1	NM2	NM1PERC	NM1MODPERC	NM2PERC	NM2MODPERC	COEF1	COEF2
1967	6946.												
1968	9035.												
1969	9760.	9324.	-436.	-4.47	4.467	11752.	11124.	20.41	20.41	13.98	13.98	0.8	0.68
1970	10663.	10300.	-363.	-3.40	3.404	10543.	10485.	-1.12	1.12	-1.67	1.67	-2.0	-1.04
1971	12180.	11992.	-188.	-1.54	1.544	11650.	11566.	-4.36	4.36	-5.04	5.04	0.6	0.69
1972	14042.	13606.	-436.	-3.10	3.105	13913.	13697.	-0.92	0.92	-2.46	2.46	-2.4	-0.26
1973	17528.	17000.	-528.	-3.01	3.012	16189.	15904.	-7.64	7.64	-9.27	9.27	0.6	0.67
1974	22119.	20850.	-1269.	-5.74	5.737	21879.	21014.	-1.08	1.08	-5.00	5.00	-4.3	-0.15
1975	27983.	30630.	2647.	9.46	9.459	27912.	26710.	-0.25	0.25	-4.55	4.55	-36.5	-1.08
1976	32811.	35300.	2489.	7.59	7.586	35402.	33847.	7.90	7.90	3.16	3.16	0.0	-1.40
1977	38077.	40000.	1923.	5.05	5.050	38472.	37639.	1.04	1.04	-1.15	1.15	-3.9	-3.39
1978	44526.	45310.	784.	1.76	1.761	44188.	43343.	-0.76	0.76	-2.66	2.66	-1.3	0.34
1979						52067.	50975.						
AVERAGE	20473.	23431.	462.	0.26	4.513	25815.	25119.	1.32	4.55	-1.47	4.89	-4.8	-0.49
STDDEVIATION		1334.67	5.10	2.40	5.95	3.74	10.7	1.2					

	ACTDIF	FORDIF	PERCH	MODPERCH	CHSE
1969	725.	289.	-60.1	60.14	190096.
1970	903.	540.	-40.2	40.20	131769.
1971	1517.	1329.	-12.4	12.39	35344.
1972	1862.	1426.	-23.4	23.42	190096.
1973	3486.	2958.	-15.1	15.15	278784.
1974	4591.	3322.	-27.6	27.64	1610361.
1975	5864.	8511.	45.1	45.14	7006609.
1976	4828.	7317.	51.6	51.55	6195121.
1977	5266.	7189.	36.5	36.52	3697929.
1978	6449.	7233.	12.2	12.16	614656.
AVERAGE	3549.	4011.	-3.4	32.43	1995077.

STD8	STD9	RMSE
2035.	3050.	1412.

R	U	UM	UR	UD
0.940	0.3453	0.1071	0.650	0.2433

Example of Variance Computer Program Output

Margin

AVIATION - MARGIN

	ACTUAL	FORECAST	ERROR	PERCENT	MODPERC	NM1	NM2	NM1PERC	NM1MODPERC	NM2PERC	NM2MODPERC	COEF1	COEF2
1967	13.80												
1968	8.30												
1969	0.90	10.60	9.70	1078.	1078.	4.99	2.80	454.7	454.7	211.	211.1	-1.37	-4.11
1970	4.00	8.20	4.20	105.	105.	0.10	-6.50	-97.6	97.6	-262.	262.5	-0.08	0.60
1971	9.60	6.90	-2.70	-28.	28.	17.78	7.10	85.2	85.2	-26.	26.0	0.67	-0.08
1972	11.50	6.20	-5.30	-46.	46.	23.04	15.20	100.3	100.3	32.	32.2	0.54	-0.43
1973	9.90	9.10	-0.80	-8.	8.	13.78	13.40	39.2	39.2	35.	35.4	0.79	0.77
1974	9.80	9.50	-0.30	-3.	3.	8.52	8.30	-13.0	13.0	-15.	15.3	0.77	0.80
1975	12.60	10.10	-2.50	-20.	20.	9.70	9.70	-23.0	23.0	-23.	23.0	0.14	0.14
1976	13.60	15.10	1.50	11.	11.	16.20	15.40	19.1	19.1	13.	13.2	0.42	0.17
1977	12.80	15.70	2.90	23.	23.	14.68	14.60	14.7	14.7	14.	14.1	-0.54	-0.61
1978	16.60	13.20	-3.40	-20.	20.	12.05	12.00	-27.4	27.4	-28.	27.7	0.25	0.26
1979						21.53	20.40						
AVERAGE	10.28	10.46	0.33	109.	134.	12.94	10.22	55.2	87.4	-5.	66.1	0.16	-0.25
STDDEVIATION		4.19	325.28	315.74		126.77	86.44	0.6	1.4				

	ACTDIF	FORDIF	PERCH	MODPERCH	CHSE
1969	-7.40	2.30	131.	131.1	94.09
1970	3.10	7.30	135.	135.5	17.64
1971	5.60	2.90	-48.	48.2	7.29
1972	1.90	-3.40	-279.	278.9	28.09
1973	-1.60	-2.40	-50.	50.0	0.64
1974	-0.10	-0.40	-300.	300.0	0.09
1975	2.80	0.30	-89.	89.3	6.25
1976	1.00	2.50	150.	150.0	2.25
1977	-0.80	2.10	363.	362.5	8.41
1978	3.80	0.40	-89.	89.5	11.56
AVERAGE	0.83	1.16	-8.	163.5	17.63

STD8	STD9	RMSE
3.449	2.862	4.199

R	U	UM	UR	UD
0.1299	1.184	0.0062	0.3306	0.663

GENERAL RUBBER GOODS - RETURN

	ACTUAL	FORECAST	ERROR	PERCENT	MODPERC	NM1	NM2	NM1PERC	NM1MODPERC	NM2PERC	NM2MODPERC	COEF1	COEF2
1967	-13.4												
1968	-4.6												
1969	1.3	-2.20	-3.5	-269.	269.2	-1.6	4.2	-221.	221.	223.	223.	-0.22	-0.21
1970	-1.5	3.70	5.2	347.	346.7	-0.4	7.2	-76.	76.	-580.	580.	-3.59	0.40
1971	-10.9	-1.90	9.0	83.	82.6	1.7	-4.3	-116.	116.	-61.	61.	0.29	-0.36
1972	-1.7	7.70	9.4	553.	552.9	-79.2	-20.3	4559.	4559.	1094.	1094.	0.88	0.49
1973	9.6	2.50	-7.1	-74.	74.0	-0.3	7.5	-103.	103.	-22.	22.	0.28	-2.38
1974	14.2	6.40	-7.8	-55.	54.9	-54.2	20.9	-482.	482.	47.	47.	0.89	-0.16
1975	29.7	1.70	-28.0	-94.	94.3	21.0	18.8	-29.	29.	-37.	37.	-2.22	-1.57
1976	20.5	8.90	-11.6	-57.	56.6	62.1	45.2	203.	203.	120.	120.	0.72	0.53
1977	19.2	26.80	7.6	40.	39.6	14.1	11.3	-26.	26.	-41.	41.	-0.50	0.04
1978	22.3	26.40	4.1	18.	18.4	18.0	17.9	-19.	19.	-20.	20.	0.05	0.07
1979						25.9	25.4						
AVERAGE	7.1	8.00	-2.3	49	158.9	0.7	12.2	369.	583.	72.	224.	-0.34	-0.32
STDDEVIATION		11.23	176.26	165.88	1331.77	332.21	1.4	0.9					

	ACTDIF	FORDIF	PERCH	MODPERCH	CHSE
1969	5.90	2.4	-59.	59.3	12.3
1970	-2.80	2.4	186.	185.7	27.0
1971	-9.40	-0.4	96.	95.7	81.0
1972	9.20	18.6	102.	102.2	88.4
1973	11.30	4.2	-63.	62.8	50.4
1974	4.60	-3.2	-170.	169.6	60.8
1975	15.50	-12.5	-181.	180.6	784.0
1976	-9.20	-20.8	-126.	126.1	134.6
1977	-1.30	6.3	585.	584.6	57.8
1978	3.10	7.2	132.	132.3	16.8
AVERAGE	2.69	0.4	50	169.9	131.3

STD8	STD9	RMSE
7.927	10.32	11.46

R	U	UM	UR	UD
0.2635	1.369	0.0392	0.515	0.4453

APPENDIX C 2

Divisional Categorisation of Error Measures

Overall interpretation of the mass of results (over 15,000) from the error measures is difficult. One measure of accuracy often contradicts another. For example, a division might be accurate at forecasting levels in relative terms, but poor at predicting turning points. In order to obtain some overall picture of performance many of the more informative measures[1] have been summed together using Z-scores[2] to derive an accuracy category for each division.

No direct weighting was applied to the measures, although the number of measures concerned with relative accuracy outweighed the measures concerned with other forms of accuracy. This reflects the importance the author believes should be attached to relative measures.

In order to separate accurate divisions from the average and the wildly inaccurate, levels of category have been attached to each. These levels are constructed on the basis of plus or minus one standard deviation from the mean (which is zero). Thus anything above plus one standard deviation from the mean is a category A, and anything below minus one standard deviation from the mean is a category C. The divisions in the middle are category B.

The following interpretation can be attached to the various categories:

A - By Dunlop standards these are consistently accurate forecasters as regards all measures of forecast accuracy.

1. The measures included: mean percentage absolute error and standard deviation for levels and incremental change; the mean absolute percentage error and standard deviation of the naive model as percentage of those of the divisional forecasts, and the percentage of negative coefficients; the correlation coefficient for levels and incremental change; mean percentage error and percentage overestimating by a large amount; Theil's coefficient and disturbance proportions; measures of false signals and missed turns.
2. Z-scores merely compare a value with the mean and divide the sum by the standard deviation in order to obtain a standard score for each series.

B - The middle divisions in accuracy terms, ranging from those which are reasonably accurate to those which are quite inaccurate. However, all these divisions should be striving for improvement in their forecast accuracy.

C - These divisions are so inaccurate that their forecasts are valueless in predictive terms. Such divisions need to rapidly re-evaluate their forecasting procedures as well as the use made of those forecasts.

So, using Z scores the following categorisations emerge:

Table C2.1

TURNOVER - DIVISIONAL CATEGORISATION

	Division	Score	Category
1.	NTS	17.24	A
2.	ISC	14.84	A
3.	AFAD	14.18	A
4.	Footwear	11.99	A
5.	PRD	9.39	B
6.	Aviation	8.00	B
7.	Dunlopillo	6.43	B
8.	GRG	6.04	B
9.	HHD	2.17	B
10.	AFSD	0.43	B
11.	URL	(3.07)	B
12.	Belting	(3.56)	B
13.	PED	(4.54)	B
14.	Semtex	(4.83)	B
15.	Suspension	(5.04)	B
16.	IHD	(6.32)	B
17.	UKTD	(6.61)	B
18.	O&M	(8.34)	B
19.	Textiles	(9.90)	C
20.	Wheel	(10.01)	C
21.	Redditch Mouldings	(10.43)	C
22.	Plant and Equipment	(18.14)	C

Trading Group Averages

1.	Consumer	3.71
2.	Tyres	2.52
3.	Industrial	1.05
4.	Engineering	(7.14)

Table C2.2

MARGIN - DIVISIONAL CATEGORISATION

	Division	Score	Category
1.	HHD	11.80	A
2.	NTS	11.59	A
3.	AFAD	8.97	A
4.	Footwear	7.92	B
5.	Suspensions	7.69	B
6.	PED	6.95	B
7.	AFSD	6.08	B
8.	Dunlopillo	5.05	B
9.	Plant and Equipment	3.84	B
10.	IHD	3.15	B
11.	ISC	2.30	B
12.	Textiles	1.35	B
13.	GRG	(0.65)	B
14.	PRD	(1.38)	B
15.	O&M	(2.82)	B
16.	URL	(3.98)	B
17.	Aviation	(7.82)	B
18.	Redditch Mouldings	(9.23)	C
19.	Wheel	(9.89)	C
20.	Belting	(9.96)	C
21.	UKTD	(10.45)	C
22.	Semtex	(19.96)	C

Trading Group Averages

1.	Industrial	2.46
2.	Consumer	(0.67)
3.	Tyres	(0.95)
4.	Engineering	(3.08)

Table C2.3

RETURN - DIVISIONAL CATEGORISATION

	Division	Score	Category
1.	NTS	13.67	A
2.	PRD	10.15	A
3.	PED	7.72	A
4.	Footwear	7.53	A
5.	Dunlopillo	5.26	B
6	AFAD	5.25	B
7.	Plant and Equipment	4.77	B
8.	O&M	3.26	B
9.	AFSD	3.12	B
10.	IHD	1.10	B
11.	Suspensions	0.93	B
12.	HHD	0.49	B
13.	Textiles	(1.11)	B
14.	GRG	(1.53)	B
15.	Belting	(3.37)	B
16.	ISC	(3.46)	B
17.	UKTD	(4.15)	B
18.	URL	(4.55)	B
19.	Redditch Mouldings	(5.51)	B
20.	Aviation	(5.64)	B
21.	Wheel	(12.32)	C
22.	Semtex	(21.18)	C

Trading Group Averages

1.	Industrial	2.91
2.	Tyres	1.66
3.	Consumer	(2.59)
4.	Engineering	(3.55)

These categorisations show some divisions are consistently accurate forecasters; for example, NTS, AFAD and Footwear. Equally some divisions are consistently poor forecasters; for example, Wheel and Redditch Mouldings. It is to these latter divisions that many of the suggested improvements must primarily apply. Immediate reduction in inaccuracy could be achieved via linear transformation or even by the use of naive forecasting models. However the divisions themselves should attempt to discover the root cause of the error, taking into account the fact that according to the results of Theil's coefficient many other divisions suffer far higher degrees of uncertainty.

In central terms, although these categorisations can be usefully applied in, for example: the setting of contingencies, the interpretation of M-Plans, or the categorisation procedure for funds allocation; some indication is required of how critical the error is to the whole Group. For example, errors in UKTD can have a much more damaging effect on, say gearing, than errors in Redditch Mouldings. For this reason the categorisation for return has been weighted according to the size of the division. The results are displayed in table C2.4:

Table C2.4

RETURN - DIVISIONAL CATEGORISATION WEIGHTED FOR SIZE

	Division	Weight[1]	Score
1.	NTS	1.718	23.49
2.	Footwear	0.420	3.16
3.	AFAD	0.539	2.88
4.	Dunlopillo	0.447	2.35
5.	PED	0.271	2.09
6.	AFSD	0.246	0.77
7.	PRD	0.068	0.69
8.	O&M	0.185	0.60
9.	Plant & Equipment	0.053	0.25
10.	IHD	0.207	0.23
11.	Hydraulic Hose	0.369	0.18
12.	Suspensions	0.151	0.14
13.	Redditch Mouldings	0.014	(0.08)
14.	URL	0.030	(0.14)
15.	Textiles	0.260	(0.29)
16.	GRG	0.429	(0.66)
17.	Belting	0.336	(1.13)
18.	Aviation	0.375	(2.12)
19.	ISC	0.692	(2.39)
20.	Wheel	0.378	(4.66)
21.	Semtex	0.429	(9.09)
22.	UKTD	2.373	(9.85)

1. The weighting is derived from the 1978 divisional turnover figures as a percentage of total Dunlop UK turnover.

The table reveals the areas where most confidence can be placed and the areas of most concern. Similarly, it shows how critical errors in important divisions like Wheel, Semtex and UKTD, are to the Group as a whole.

Such scores as these could possibly be used in centrally imposed probability statements on the forecasts.

APPENDIX C 3

Example of the variance analysis on a divisional basis

SEMTEX

Performance Summary

	% age Error	% age Error std dev.	Absolute % age Error	Absolute % age Error std dev.	Naive Model % age Absolute Error	Naive Model % age Absolute Error std. dev.	% age of Negative Coefficients	FIRST DIFFERENCES % age Error	% age Error std dev.	Absolute % age Error	Absolute % age Error std.dev.
Turnover	9.7	5.0	9.7	5.0	8.3	4.6	70	937	2022	937	2022
Margin	215	193	221	186	131	87	80	189	149	197	138
Return	227	199	233	191	123	87	70	294	420	315	405

	Actual Dif/ Forecast Dif R	Theil's Coefficient U	THEIL'S DECOMPOSITION Mean UM	Regression UR	Disturbance UD	Turning Point Analysis % age Type I Error	% age Type II Error	No. Accurately Forecast
Turnover	0.66	1.23	0.68	0.11	0.21	0	20	2
Margin	0.45	1.52	0.62	0.06	0.32	50	20	2
Return	0.23	1.81	0.55	0.17	0.27	40	20	2

The summary table reveals that Semtex's forecasts, even by Dunlop's standards, have been exceptionally inaccurate. Nearly all the summary statistics are large, indicating a high degree of error, with much of that error attributed to systematic, and therefore eliminable, factors.

Summary Measures

The most startling factor concerning Semtex's forecast accuracy is the consistent bias, in terms of overestimation, which is present in nearly all forecast periods. In turnover, in particular, Semtex overestimated in every year without exception. Indeed the extent of the overestimation is so great that if the forecasts for the previous year are used to predict the present year (i.e. t+2 instead of t+1), mean error is reduced from 9.7% to 1.1%.

The degree of overestimation is further revealed in incremental change analysis. This displays mean absolute errors that, by any standards, represent an enormous degree of inaccuracy. The errors in turnover are particularly high here, but there is some phasing down in the case of margin and return. However, for levels the mean errors are very large for both margin and return; 221% and 233% respectively. Again, what is of more concern is the fact that almost all of this error is attributed to consistent overestimation.

Relative Accuracy

The extremely high relative in accuracy puts Semtex's forecasts into perspective. For levels, a simple extrapolation naive model outperforms the divisional forecasts for 70% of the time, in the case of return and turnover cases, and 80% of the time in the case of margin. In other words, on only two or three occasions do Semtex manage to out perform the naive model. Similarly, for all three variables, both the mean and standard deviations of the error are considerably reduced by using the naive model. For example, naive forecasts for margin and return are twice as accurate as the divisional forecasts. Such a result can only be interpretted as meaning Semtex's forecasts are totally derisory.

As for incremental change, the picture is, if anything, worse. Theil's coefficient recorded values of 1.23 for turnover, 1.52 for margin, and 1.81 for return. Thus, the forecasts were 23%, 52%, and 81%, respectively, less accurate than if a simple no-change naive model had been used. Such a result adequately demonstrates the futility of Semtex's present forecasting techniques.

Decomposition of the error

The extent of the overestimation is also displayed in the decompositon of the error. This indicates that between 50% and 60% of the error is attributed to bias. Similarly, only 20% to 30% is attributed to unsystematic disturbance factors. Thus, by careful monitoring of past forecast performance, up to 80% of the error could be eliminated.

As demonstrated by figures C3.1-C3.4, by far the majority of this improvement can be achieved by phasing down the forecasts by the difference between F and Fc (as a percentage).

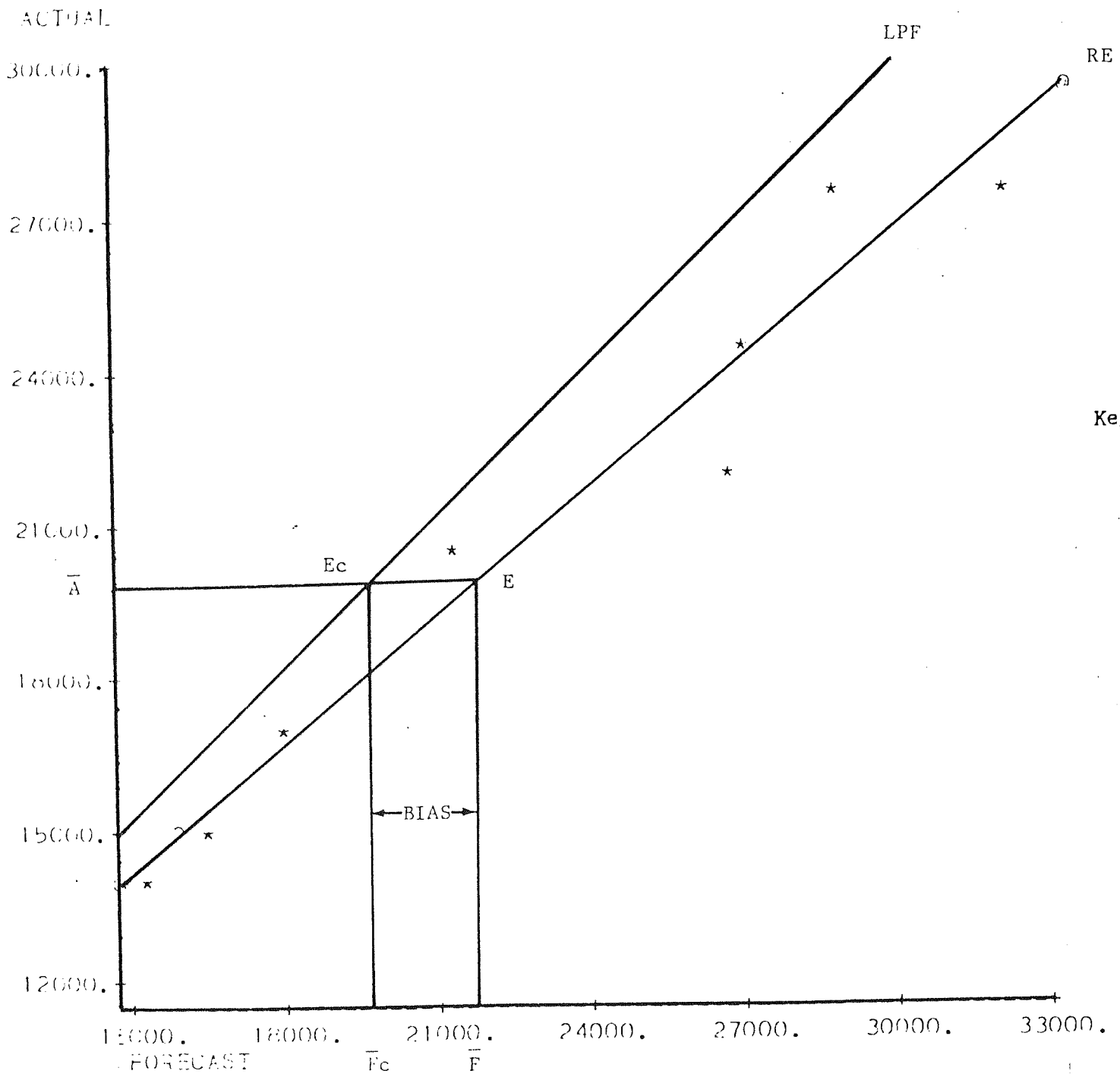
The correlation coefficients give an indication of the degree to which such transformations might be successful. Margin and return record coefficients which are not significantly different from zero indicating that there is considerable randomness about the predictions. However, the common trait of overestimation can always, to some extent, be removed.

As for turnover, future forecasts can be significantly improved by employing linear transformation. Figure C3.1 indicates how this might be achieved. The overestimation, displayed by all the points fall below the line of perfect forecasts, could significantly be reduced by phasing the forecasts down by £1.4m, which is the constant of the regression equation. Similarly, the slope error can be reduced by multiplying each forecast by 0.84 which is the regression coefficient. For example, the 1978 forecast of £32.1m would be adjusted to £25.8m, which would reduce the error from 16.35% to 6.5%.

Prediction of Turning Points

Even though the magnititude of turnover, margin and return was inaccurately predicted, the forecasts would have been of some value had they accurately predicted turning points. However, as displayed in the performance summary, Semtex are equally incapable of predicting the direction of the change or the size of that change. None of the declines experienced were accurately forecast; and false signals, as one might expect in a low profit division, were common.

Such results indicate the degree of confidence which can be attached to Semtex's forecast. Indeed Semtex would be wise to now critically examine the value of their present forecasting techniques and the use made of those forecasts.



Key: LPF - Line of perfect forecast

RL - Regression line

$\bar{A}$ - Mean actual

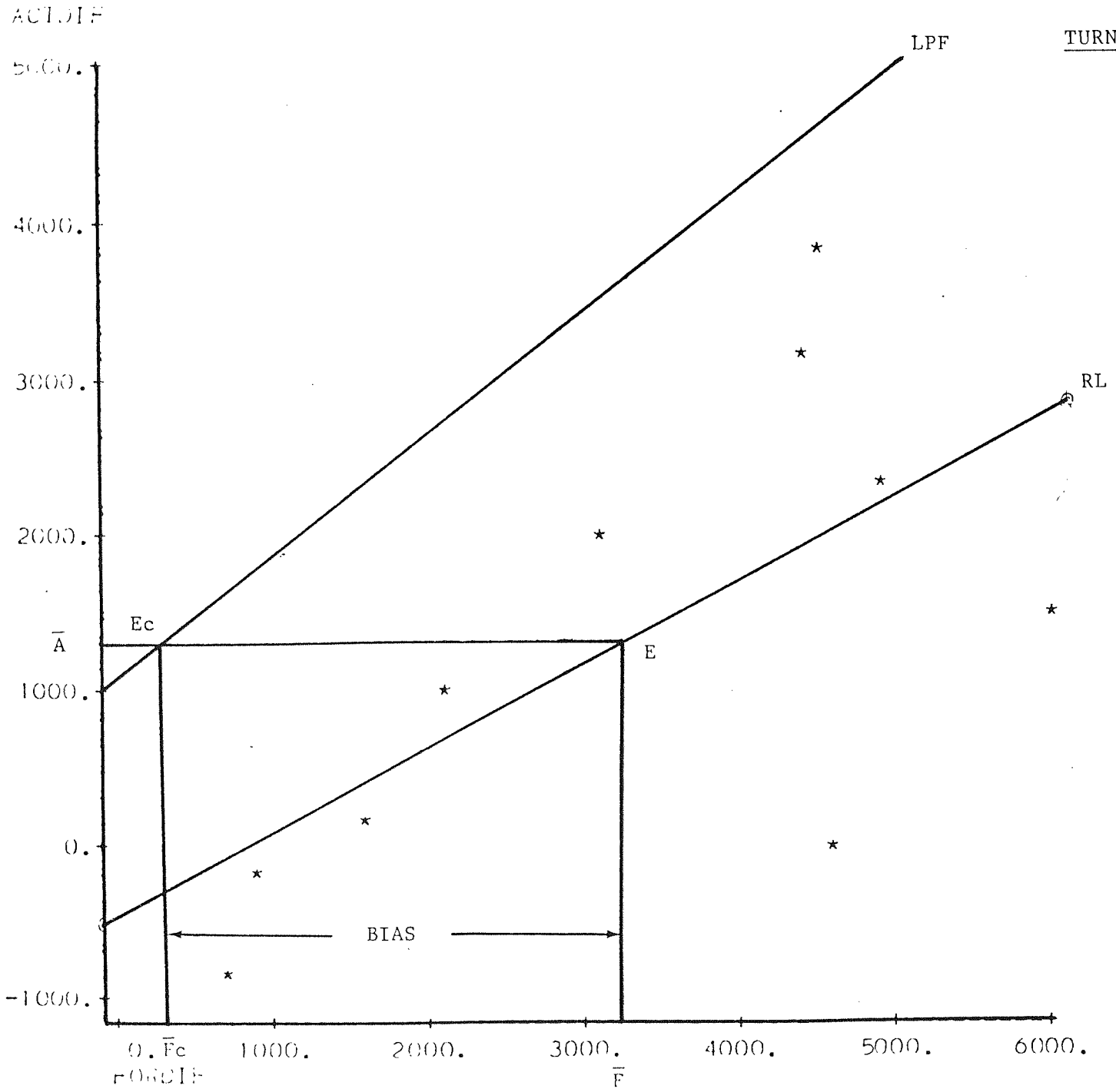
$\bar{F}$ - Mean forecast

$\bar{F}c$ - Mean corrected forecast

E - Mean error point

Ec - Corrected mean error point

FIGURE C3.1



TURNOVER INCREMENTAL CHANGE

Key: LPF - Line of perfect forecast

RL - Regression line

$\bar{A}$ - Mean actual

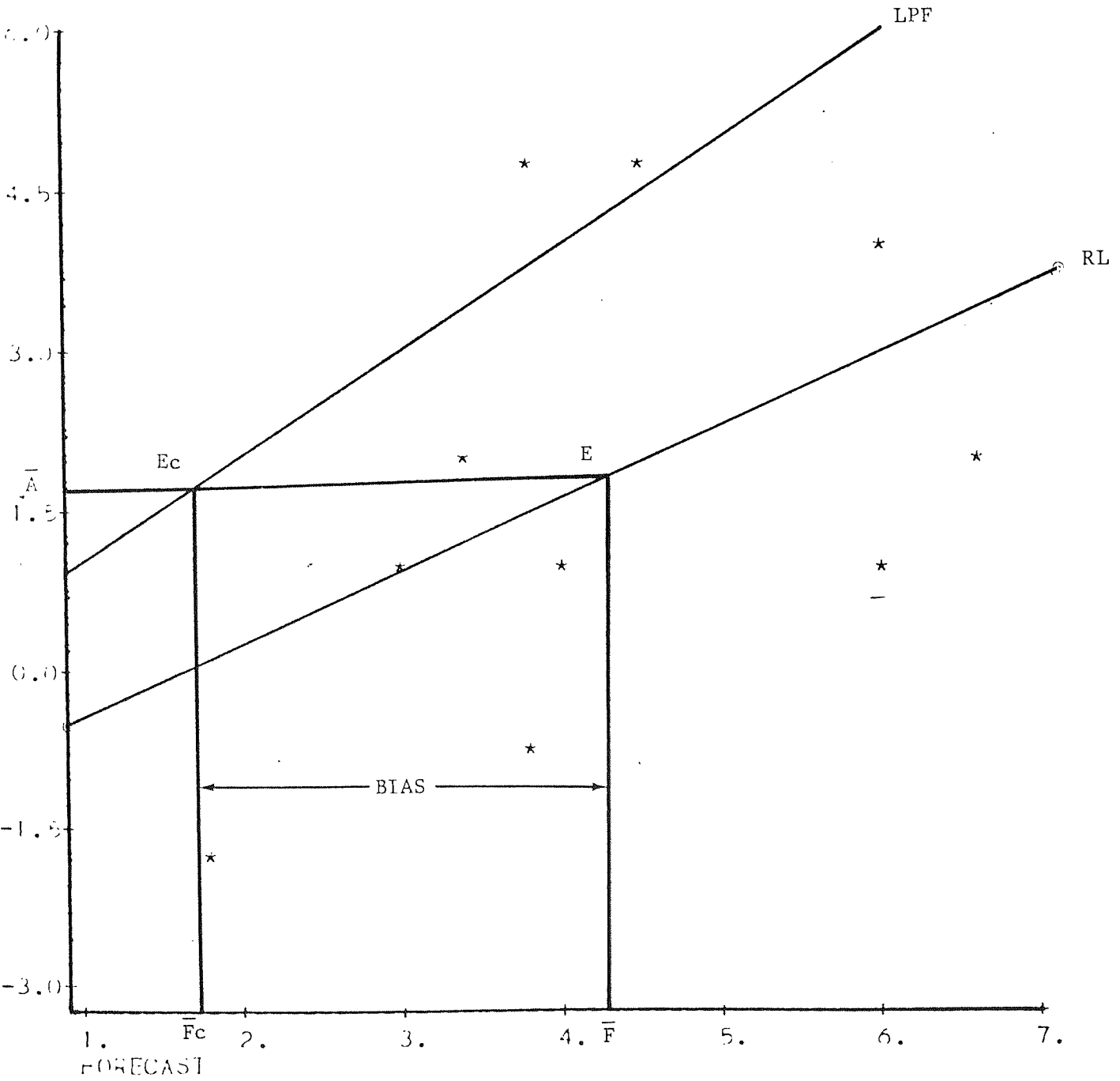
$\bar{F}$ - Mean forecast

$\bar{F}c$ - Mean corrected forecast

E - Mean error point

Ec - Corrected mean error point

FIGURE 6.1



MARGIN

Key: LPF - Line of perfect forecast

RL - Regression line

$\bar{A}$ - Mean actual

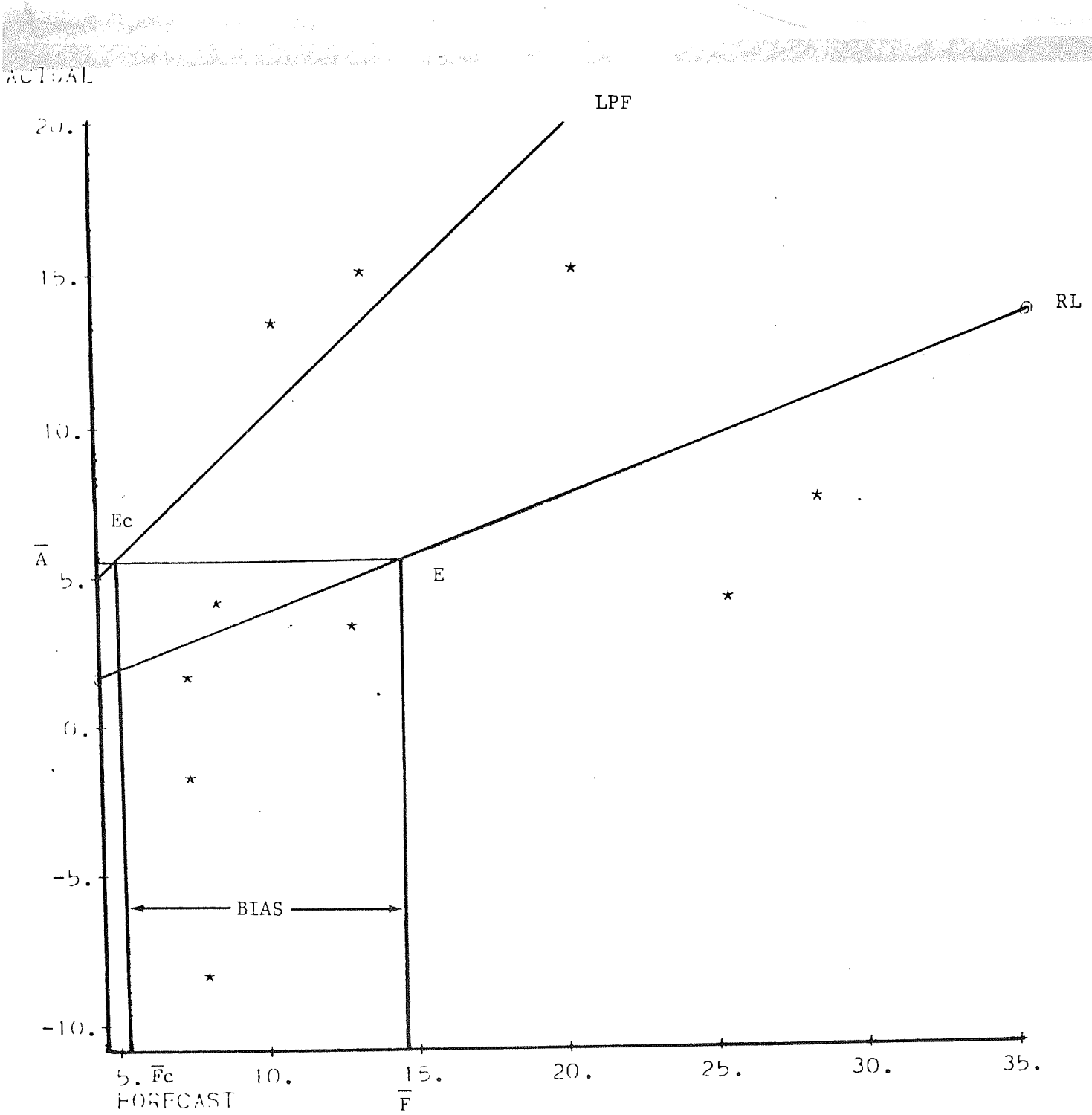
$\bar{F}$ - Mean forecast

$\bar{F}c$ - Mean corrected forecast

E - Mean error point

Ec - Corrected mean error point

FIGURE C2.3



RETURN

Key: LPF - Line of perfect forecast

RL - Regression line

$\overline{A}$ - Mean actual

$\overline{F}$ - Mean forecast

$\overline{Fc}$ - Mean corrected forecast

E - Mean error point

Ec - Corrected mean error point

FIGURE 3.7

APPENDIX C 4

Detailed Results of the Variance Analysis of Margin

C4.1 Levels

C4.1.1 Distribution of percentage error.

Although there is some semblance of normality in the overall percentage error distribution (Figure C4.1), it is clearly skewed towards the positive. The error range adequately reflects this skewness, varying varies from (283%) to>500.

On a trading group basis the results are equally disturbing:

	Percentage Error
Consumer	(56) - >500
Engineering	(46) - >500
Industrial	(283) - >500
Tyres	(54) - >500

These ranges show that, with the exception of Industrial Group, all groups display a distinct tendency towards positive skewness (overestimation). Interestingly, the three groups with positive skew also have a modal group in the range of (20%) to (40%). This suggests that although these divisions have a pronounced inclination towards overestimation, when more accurate forecasts do appear they are invariably moderate underestimations.

C4.1.2 Mean absolute percentage error

On a divisional basis the mean absolute error ranges from 16% to a rather disturbing 221%, with an overall average value of 90%. The results as a trading group basis are equally disturbing:

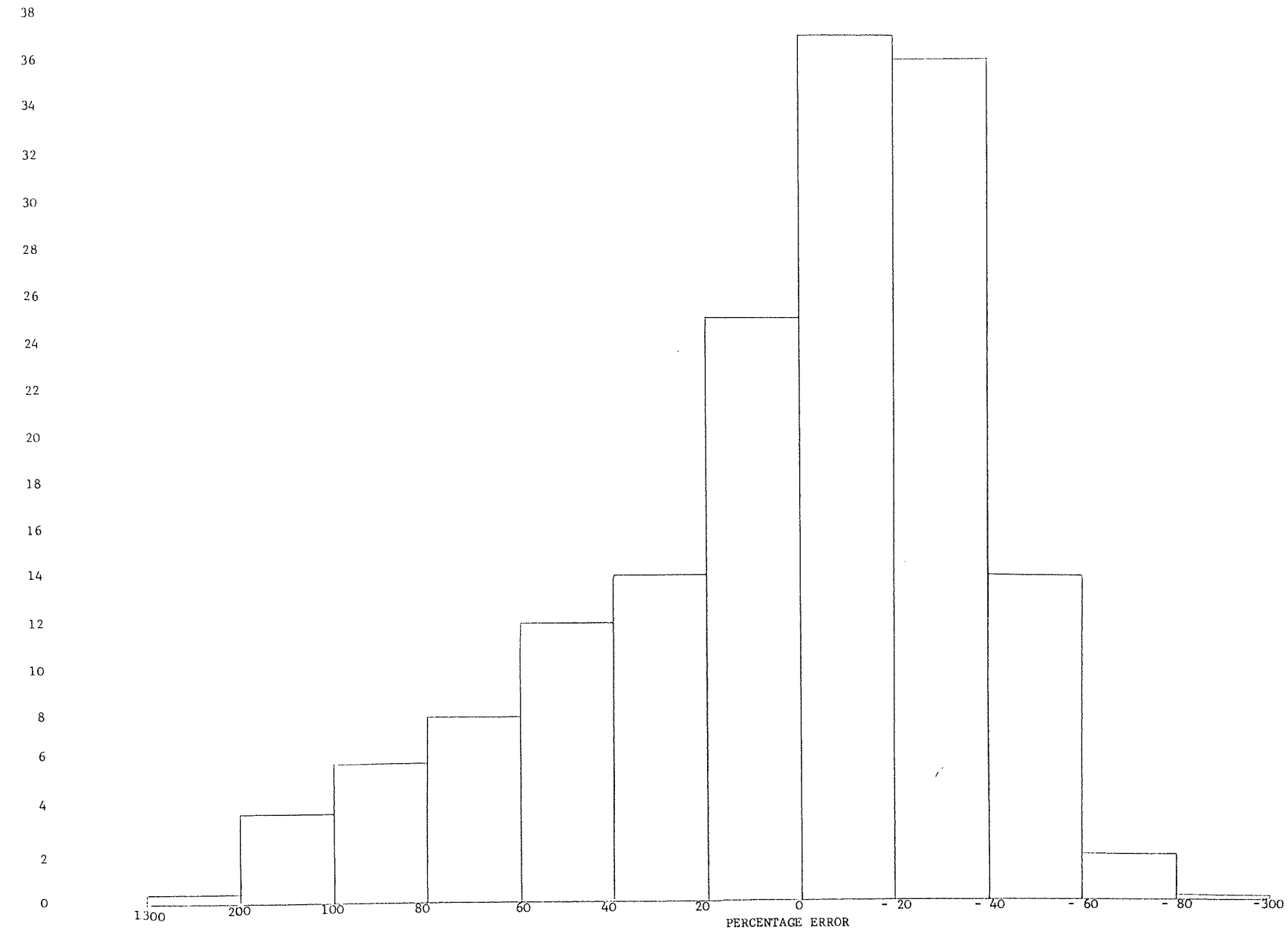
	Mean absolute percentage error
Consumer	93.9
Engineering	118.9
Industrial	69.7
Tyres	93.6

Table C4.1

Mean Absolute Error Ranking Table - Margin

	Division	Absolute Percentage Error
1.	HHD	16
2.	AFAD	24
3.	ISC	28
4.	Dunlopillo	36
5.	PRD	39
6.	NTS	41
7.	Suspensions	51
8.	O&M	57
9.	AFSD	68
10.	Belting	68
11.	IHD	70
12.	Footwear	77
13.	UKTD	92
14.	Textiles	109
15.	PED	116
16.	Plant & Equipment	117
17.	Aviation	134
18.	Wheel	144
19.	URL	148
20.	Redditch Mouldings	148
21.	GRG	169
22.	Semtex	221
Average		90

Figure C4.1 MARGIN PERCENTAGE ERROR DISTRIBUTION



As with much of this analysis, Industrial Group significantly outperform the other groups and Engineering Group perform the worst.[1]

As an aside, it is interesting to note that Semtex produce by far the largest absolute error (table C4.1). As their performance in the analysis of turnover variance was fairly average, this suggests much of their error is attributed to inaccuracy in the profit forecast.

C4.1.3 Percentage of forecasts within ± 15%

In the analysis of turnover ±5% was used to represent a high degree of accuracy. Taking into account margin's position in the error hierarchy (6.3.1) and the fact that it is a ratio, it seems reasonable to set a higher limit of ±15%. Such a limit would mean that on a margin of 7% (the average for the Group 1969-78), an acceptable range of error would be ±1.05%, that is between 5.95% and 8.05%.

At this chosen level, 46(22%) of the 206 forecasts fall within the range. On a trading group basis, the following pattern emerges:

	No. within ± 15%	Percentage
Consumer	9	18
Engineering	10	21
Industrial	23	29
Tyres	4	13

Yet again Industrial Group outperform other groups, but Engineering Group do better than might have been suggested by their performance in mean absolute error. This indicates that although they have a propensity to produce very large errors, many of the other errors fall within a reasonably tight band of accuracy. Thus from this analysis one might suggest that it is unrealistic to expect accuracy greater than ±15% for margin.

1. This contradicts the findings of Tull (5.5.5)

Purely as an aside, two divisions, Redditch Mouldings and NTS managed to produce forecasts which were 100% accurate. The fact that only two forecasts were so accurate must suggest that ranges, as opposed to point estimates, are applicable to ratios as well as turnover.

C4.1.4 Statistical bias

(i) Mean percentage error

The tendency for divisions to overestimate was adequately demonstrated in section C4.1.1. This is reiterated in the analysis of mean error, where the range is between 3% and 215%, with an average of 66% thoughout the Group. As none of the mean values are negative, overestimation does appear to be rife. The extent of the overestimation is further revealed by the following breakdown:

	Mean Percentage Error
Consumer	72.1
Engineering	100.8
Industrial	41.1
Tyres	73.1

These figures are disturbing, particularly in the case of Engineering Group who managed, on average, to misforecast margin by over 100%.

(ii) Tendency to overestimate (hypothesis i)

Of the 206 forecasts, 117 were overestimations, which is not significant. A comparision of this with the mean percentage error, suggests that when divisions do overestimate they do it by a large amount. For the trading groups the following was found:

	Overestimates		Underestimates	
	No.	%	No.	%
Consumer	30	60	20	40
Engineering	30	63	18	37
Industrial	38	49	40	51
Tyres	19	63	11	37

None of these results are statistically significant, indeed Industrial group appears to show no bias whatsoever towards overestimation. In comparison with the results of turnover there has been some considerable phasing down of the forecasts.

(iii) Tendency to overestimate by a large amount

Although again the selection of the figure to represent a 'large amount' is relatively arbitrary, to take account of the position of the variable in the error hierarchy 45%, was chosen.

Of the 206 forecasts, 71 (34%) overestimated by more than 45% and 12 (6%) underestimated by the same amount. So, of the 83 forecasts greater than ±45%, 86% were overestimations and only 14% underestimations. This result clearly supports hypothesis ia, that divisions tend to overestimate by a larger amount than they underestimate by. Similarly, on a trading group basis only Industrial Group fail to support the hypothesis.

	underestimating by more than 45%	% of total greater than ± 45%	overestimating by more than 45%	% of total greater than ± 45%
Consumer	2	10	18	90
Engineering	1	5	20	95
Industrial	8	29	20	71
Tyres	1	7	13	93

(iv) Tendency to underestimate growth

Of the 102 periods of expansion, only 57 (58%) were underestimated, which does not lend support to the hypothesis. However, examining high growth periods, the results are significantly different. Of the 54 periods of margin growth in excess of 25%, 44 (81%) were underestimated, clearly suggesting a tendency to underestimate high levels of growth. Each trading group bears out similar conclusions:

	No. of periods of growth over 25%	Percentage of those periods underestimating
Consumer	20	80
Engineering	9	78
Industrial	20	85
Tyres	5	80

With margin therefore, 25% does seem to be a significant percentage of growth above which many divisons appear to stop forecasting high growth.

(v) Tendency to forecast growth during decline (hypothesis ii)

No evidence can be found to support this hypothesis, indeed divisions appear equally likely to forecast growth or decline during periods of decline.

C4.1.5 Relative accuracy - Performance against a naive model (hypothesis iii)

The naive model employed for margin is NM2 (with the exception of URL where NM1 is used). NM2 is simply a model which extrapolates by using the previous increase in level. That is:

$$F_{t+1} = A_t + A_t - A_{t-1}$$

Again utilizing the percentage of negative coefficients as a indicator of performance against the naive model, an examination of the margin summary sheet (table 6.9) is instructive.

Eight of the twenty-two divisions would have performed more accurately in at least half the periods had the naive model been used. Also, of the other fourteen divisions, the naive model often produces a lower mean absolute error or standard deviation. This seriously questions the value of divisional forecasts in comparison to naive models.

Analysing the results according to trading groups the following emerges:

	Mean absolute percentage error of divisional forecast	Mean absolute percentage error of naive model	Percentage of negative coefficients
Consumer	93.9	105	48
Engineering	118.9	144	40
Industrial	69.7	90	40
Tyres	93.6	117	43

This analysis suggests that relative forecast performance for margin has improved against the performance observed in turnover. The naive model's performance, however, still puts in question the value of the divisional forecasts, as their accuracy is not significantly better than that produced by the model.

C4.1.6 Randomness

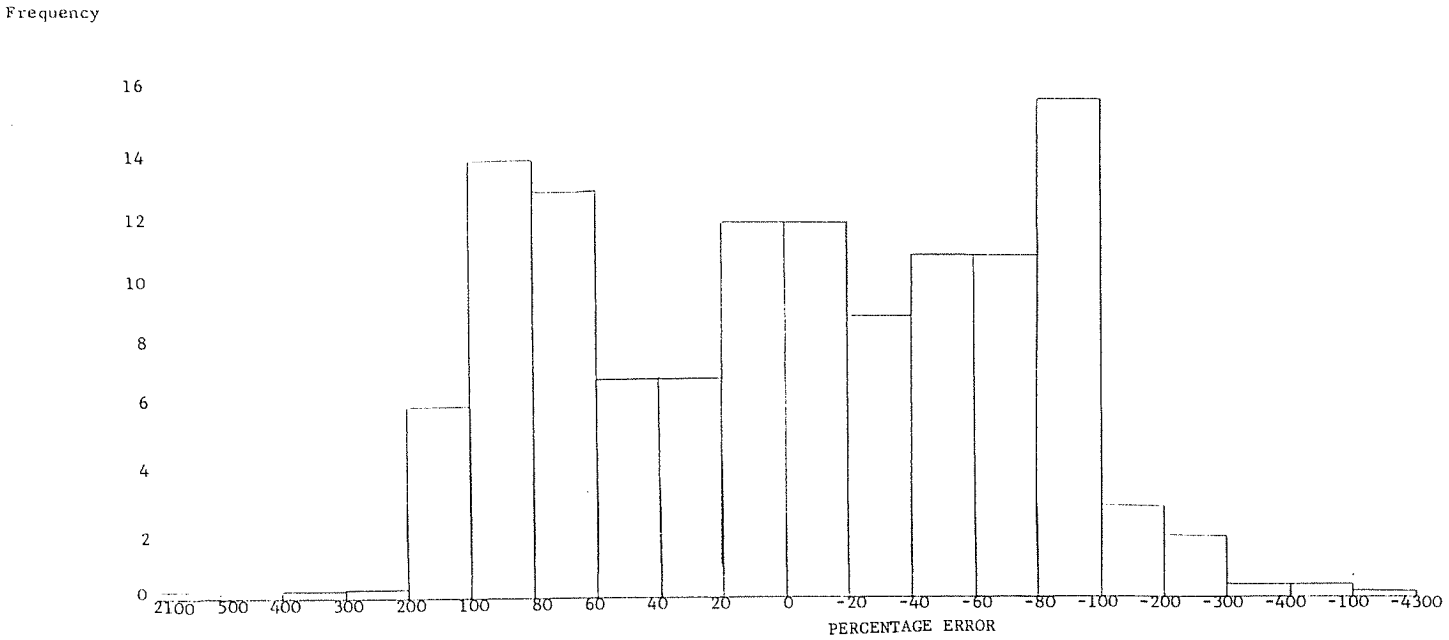
Being a ratio, the base of the extrapolation element (5.6.8) is less significant, and thus lower correlation coefficients would be experienced in margin than in turnover. This is indeed the case, but the degree to which they are lower is surprising. Only four divisions managed to show a significant (5% level) correlation between actual and forecast: Wheel; AFAD; GRG; and PED. It is concluded from this, that many of the forecasts of Consumer and Tyre Groups, as well as large parts of Industrial and Engineering groups, are no better than random forecasts.

C4.2 Incremental Change

C4.2.1 Distribution of percentage error

The overall incremental change distribution (Figure C4.2) deviates significantly from the normal. However, it is not skewness which causes this deviation, but the high degree of variability which is present. On top of this, the overall range is from ($>$ 500) to $>$ 500%, which when compared with the analysis of levels, must mirror the additional difficulty experienced in forecasting incremental change.

Figure C4.2 DISTRIBUTION OF INCREMENTAL CHANGE PERCENTAGE ERROR - MARGIN



On a trading group basis, the results are much the same with multi-modal distributions of considerable width (>500 to >500) but without pronounced skewness. Indeed although the ranges indicate the inability of divisions to accurately forecast changes, they do show significantly less bias towards overestimation than was present in the forecasts of levels.

C4.2.2 Mean absolute percentage error

The margin summary sheet (table 6.9) shows that mean absolute error varies from 79% to >500%, which is a considerable improvement on the results of the incremental change analysis for turnover. This improvement might be attributed to margin being a ratio, which tend to be smaller and less volatile, than non-standardised variables, when it comes to incremental changes.

The average mean absolute error throughout the Group is 246%, which although very high, confirms the improvement over turnover. On a trading group basis it is as follows:

	Mean absolute percentage error
Consumer	166
Engineering	337
Industrial	268
Tyres	162

An examination of mean absolute error performance for levels and changes (tables C4.1 and C4.2) shows little correlation. Indeed some divisions, Semtex for example, appear to find it easier to forecast changes more accurately than levels. This result conflicts with the consensus of previous studies (5.5). Similarly, some divisions have significantly improved their performance against that experienced in turnover. Most notable of these are Plant and Equipment and PED, who came 17th and last respectively in turnover's analysis, and here come first and second. Such changes must be attributed to very accurate profit forecasting, as turnover is employed as the denominator in this ratio.

Table C4.2

Incremental Change Ranking Table - Mean Absolute Percentage Error - Margin

	Division	Mean Absolute Percentage Error
1.	Plant & Equipment	79
2.	PED	90
3.	Footwear	95
4.	Dunlopillo	101
5.	URL	103
6.	AFAD	105
7.	AFSD	107
8.	IHD	118
9.	UKTD	143
10.	Aviation	164
11.	Textiles	176
12.	HHD	180
13.	Semtex	197
14.	Suspensions	203
15.	PRD	232
16.	NTS	240
17.	ISC	259
18.	Belting	342
19.	GRG	579
20.	Wheel	601
21.	Redditch Mouldings	638
22.	O&M	662
Average		246

C4.2.3 Mean percentage error

The overestimation which was so clearly displayed in the analysis of turnover's incremental change, appears to be considerably reduced in margin. In particular, Industrial Group swing from an overestimation displayed in turnover (and margin level analysis) to an underestimation for mean error in margin's incremental change. Indeed, the mean value across the Group for percentage error is 15%, which is obviously a considerable improvement on the 90% for the mean of the levels analysis. For the trading groups, the breakdown is:

	Mean percentage error
Consumer	64
Engineering	35
Industrial	(36)
Tyres	52

Clearly this improvement over turnover, via a reduction in the size of overestimation, possibly indicates less biased profit forecasts than seen in turnover.

C4.2.4 Theil's Coefficient

The results of this analysis show some slight improvement on that displayed in turnover. Twelve of the twenty-two divisions display a better forcasting ability than a no-change model. However, the overall range of the coefficient is 0.64 to 1.52. So, although the number of divisions actually outperforming the model has improved, the degree to which they outperform has fallen from an average of 0.60 for turnover to 0.89 for margin.

The overall Group average is again slightly over one (1.03), suggesting that, on average, performance is below that which would have been experienced had the no-change model been used.

Table C4.3

Theil's Coefficient Ranking Table - Margin

	Division	U
1.	PED	0.64
2.	NTS	0.82
3.	HHD	0.83
4.	Footwear	0.84
5.	Redditch Mouldings	0.87
6.	Textiles	0.90
7.	AFSD	0.90
8.	AFAD	0.92
9.	Suspensions	0.95
10.	GRG	0.98
11.	IHD	0.99
12.	URL	0.99
13.	Dunlopillo	1.02
14.	O&M	1.03
15.	ISC	1.06
16.	Plant & Equipment	1.09
17.	Wheel	1.11
18.	Aviation	1.18
19.	Belting	1.27
20.	UKTD	1.30
21.	PRD	1.40
22.	Semtex	1.52
Average		1.03

As with turnover, interesting conclusions can be drawn by comparing the mean absolute error ranking table (table C4.2) and Theil's coefficient ranking table (table C4.3). For example, Plant and Equipment top the mean absolute table with 79%. Their results against a no-change model, however, shows that this could be improved by 9% simply by using the naive model. Conversely, Redditch Mouldings, who have a mean absolute error of 639%, would have produced a forecast some 13% worse had they used the model. Such results give an indication of the degree of difficulty in forecasting change in certain markets.

Examining the trading groups, none of them managed, on average, to outperform the naive models. This of course is very dissappointing and must seriously question the value of consolidated forecasts at trading group level.

	Theil's coefficient
Consumer	1.07
Engineering	1.04
Industrial	1.00
Tyres	1.04

C4.2.5 Theil's Decomposition

A cursory glance at the margin summary table (table 6.9) and table C4.4 shows that the majority of divisional error is attributed to unsystematic elements (U_D). This indicates the forecasts are as efficient as they can be, taking into account the inherent variability.

Most divisions display relatively small bias proportions, although four divisions do show high systematic bias in this area: Semtex, 62%; Textiles, 33%; Plant and Equipment, 33%; and IHD, 30%. Interestingly, a high correlation between the coefficient and the decompositon is recorded. This suggests that division who are, in

Table C4.4

Theils' Inequality Decomposition Disturbance Proportion Ranking Table - Margin

	Division	U^D
1.	AFAD	1.00
2.	Footwear	1.00
3.	PED	0.96
4.	HHD	0.96
5.	AFSD	0.94
6.	O&M	0.94
7.	Redditch Mouldings	0.94
8.	NTS	0.94
9.	Dunlopillo	0.86
10.	Suspensions	0.83
11.	Textiles	0.82
12.	Wheel	0.75
13.	URL	0.75
14.	IHD	0.73
15.	GRG	0.68
16.	ISC	0.67
17.	Aviation	0.66
18.	Plant & Equipment	0.66
19.	Belting	0.64
20.	UKTD	0.49
21.	PRD	0.47
22.	Semtex	0.32

relative terms, poor forecasters, have a high proportion of their error attributed to systematic and eliminable factors. The position as regards various trading groups is:

	U_M	U_R	U_D
Consumer	0.16	0.10	0.73
Engineering	0.13	0.11	0.76
Industrial	0.05	0.17	0.81
Tyres	0.19	0.08	0.73

It is worthy of note that the relatively small bias recorded by Industrial Group supports their general tendency not to overestimate.

C4.2.6 Turning point analysis

Over half of the 206 forecast periods transpired to be turning points, 85 (80%) of which were accurately forecast. Although such a result appears acceptable, it should not be viewed in isolation. Comparison should be made with the number of false signals produced to ensure divisions are not forecasting regressively (that is always forecasting the opposite of the trend).

Of all the turning points forecasts, 22 were false signals, which is 27% of all predicted turns. The average of missed turns through the Group as a percentage of all forecasts is 11.0%, whereas false signals is 25.2%, that is one in four forecasts gives a false signal. Breaking down according to trading groups the following picture emerges:

	False Signals[1]	Missed Turns[2]	No. of Actual declines	% accurately forecast
Consumer	0.43	0.20	24	50
Engineering	0.34	0.21	21	52
Industrial	0.36	0.15	37	59
Tyres	0.39	0.28	21	52

1. Ratio of false signals to all predicted turns
2. Ratio of missed turns to all recorded turns

There is little or no evidence to suggest that divisions accurately forecast declines as out of 103 decline periods only 56 (54%) were forecast correctly.

C4.2.7 Randomness

In the analysis is of levels, lower correlations were recorded between actual and forecast than were seen in turnover, and this is mirrored in the analysis of incremental change. As one might expect, with the base of the extrapolation element completely removed (C4.1.5), the correlations are even lower than in levels. Only two divisions, PED and NTS, recorded significant values.
Such low coefficients not only suggest that the forecast, as against a random prediction, is of limited value, it also means that little can be attempted by way of linear transformation to improve the forecasts.

C4.2.8 Confidence Limits Attached to New Forecasts

		Percentage forecast error*
Wheel	123+/-315.6	-192.6 to 438.6
AFAD	7+/- 54.9	- 47.9 to 61.9
GRG	80+/-437.1	-357.1 to 517.1
PED	90+/-354.8	-264.8 to 444.8

* correlation in excess of 5% significance.

No significant correlations were recorded for the majority of divisions, thus making any prediction of forecast errors difficult. Even where ranges of likely error can be given, as above, they are so wide as to be meaningless in predictive terms. However, they do give some indication of the degree of uncertainty surrounding the forecasts.

APPENDIX C 5

Detailed Results of the Variance Analysis of Return

C5.1 Levels

C5.1.1 Distribution of percentage error.

The overall distribution of return (Figure C5.1) is much the same as the distribution for margin, but even more positively skewed. Similarly, the overall range of (264) to>500 displays this skewness, as do each of the individual trading groups:

	Percentage Error
Consumer	(59) to >500
Engineering	(49) to >500
Industrial	(269) to >500
Tyres	(38) to >500

With the exception of Industrial Group, all groups show a tendency in the distributions towards considerable positive skew. Interestingly, as in margin, the modal ranges tend toward the negative indicating the most common error is a slight underestimate. However, there can be no mistaking the fact that overestimates predominate and that these are often very large indeed.

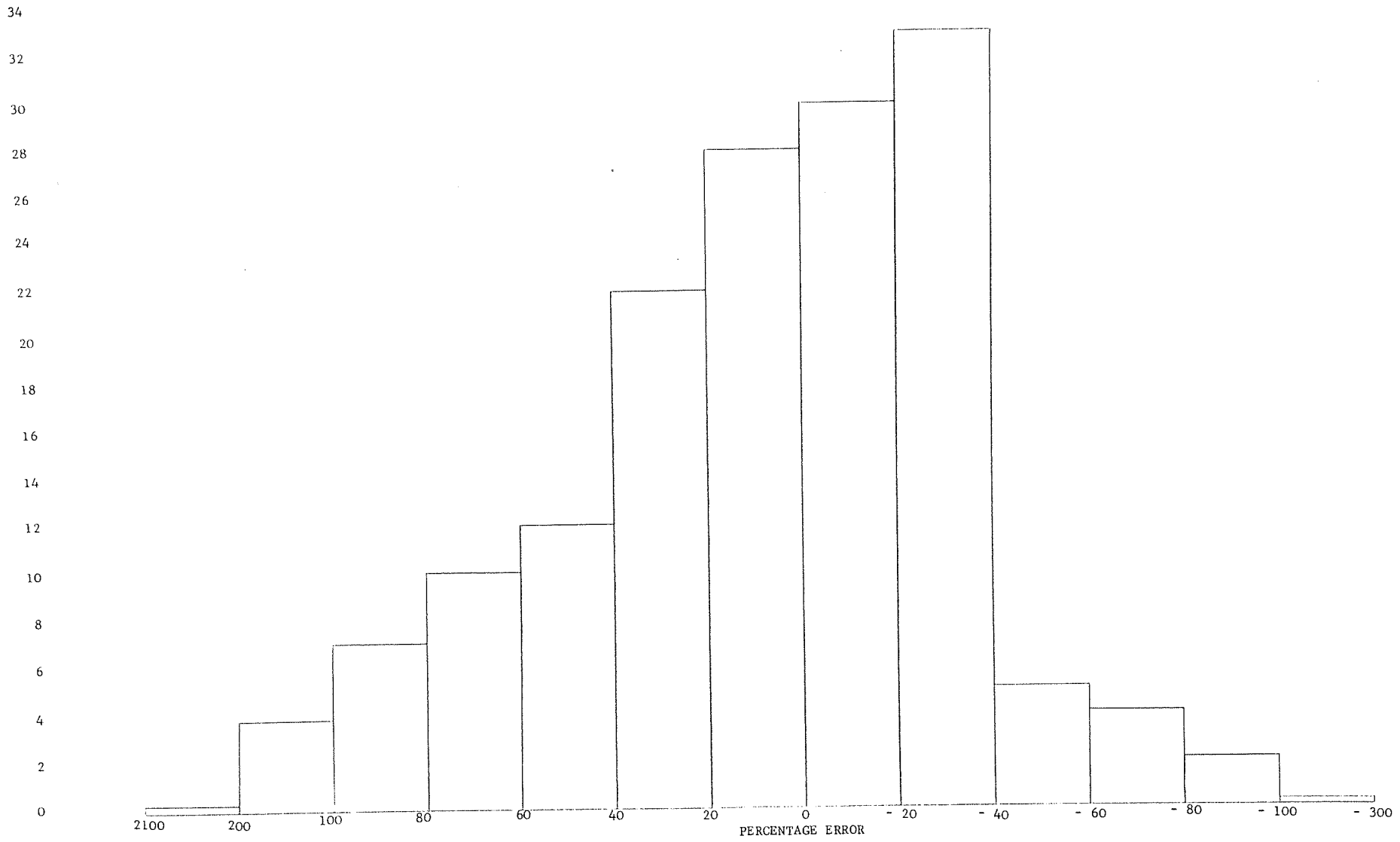
C5.1.2 Mean absolute percentage error

Across all divisions, mean absolute error ranges from 24% to 235% with an average of 102%. With errors of such magnitude it is difficult to put much faith in the forecasts.

The increase in the size of the mean absolute error over margin (90% to 102%), suggests that return is slightly further up the error hierarchy and therefore that ANFE is a more difficult variable to forecast than turnover.[1]

1. This is contrary to findings of the pilot study (Kelsall, 1978).

Figure C5.1 RETURN PERCENTAGE ERROR DISTRIBUTION



On a trading group basis mean absolute error breaks down thus:

	Absolute mean percentage error
Consumer	106.8
Engineering	152.1
Industrial	76.0
Tyres	84.8

In all cases except Tyre Group, the deterioration of the error from margin to return is displayed on a trading group as well as Group basis. As usual, Engineering Group do significantly worse than other trading groups, and Industrial are significantly more accurate than the average.

The absolute ranking table (table C5.1) shows that Industrial Group occupy the first three places and HHD, as in margin, outperform all other divisions. Also, as with so much of the analysis, the poor performance of Textiles and Semtex adversely affects Consumer Group.

C5.1.3 Percentage of 'very accurate' forecasts within ± 15%

As no enormous differences in accuracy exist between margin and return, and to allow some comparison, ±15% is used in this analysis as well as in margin.

Throughout the 206 forecasts, 44 (21%) were within ±15%, which is much the same result as experienced in margin. For the trading groups the results were:

	No. within ± 15%	Percentage
Consumer	13	26
Engineering	6	13
Industrial	18	38
Tyres	7	23

Table C5.1

Mean Absolute Error Ranking Table - Return

	Division	Absolute Percentage Error
1.	HHD	24
2.	PRD	29
3.	AFAD	30
4.	NTS	33
5.	ISC	40
6.	Dunlopillo	41
7.	O&M	71
8.	Belting	71
9.	Suspensions	80
10.	Footwear	84
11.	IHD	86
12.	AFSD	91
13.	UKTD	92
14.	Plant & Equipment	123
15.	PED	124
16.	URL	130
17.	Textiles	137
18.	Aviation	144
19.	GRG	159
20.	Wheel	178
21.	Semtex	233
22.	Redditch Mouldings	235
Average		102

As with the analysis for margin, these results are not particularly inspiring, especially as Industrial Group do less well than their performance in absolute error might have suggested. Again, the conclusion from this is that, in Dunlop, forecast performance of ±15% for return, must be regarded as very accurate.

As an aside, none of the divisions managed to forecast return in any year with 100% accuracy, thus supporting the requirement for ranges as opposed to point estimates.

C5.1.4 Statistical bias

(i) Mean percentage error

The return summary table (table 6.10) reveals that of twenty-two divisions, only Dunlopillo recorded a negative mean error. Indeed, the average mean error was 75%, suggesting a distinct propensity to overestimate. This situation, which as one might expect is similar to that in marign, is further revealed by the following table:

	Mean Percentage Error
Consumer	80.8
Engineering	132.8
Industrial	41.5
Tyres	70.0

The overall range throughout the Group for mean error is (1%) to 227%, reflecting the finding of much of this analysis, that considerable overestimation appears to be the norm.

(ii) Tendency to overestimate (hypothesis i)

Of the 206 forecasts there were 119 (58%) underestimates and 87 (42%) overestimates, which is not sufficiently significant to indicate a propensity to overestimate. However, breaking this down according to trading groups, Engineering did show a statistically significant tendency to overestimate with 32 overestimations (67%) and 16 underestimations (33%).

This general lack of bias in the forecasts indicates divisions (with the exception of Engineering Group) do not consistently overestimate in the case of return.[1] Comparison of this result with the mean error analysis suggests that a number of the positive errors must be very large in order to get results so heavily biased towards the positive.

(iii) Tendency to overestimate by a large amount (hypothesis ia).

The same relatively arbitrary figure, ±45%, has been chosen for return as was used in margin analysis, thus allowing ease of comparison.

Of the 206 forecasts, 69 (33%) overestimated by more than 45%, while only 19 (9%) were underestimated by that amount. Similarly, of the 88 forecasts in excess of ±45%, only 22% were underestimates against 78% which were overestimates. Such results support the hypothesis on a Group basis.

A similar picture emerges when the trading group breakdown is examined:

	No. underestimating by more than 45%	% of total in excess to ± 45%	No. overestimating by more than 45%	% of total in excess of ± 45%
Consumer	5	23	17	77
Engineering	4	16	21	84
Industrial	10	35	19	65
Tyres	0	0	12	100

Again this generally supports the hypothesis as, with the exception of Industrial Group, all are significant at the 5% level.

1. A similar result was derived for profit forecasts by Tull (5.5.5)

(iv) Tendency to underestimate growth

From 1969 to 1978 there were 108 periods of expansion, 64 (69%) of which were underestimations (significant at the 10% level). When the analysis is examined on a trading group basis only Industrial Group underestimated growth a significant number of times:

	No. of periods of expansion	Percentage underestimated
Consumer	27	59
Engineering	27	52
Industrial	43	77
Tyres	11	55

Thus, although Industrial Group appear to have some ceiling to the level of their overestimation, other groups seem to forecast overestimates consistently.

However, as with margin and turnover, a much clearer picture is given if divisions' performance during high growth periods is examined.

Of the 60 periods of growth in excess of 25%, 47 (78%) were underestimates. On a trading group basis:

	No. of periods of growth over 25 %	Percentage of those periods underestimated
Consumer*	18	72
Engineering+	13	77
Industrial	24	88
Tyres*	5	60

* Not statistically significant
\+ Significant at the 10% level

From this, Industrial Group, and to a lesser extent Engineering Group, appear to have, at most, a 25% ceiling to the level of their overestimation. Tyres and Consumer Groups however continue to overestimate above this level.

(v) Tendency to forecast growth during decline (hypothesis ii).

As with margin, there is no evidence that divisions either systematically forecast growth or decline during periods of decline. That is to say, that during periods of contraction, generally speaking, a division is equally likely to forecast growth as it is decline.

C5.1.5 Relative accuracy - Performance against a naive model (hypothesis iii)

In all cases except two (Textiles and URL) the naive model NM2 (as described in margin's analysis) was used as a measure of relative accuracy.

The return summary table (table 6.10) shows that, in relative terms, improvements have been made over both turnover and margin. Only six of the twenty-two divisions would have performed better in at least half the periods had the naive model been used. However, such analysis does not represent the full picture. Had the naive model been used by the divisions, over half of them (12) would have recorded a lower standard deviation. Similarly the mean absolute error would have only been marginally worse - 106% against 102%, and a trading group basis:

	Mean absolute percentage error of divisional forecast	Mean absolute percentage error of naive model	Percentage of negative coefficients
Consumer	106.8	107.2	44
Engineering	152.1	134.6	40
Industrial	76.0	93.9	38
Tyres	84.8	100.7	33

This illustrates the relative performance of divisions, as Consumer Group only marginally outperform the naive model in absolute error terms, while Engineering Group do significantly worse (10% level). The value of the forecasts of these two groups, if not all the groups, must be seriously questioned.

C5.1.6 Randomness

As with margin, the correlation coefficients are significantly lower than those observed for turnover. However, Aviation; Plant and Equipment; Wheel; HHD; AFAD; and URL; all record significant correlations suggesting that the rest (including all Consumer Group) are no better than random forecasts.

C5.2 First Differences

C5.2.1 Distribution of percentage errors

The overall distribution (Figure C5.2) shows little sign of normality and is multi-modal at 80 to 100%, (20%) to (40%), and (80%) to (100%). As with margin, the overestimations seen in the examination of levels are considerably reduced when it comes to incremental change. Indeed on a trading group basis, most groups display little tendency towards overestimation. However, again, the range was extremely wide (>500) to >500%.

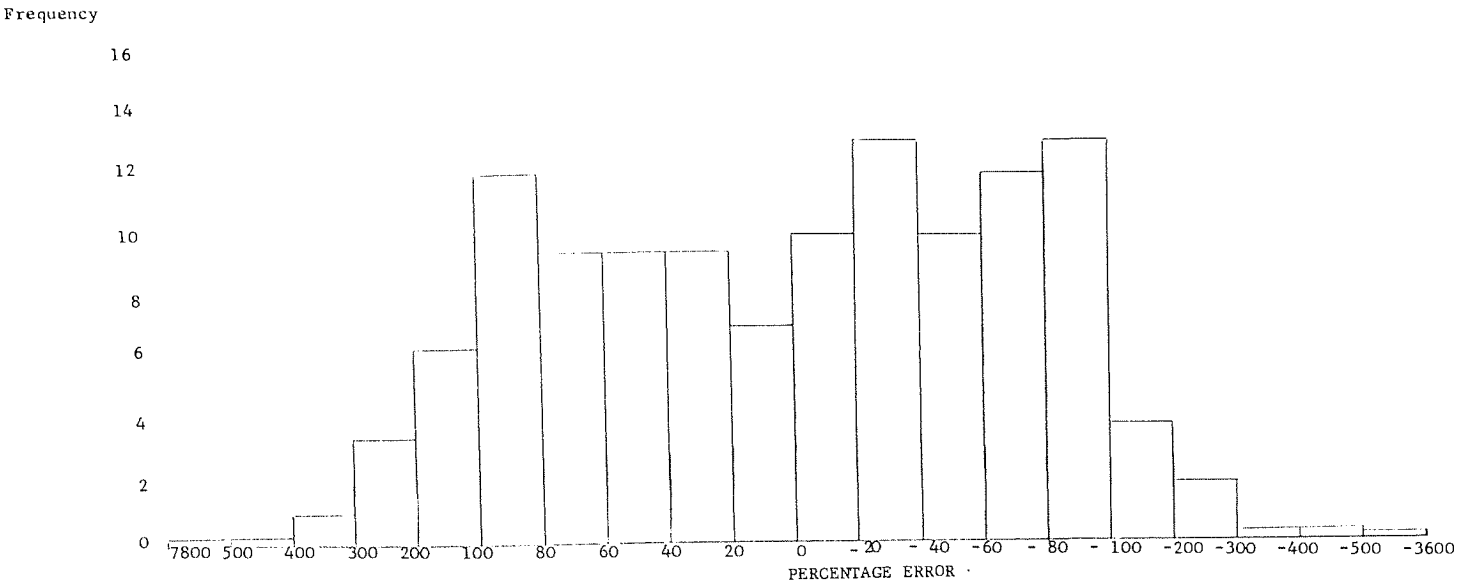
C5.2.2 Mean absolute percentage error

The average mean absolute error throughout the Group in 244%, which, although horrendously high, is considerably lower than that experienced in turnover and fractionally lower than in margin. The trading group breakdown shows that this improvement over margin is largely attributed to Engineering Group.

	Mean absolute percentage error
Consumer	275
Engineering	255
Industrial	255
Tyres	143

Tyre Group, who were by far the worst at forecasting incremental change in turnover, and fractionally the best at forecasting margin, are by far the best at forecasting return. This tends to indicate that their forecasts of incremental profit change are quite good, which contradicts their performance in the analysis of levels.

Figure C5.2 DISTRIBUTION OF INCREMENTAL CHANGE PERCENTAGE ERROR - RETURN



This comparison between levels and change can be further elucidated by an examination of tables C5.1 and C5.2. It appears that divisions who forecast levels with some accuracy do not necessarily repeat that performance in forecasting incremental change. A striking example of this is HHD who came top in the ranking table for forecasting levels and bottom for forecasting changes. Such cases are largely attributed to divisons forecasting large incremental changes, which may not be large in terms of levels, when only small changes actually occcur.

C5.2.3 Mean percentage error

Although the figure C5.2 indicated a swing away from overestimation against that experienced in margin, the mean percentage error does not bear out this conclusion. The average error for return was 89% against 15% for margin. For the trading groups the following results are seen:

	Mean percentage error
Consumer	(8.6)
Engineering	163.8
Industrial	129.2
Tyres	11.0

Two surprises are revealed by this. Firstly, the lack of overestimation on the part of Tyre Group (given their performance in much of this analysis). And secondly, the negative value (underestimation) recorded by Consumer Group. Both cases represent enormous improvements over turnover and margin.

The relatively poor performance recorded by Industrial Group is entirely attributed to a single poor forecast by HHD, which, if excluded gives a mean error of (18.4%). This being said, it is clear that only Engineering Group show any sign of systematic overestimation.

Table C5.2

Incremental Change Ranking Table - Absolute Mean Percentage Error - Return

	Division	Mean Absolute Percentage Error
1.	Footwear	82
2.	PED	92
3.	Plant & Equipment	97
4.	O&M	106
5.	AFSD	111
6.	URL	116
7.	AFAD	125
8.	Redditch Mouldings	128
9.	UKTD	135
10.	Aviation	138
11.	Dunlopillo	158
12.	IHD	159
13.	PRD	161
14.	GRG	170
15.	NTS	179
16.	Belting	184
17.	Suspensions	205
18.	Textiles	277
19.	Semtex	315
20.	ISC	541
21.	Wheel	709
22.	HHD	1189
Average		244

C5.2.4 Theil's Coefficient

Performance against a no-change model for return is disappointing in that only nine out twenty-two divisions managed to outperform it by using their own forecasting techniques. In terms of the range of results, return appears to be the worst of the three variables, varying from 0.65 to 1.81. Similarly, the mean of the coefficients for the Group is 1.03. As with turnover and margin, this suggests that performance is generally below that which would have been achieved had a no-change model been employed.

A comparison between the mean absolute percentage error ranking table (table C5.2) and the coefficient ranking table (table C5.3) is again instructive. HHD, who came bottom in the absolute error ratings with a mean of 1189%, would have been 19% more inaccurate had they used a no-change extrapolation. Such a result gives an indication of the difficulty experienced in forecasting in this market. Conversely, Footwear, who top the coefficient table, would have recorded the same error had they simply used a no-change model. Such a result suggests the relative simplicity of the forecasting techniques required in this market, and must bring into question the efficiency of their present techniques.

The trading group analysis of the coefficient is largely the same as margin:

	Theil's inequality coefficient
Consumer	1.22
Engineering	1.10
Industrial	0.96
Tyres	1.07

This breakdown indicates that all groups, with the exception of Industrial, would have performed more accurately had a no-change model been used. Such a result must seriously question the value of the forecasts in these groups.

Table C5.3

Theil's Coefficient Ranking Table - Return

	Division	U
1.	PED	0.65
2.	HHD	0.81
3.	NTS	0.82
4.	AFAD	0.88
5.	AFSD	0.90
6.	PRD	0.92
7.	Plant & Equipment	0.94
8.	Redditch Mouldings	0.96
9.	Textiles	0.97
10.	Footwear	1.00
11.	O&M	1.02
12.	IHD	1.04
13.	Dunlopillo	1.06
14.	Suspensions	1.07
15.	Belting	1.08
16.	Aviation	1.15
17.	UKTD	1.18
18.	URL	1.22
19.	ISC	1.25
20.	GRG	1.37
21.	Wheel	1.37
22.	Semtex	1.81
Average		1.03

C5.2.5 Theil's Decomposition

The return summary table (table 6.10) shows that fifteen of the twenty-two divisions have a disturbance proportion in excess of 70%. That is, at least 70% of the error is attributed to non-systematic factors.

Table C5.4 displays the disturbance proportion in the form of a ranking table. From this table, for example, Semtex's poor relative performance can be appreciated, with no less than 73% of the error being attributed to systematic factors. Similarly, useful comparison can be made between this table and the absolute error ranking table (table C5.2). Many of the lower ranking divisions, in terms of absolute error, have large amount their error attributed to systematic factors (indeed a high correlation was recorded between these two tables). These systematic factors can, at least in theory, be eliminated. For example, both Wheel and Semtex have high bias proportions, 36% and 55% respectively. Such results indicate that these divisions have not 'learnt' from past errors but continue to overestimate on systematic basis and do not 'phase down' their forecasts accordingly.

There is also a high correlation between Theil's coefficient and the decomposition. This suggests that divisions who, in relative terms, forecast poorly, do so because of systematic error.

The trading group analysis shows that all groups display similar amounts of systematic influences in their forecasting errors.

	U_M	U_R	U_D
Consumer	0.17	0.16	0.67
Engineering	0.16	0.12	0.72
Industrial	0.06	0.12	0.84
Tyres	0.22	0.07	0.71

Table C5.4

Theil's Inequality Coefficient Disturbance Proportion Ranking Table - Return

	Division	U_D
1.	AFAD	1.00
2.	PRD	0.97
3.	NTS	0.95
4.	AFSD	0.94
5.	O&M	0.93
6.	Redditch Mouldings	0.93
7.	PED	0.88
8.	HHD	0.88
9.	Belting	0.87
10.	Footwear	0.84
11.	Textiles	0.83
12.	Dunlopillo	0.81
13.	Suspensions	0.75
14.	Plant & Equipment	0.73
15.	IHD	0.71
16.	Aviation	0.67
17.	URL	0.62
18.	ISC	0.61
19.	UKTD	0.56
20.	Wheel	0.53
21.	GRG	0.45
22.	Semtex	0.27

C5.2.6 Turning point analysis

Of the 206 forecast periods, 110 (53%) transpired to be turning points. Such a large proportion of turning points gives some indication of the variability which is present in these series.

Of the 110 turning points, 82 (75%) were accurately forecast, which like the result in margin, shows reasonable accuracy. However, further analysis is required to substantiate this finding. Examining the turning point errors, 50 (24% of all forecast periods) were false signals and only 28 (14% of all forecast periods) were missed turns. This result does seem to indicate a tendency not to forecast trends, but rather perhaps to forecast changes in trends or regressivity (as found by Modigliani 5.5.1).

A clearer picture, in particular of overestimation, can be derived from the accuracy with which divisions forecast declines. Of the 88 periods of decline, 47 (53%) were accurately forecast. Such a result suggests that divisions are equally likely to forecast growth or decline in periods of decline.

Breaking the analysis down accordng to trading groups the following appears:

	False Signals[1]	Missed Turns[2]	No. of actual declines	Percentage accurately forecast
Consumer	0.33	0.24	48	48
Engineering	0.37	0.29	21	38
Industrial	0.44	0.22	35	60
Tyres	0.32	0.28	19	37

1. Ratio of false signals to all predicted turns
2. Ratio of missed turns to all recorded turns

Across all divisions in Dunlop, the ratio of false signals to predicted turns is 0.38, thus on average a false signal is given for every 2.6 predicted turns. However, only 1 in 4 of every recorded turn is missed by the divisions. This indicates a slight tendency towards regressivity.

C5.2.7 Randomness

An examination of the return summary table (table 6.10) shows that only one division manages to produce a significant correlation - PED. Although forecasting incremental change is by no means easy, such a result, which suggests that the forecasts are no better than random forecasts, must but be viewed as a condemnation of the prediction process.

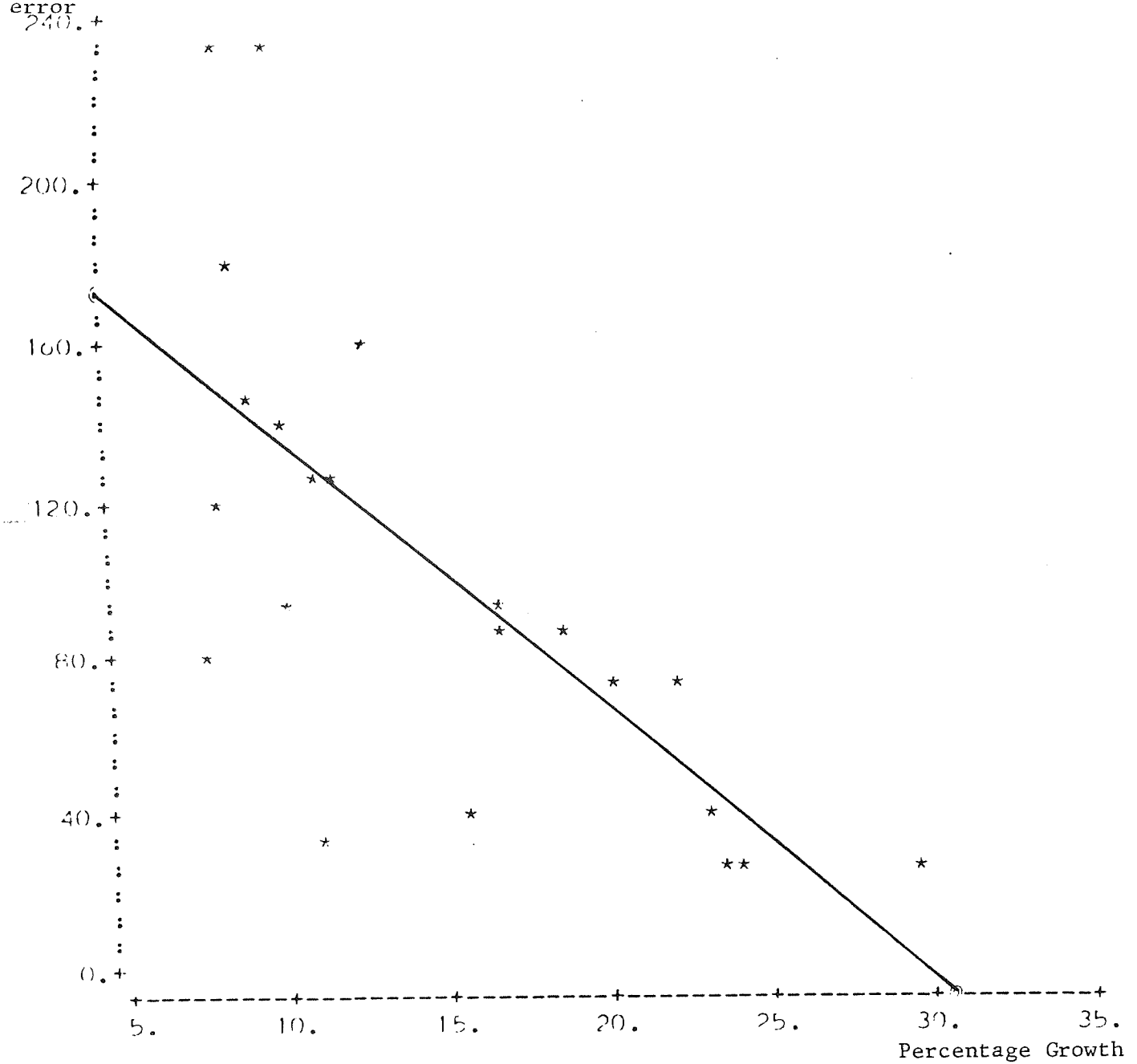
C5.2.8 Confidence limits attached to new forecasts.

	Percentage forecast error*	
Aviation	125+/-701.7	-575.7 to 826.7
Plant & Equipment	111+/-162.7	- 51.7 to 273.7
Wheel	165+/-358.7	-193.7 to 523.7
AFAD	9+/- 76.4	- 67.4 to 85.4
HHD	8+/- 80.4	- 72.4 to 88.4
NRL	116+/-329.3	-213.3 to 445.3

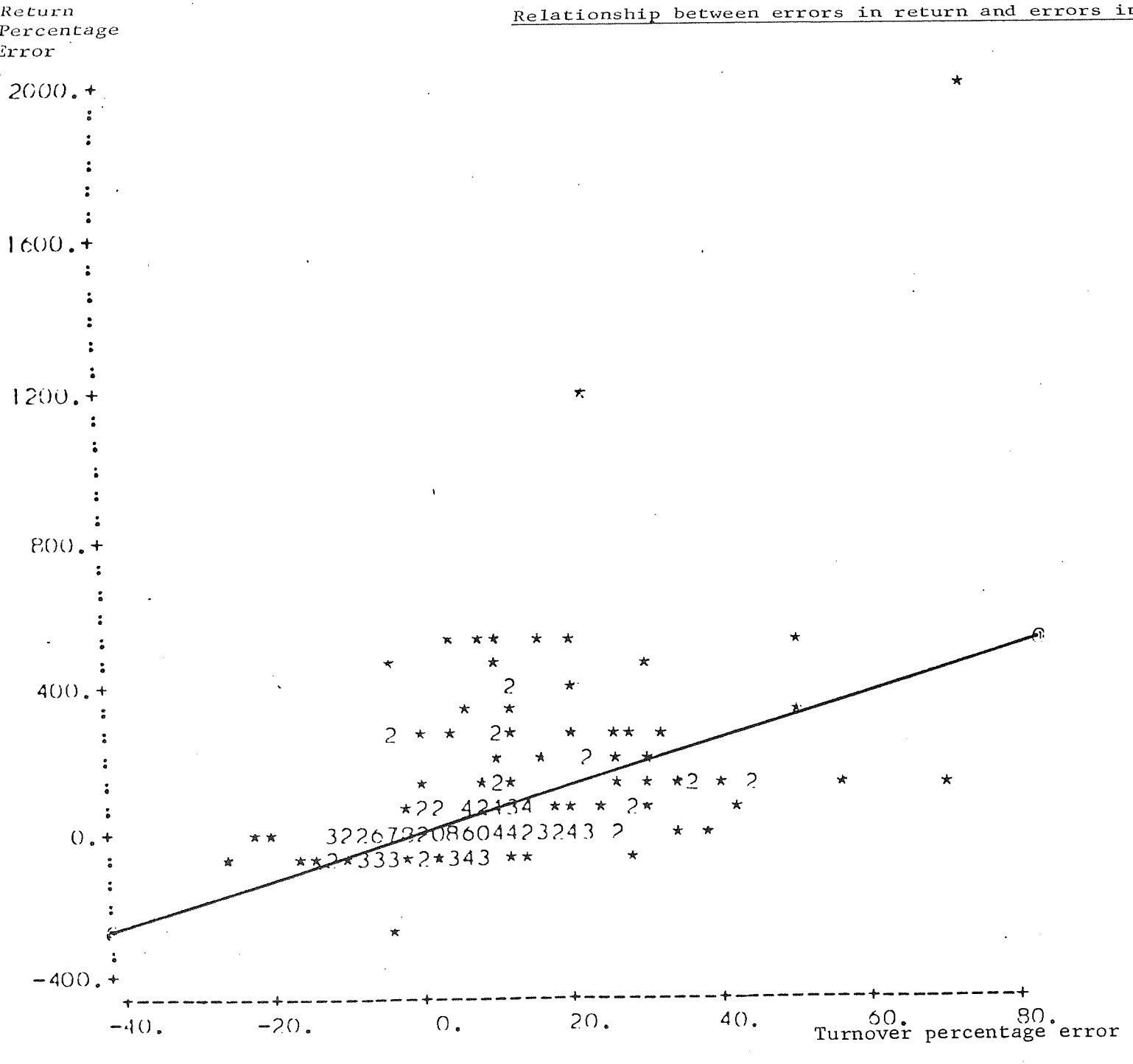
* correlations in excess of 5% significance.

As with margin, where correlations are high enough to predict forecast accuracy, the predictions of future forecasts are so wide as to be meaningless. However, they do give an indication of the extreme uncertainty surrounding the forecasts.

Relationship between divisional growth and error

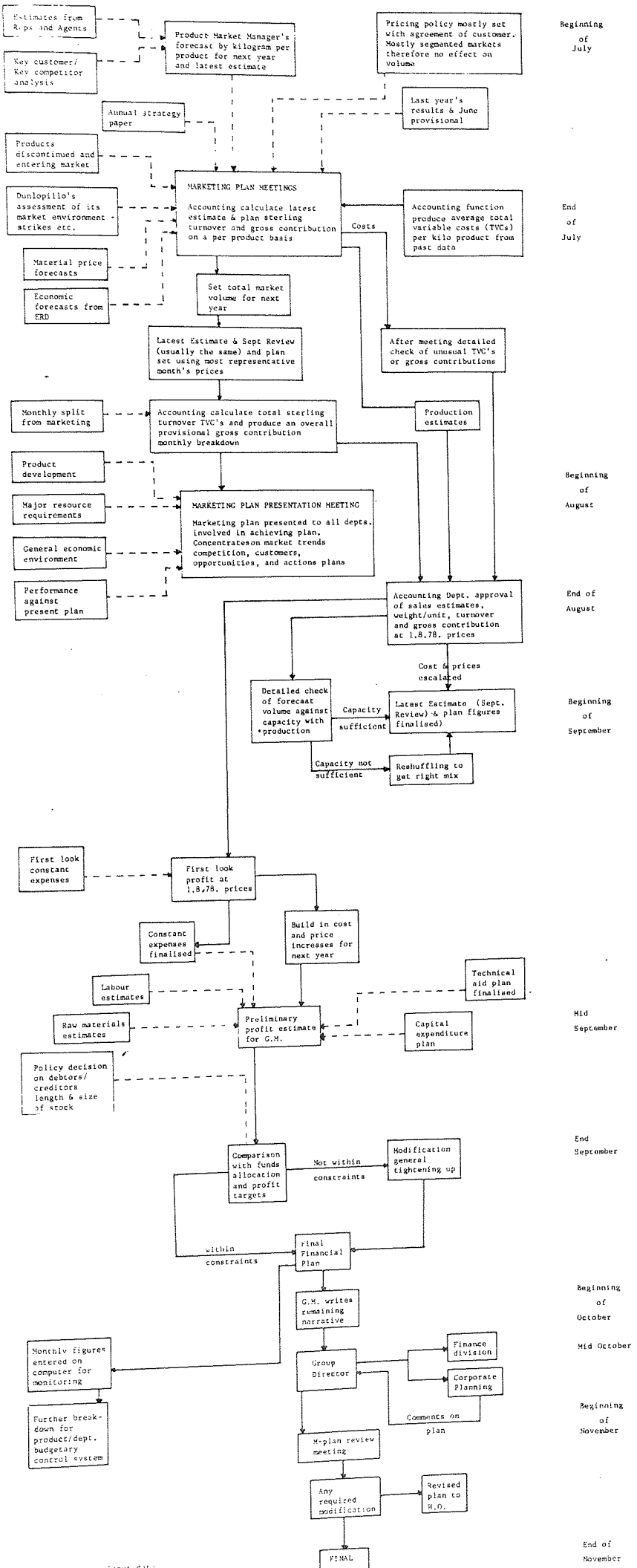


Relationship between errors in return and errors in turnover



APPENDIX D

Appendices Relating to the Analysis of the Management Planning System


Estimates from Reps and Agents
Key customer/ Key competitor analysis
Product Market Manager's forecast by kilogram per product for next year and latest estimate
Pricing policy mostly set with agreement of customer. Mostly segmented markets therefore no effect on volume
Beginning of July
Last year's results & June provisional
Annual strategy paper
Products discontinued and entering market
MARKETING PLAN MEETINGS
Accounting calculate latest estimate & plan sterling turnover and gross contribution on a per product basis
Dunlopillo's assessment of its market environment - strikes etc.
Accounting function produce average total variable costs (TVCs) per kilo product from past data
End of July
Costs
Material price forecasts
Economic forecasts from ERD
Set total market volume for next year
Latest Estimate & Sept Review (usually the same) and plan set using most representative month's prices
After meeting detailed check of unusual TVC's or gross contributions
Monthly split from marketing
Accounting calculate total sterling turnover TVC's and produce an overall provisional gross contribution monthly breakdown
Production estimates
Product development
Major resource requirements
General economic environment
Performance against present plan
MARKETING PLAN PRESENTATION MEETING
Marketing plan presented to all depts. involved in achieving plan. Concentrateson market trends competition, customers, opportunities, and actions plans
Beginning of August
Accounting Dept. approval of sales estimates, weight/unit, turnover and gross contribution at 1.8.78. prices
End of August
Cost & prices escalated
Detailed check of forecast volume against capacity with production
Capacity sufficient
Latest Estimate (Sept. Review) & plan figures finalised)
Beginning of September
Capacity not sufficient
Reshuffling to get right mix
First look constant expenses
First look profit at 1.8.78. prices
Constant expenses finalised
Build in cost and price increases for next year
Technical aid plan finalised
Labour estimates
Raw materials estimates
Preliminary profit estimate for G.M.
Capital expenditure plan
Mid September
Policy decision on debtors/ creditors length & size of stock
Comparison with funds allocation and profit targets
Not within constraints
Modification general tightening up
End September
within constraints
Final Financial Plan
Beginning of October
G.M. writes remaining narrative
Monthly figures entered on computer for monitoring
Group Director
Finance division
Corporate Planning
Mid October
Further break-down for product/dept. budgetary control system
Comments on plan
Beginning of November
M-plan review meeting
Any required modification
Revised plan to H.O.
FINAL
End of November
Input data

APPENDIX D2

Introductory Letter for Divisional Visits

Mr. General Manager,

T.J. Kelsall, Planning Research Officer, Corporate Planning.
TJK/KB
4th December, 1979. 338

Meeting to discuss M-plan system 10th December 1979

Many thanks for the opportunity to come and discuss the M-plan system with you and your colleagues. It may help to expedite matters if I broadly outline the areas I wish to cover.

Basically I am investigating different divisional approaches to the M-plan system and more specifically:

1. Methods employed in plan construction and monitoring
2. Interrelation with the S-plan
3. Attitudes and philosophies towards the system
4. Problems encountered in operating the system
5. Areas of possible improvement

I look forward to seeing you.

T.J. Kelsall

DATA COLLECTION DOCUMENT SUMMARY

QUESTION	CONSUMER GROUP			ENGINEERING GROUP				INDUSTRIAL GROUP							TYRE GROUP		
	Dunlop-illo	ISC	Semtex	Aviation	Redditch Mould-ings	Sus-pensions	Wheel	AFAD	AFSD	GRG	HHD	IHD	PED	PRD	Pirelli	UKTD	URL
Question																	
Philosophy towards M-plan																	
1. Division's Perception	e/c	e	e/c/a	e	e/a	e/d/a	d/b/a	e	e/a	e/a	e/a	e/c/a	e/a	e	e	a	e/c
2. Influence on Efficiency	d	d		e	d	e	d	d	e	d	e	e		d	d		e
3. Usefulness in Planning	d	d		d	d	d	c	d	d	e	e	d		d	d		d
49. Same Outside Dunlop	a	b		a	a	a	a	b	b	b	b	a	c	a	a	e	a
Financial Projections																	
6. Targets or Forecasts	d	d		b	c	c	c	c	d	d	d	d	c	d	d	a	d
7. Div's. Forecast Tight				c		a	a		c	a	c	a		a			c
26. External Targets	a	a		a	a	a	a	a	a	a	e	a	a	e	e	a	e
27. Profit Target Tight/Loose				b		b	a			b				b			
33. Knowledge of GM's Contingency				a		b	c		b	b	b			a	b		a
34. GM Contingency	c	c		c		c	a	c	c	c	c	c	c	c	c		c
40. Perception of Last Forecast T/O				pess		opp	acc		acc	opp	opp	acc		acc			acc
Return				pess		acc	opp		acc	opp	opp	acc		acc			acc
41. Confidence in T/O ± 10%				b		d	e		c	b	a	a		b	a		e
42. Confidence in Return ± 15%				b		d	e		d	d	b	a		b			e
43. Error in Past T/O				a		d	d		b	b	b	b		b			d
8. Strategic Input	b	a		b	d	d	b	b	b	b	b	b	b	a	d		b
8a. Analysis of Strategic Route	b	c		c	a	a	c	c	c	b	b	c	c	b	a		b
21. Funds Alloc. Impact	b		b	b	a	a	a	b	b	b	b	b	b	b	c	b	b
21a. Profit Target Impact	b		b	b		b	d	b	b	b		b	b		c	b	b
12. Start Date for Planning	a	a	a	a	b	a	a	a	a	a	b	a	a	c	a		b
57. Production of Plan (Man Weeks)	55		50	120		35	10		£10K	150	12	50		10	100		6
24. Market Competitiveness	b/c			a/d			b		c	c	c	d		b	c		b
23. Growth as Primary Objective	c			b						b	a			a	c		c
22. Limiting Factors	a	a		b		a	a		a	a	a/b	a		b	a		b
Monitoring																	
35. Plan Monitoring	c			a		a	b		c	a	c	a		a	a		a
37. Frequency of Monitoring				b		b	b		a	a	b	b		a			a
Planning Techniques																	
13. Forecasting Techniques	c/d	b/c/f	a/e	d	d	a/f	d/e	a/d	d/e/f	a/c/d	a/c/d		a/c/d	a/f	a/c/e	a/g	d
13a. ERD Assumptions	b		a	a	a	a	a		b		b	d	a			d	c
18. Break-even Analysis	a			b		b	a		b	b	b	b					a
20. Computer Modelling	d		c	b		c/a(G.M.)	a	c	a	d	a	c	c	a	c	c	a
25. Competitor Analysis	c		b	e		a	b	e	b	c	b	b	b	b	b		b
47. Probability	c	c	c	c	a	b	b	b	d	d		b	a	a	a		b
48. Inflation Accounting				c		d	d		c	a		d		d	a		b
Participation																	
50. Decision Making in Plan	b			b	a	b	b		c	b	c	b	a	b	c		b
53. Construction Participation	d			c	a	e	c		d	b	d	b	a	c	d		b
14. Who produces the Sales Forecast	c			b	a	a	b	b	b	a	b	b		a	c		a
56. Numbers Involved in Writing the Plan				15	1	5	1		8	9	8	9			3		3

Key - Alphabetical symbols on this table refer to the data collection document in Appendix D2.

DATA COLLECTION DOCUMENT

APPENDIX D3

..... Division Date of Visit .....

PERSONNEL INTERVIEWED:

1) What roles do you see the M-Plan fulfilling?

a) H.O. information document for central control
b) Funds allocation document
c) Target measure of performance
d) S-Plan implementing document
e) Budgetary Control device (Financial schedules and action plans to achieve a stated objective)

2) How does the M-Plan influence the operating efficiency of the division?

a) Negative influence
b) Possible negative influence
c) No influence
d) Possible positive influence
e) Positive influence

3) In terms of planning and control of the division, how useful is the M-Plan?

a) Of no use
b) Of little use
c) Fairly useful
d) Very useful
e) Essential

4) How does the M-Plan relate to your budgetary control system?

a) B.C.S. derived from M-Plan broken down into monthly sections according to forecast sales

b) B.C.S. is used to develop M-Plan i.e. the M-Plan is a consolidation of some of the B.C.S. figures

c) B.C.S. is separately developed

5)* Is there a lower level of planning than the M-Plan? If so, in what form?

a) Yes

b) No

6) What are the financial projections regarded as?

a) Unobtainable targets

b) Realistic forecasts

c) Mixture of targets and forecasts

d) Forecasts with some measure of stretching

7) In terms of achievability how are the financial projections generally viewed?

a) Tight (Difficult)

b) Loose (Easy)

c) Just right

8) Is there a strategic input in the plans? If so, when does it occur?

a) Little or no strategic input
b) S-Plan provides only the broadest frame of reference for the M-Plan
c) Translation of problems and opportunities into action schedules
d) Analysis at the beginning of the M-Planning cycle of where the division lies on its agreed strategy - Gap analysis
e) Detailed translation of relevant year of S-Plan into tactical alternatives for M-Plan cycle beginning.

8a) Does any comparison take place between S-Plan and projected M-Plan to discover where the division lies along its 'strategic route'?

a) Always
b) Occassionally
c) Never

9)* Do you see the S-Plan as having any role in short-term decision making?

a) Yes
b) No

10) Is the M-Plan system regarded as being rigid?

a) Yes
b) No

11) What is the effect of the rigidity in the M-Planning system?

a) Forces planning outside "natural cycle" of the division
b) Annual plans are too short
c) Annual plans are too long
d) Forces the production of schedules which are not applicable to the division
e) Presents problems when translating the Plan to the annual budget
f) General problems of applicability to size/type of division

12) When does the division start the M-Planning cycle?

a) Before end of July
b) End of July-middle of August
c) After middle of August

13) What type of forecasting technique is employed?

a) 'Seat of pants' (i.e. subjective assessment) by marketing manager or similar
b) Roll-over
c) Consensus
d) Key customer/key competitor
e) External indicators (ERD, Trade Associations, Consultants, etc)
f) Statistical Trend analysis
g) Forecasting model

) Subjective

13a) Are ERD assumptions used as a fundamental part of the planning process? (Where are they introduced?)

a) Not used at all
b) Used as a check after construction
c) Used for setting costs
d) Used as a major input into the market and cost setting

14) Who produces the sales forecast?

a) Marketing Manager alone
b) Marketing Department
c) Marketing Department in conjunction with other departments
d) Accountants via a forecasting model

15) How is the financial data constructed?

a) Derived from volume using standard total variable costs
b) Basically derived from volume with inputs from department heads for constants
c) Each input individually forecast

16) What type of costing is employed in M-Planning?

a) Marginal
b) Absorption

17)* How are your standard costs set?

18) Is any break-even analysis attempted?

a) Never
b) Occasionally
c) Regularly

19) Is a financial modelling computer package employed in M-Plan construction? If so, what does it encompass?

a) Yes
b) No

20) Would the introduction of a financial modelling computer package be of assistance to divisional planning?

a) Not applicable
b) Tried and failed
c) Considering its application
d) Using it at present

21) What effect does funds allocation have on planning?

a) None (plan as if there were free availability of funds)
b) The Plan is contructed and then amended to fit the allocation
c) The Plan is built up from the plans

21a) What effect do profit objectives have on your planning?

a) None (plan as if there were no objectives)
b) Plan is constructed and subsequently amended to fit objective
c) Planning cannot start until the objective is obtained

22) What are the major limiting factors to the M-Plan?

a) Sales
b) Funds
c) Labour
d) Materials
e) Capacity

23) To what extent is growth in real turnover viewed as a major objective?

a) Seek growth as a prime objective
b) Attempt to achieve some growth
c) Not viewed as important

24) How competitive are the markets in which you operate?

a) Monopolistic
b) Oligopolistic
c) Reasonably competitive
d) Aggressively competitive

25) Is any competitor analysis attempted?

a) No/not applicable
b) Assessment of market shares for each competitor
c) Assessment of likely competitor strategies
d) Game theory type approach
e) McKinsey Competitive Strategy Exercise

26) What targets are set externally?

a) Profit
b) Turnover growth
c) Market share
d) Return
e) None

27) How tight or loose do you regard these targets?

a) Too tight
b) Tight but attainable
c) Just right
d) Fairly loose
e) Too loose

29) What is the level of interaction with G.D. over targets?

a) Targets firmly set - no negotiation
b) Some interaction
c) Targets may be open to negotiation

30)* Does the division know how it fits into the overall objectives/performance of the trading group?

a) Sees other divisions' performance in monthly reports
b) Is aware of overall trading group objectives
c) Neither

31) How useful do you find the M-Plan review with Group Director?

a) Extremely useful
b) Reasonably useful
c) Of little or no use

32) Does the division see Corporate Planning's comments on the M-Plan?

a) Always
b) Occasionally
c) Never

33) What knowledge is there of GD contingencies?

a) None
b) Knowledge of existence
c) Knowledge of size

34) Is there a G.M. contingency in the Plan?

a) Never
b) On occasion and declared
c) Unofficially

35) What Plan monitoring is undertaken?

a) Only monthly monitoring schedules
(plus March & Sept. reviews)
b) Weekly monitoring on selected variables (Which?)
c) Comprehensive weekly monitoring via a computer
d) Monitoring of the strategy

36)* How is the lower level planning (mentioned earlier) monitored?

a) Within the same system
b) Not formally monitored
c) Monitored in greater depth than the M-Plan

37) Do you have frequent meetings to discuss how the division is doing against Plan? If so, what do you think of those meetings?

a) Weekly
b) Monthly
c) As required

38) What action is taken when large variances occur in key variables?

39) How do you determine when a variance is large enough to investigate?

40) How do you regard last year's (1978) forecast of the following variables?

	Op	Acc	Pess[1]
a) Turnover			
b) Return on funds			

41) How confident are you that this year's (1979) turnover forecast will be within ± 10%?

a) Certain
b) Fairly confident
c) 50/50
d) Not confident
e) Totally unconfident

42) How confident are you that this year's (1979) return forecast will be within ± 15%

a) Certain
b) Fairly confident
c) 50/50
d) Not confident
e) Totally unconfident

1. Broad definitions of these categories are as follows:
Turnover - accurate, within ± 10%; optimistic, greater than 10%; pessimistic, less than-10%.
Return - accurate, within ± 15%; optimistic, greater than 15%; pessimistic, less than-15%.

43) Within ± x%, how accurate do you think your turnover forecasts have been over the past 5 years?

a) Within ± 5%
b) Within ± 10%
c) Within ± 15%
d) Within ± 20%
e) More than ± 20%

44)* Within the division, does the March review take the place of the original plan in terms of a 'target'? (Can the M-Plan be adjusted during the year?)

a) Always
b) Occasionally
c) Never (except 1973)

45) What is regarded as a good management plan?

46) What factors would be regarded as an improvement in the present M-Planning system?

a) Improvements in the timetable to fit division better
b) Removal or changes in the schedules/structure generally
c) Increase in the assumptions and guidelines etc. from H.O.
d) Move towards more flexible budgeting (March and September review reporting)
e) Comprehensive budget manual supplied by H.O.
f) Split management and financial accounts into separate documents
g) Completely satisfied with present system

47) Would the introduction of probability analysis to certain parameters be beneficial?

a) Not in favour
b) Did not understand the concept/unsure
c) In favour
d) Actually using it

48) Has the introduction of inflation accounting been beneficial to the divisions planning? If so, why?

a) No
b) Not sure
c) View it as H.O. requirement
d) Use it at divisional level

49) What type of planning system would the division operate if there was no requirement from H.O.?

a) Same as within D
b) Similar but different timetable/schedule
c) More emphasis on budgetary control
d) Separate budgeting and planning
e) Completely different system

50) What level of personnel has a decision-making role in the M-Plan?

a) General Manager
b) Management Committee
c) Accountants, Marketing personnel etc. department manager and below

51) Does the division employ any full time planning personnel?

a) Yes
b) No

52) Have you sufficient resources (staff, etc) to produce what you feel is a satisfactory plan? If not, what is required?

a) Yes
b) No

53) How participative do you think the division is in its M-Plan construction?

a) Autocratic - no discussion . Management Committee told their targets by GM (Exploitive autocrat)
b) Some discussion but figures/plan set (Benevolent autocrat)
c) Management Committee involved in some dialogue over targets
d) Largely participative with involvement of departmental managers, but some stretching by GM (Consultative)
e) Full participation of Management Committee and lower levels in setting the targets (Participative group)

54) Do you think the personnel in the division have the right role in the construction of the M-Plan? If not, what should be different?

a) Yes
b) No

55) Is personality an influencing factor in the plan?

a) Personalities generally
b) Personality of GM
c) Personality of GD
d) Personalities of Management Committee

56) How many people are directly involved in writing the plan? ☐

57) What is the total cost of producing M-Plans p.a. in man/weeks? ☐

58) Do you think the M-Plan in its present form involves too much work in relation to its likely pay-off? If so, what would you change?

a) Yes
b) No

☐

59) Are there any special difficulties forced by the division in its M-Planning?

60) What is your general opinion of the way the M-Plan is constructed?

APPENDIX D4

FINANCIAL MODELS AND THEIR

APPLICATION TO FINANCIAL PLANNING

J. Kelsall
C. Lock

Corporate Planning.
Group Management Services.

5/10/79.

Financial models and their application to financial planning

This report aims to introduce the concept of financial modelling and illustrate how it might be applicable to planning systems within Dunlop.

In the first section the concept of modelling, and specifically 'what-if' modelling, is described. The second section outlines the contents of modelling packages followed by a description of some languages. The final section draws on divisional reports to illustrate the relationship of computer modelling to Dunlop systems.

1. Models

The term model is commonly associated with a scaled down representation of an original object, as in a model boat. Mathematical models, that is the use of symbols to describe reality, have long been used by scientists and engineers. However the financial model is a slightly newer concept.

The objective of the financial model is to represent as simply as possible the financial activities of the firm taking into account all important variables. Such a model can be used as an analytical tool for solving problems and as an aid to decision making. When situations and relationships are complex, models help to simplify and systemize the problem thus aiding understanding, anticipation and measurement.

Financial models in various forms have always been used by management. For example the balance sheet can be regarded as a descriptive simplification of the complex financial position of the company. Another simple model would be discounted cash flow analysis of a capital investment.

Management has however traditionally used mental models for most decision making tasks but the complexity of modern business has made this less feasible. Formal models not only allow decisions (and the assumptions) to be easliy discussed and improved upon but more importantly they allow the model builder to develop his understanding of the problem. This is achieved because the decision maker has to isolate the important variables and their relationships in the problem.

Financial models are divided into two types: descriptive and analytical. Descriptive models, (e.g.the balance sheet) leave the job of evaluation and analysis to the receiver. Analytical models, (e.g. investment analysis) are designed to provide solutions to specific questions.

Models can be used to assist in the analysis of large sets of data. For example the construction of the O-plan, which is largely a routine task where management wish to test different assumptions and decisions. Modelling simply translates the financial relationships that exist in plan construction into logical statements or equations. The variables can then be adjusted and run through the model.

Models can be 'run' in various ways: manually/via an electronic calculator, via conventional data processing systems; or by a computer modelling package. The decision as to which method to choose is largely dependent on the type and quantity of data. Computer based financial models have now been developed for use in most financial areas, for example: cash flow, sales forecast, finance forecast projections.

These models can be linked together to form an overall model of a particular system. For example an annual planning model would include separate models of sales projection, production, cash flow and so on. Such a development has meant that it is possible to have a much more comprehensive view of the effect of decisions.

1.1 Advantages of modelling

Modelling is generally regarded as having increased the efficiency of decision making in business. Among its many advantages are:

a) By physically writing down the relationships that exist within a system in order to develop the model, managements' understanding of a problem is often considerably increased.

b) Modelling allows the manager to consider alternatives in a systematic manner and also to make his assumptions explicit.

c) Modelling produces not only a representation of a static financial position but also allows that position to be projected forward over different time periods.

d) It permits the rapid construction of plans and revisions over several time periods plus fast monitoring and feedback. This gives the manager the ability of seeing the possible results of a decision within minutes rather than in hours and days.

e) Risk assessment is considerably improved by allowing alternatives to be more easily considered. This of course helps to improve, among other things, project selection.

f) It reduces the tedium of calculation and therefore allows the manager to get on with the job decision making.

g) When employed via a computer modelling language it brings the computer closer to the manager by reducing the dependance on computer specialists and system analysts.

1.2 'What-if' modelling

Computer modelling has meant that data can be held in a flexible fashion and this has allowed for the development of the 'what-if' model. This model, as the name suggests, permits the manager to ask what if a particular event happens in the environment or what happens if he decides to take a particular course of action. Similarly it allows him to determine what he must do to get a desired state of affairs in the future. The manager is therefore the interrogator of the computer employing a descriptive model to aid his selection of the better solution.

Using decision rules set out by the manager the data or the relationship can be changed in order to generate alternative scenarios to reflect a wide range of assumptions about the operating environment of the firm. Once the basic model has been constructed these scenarios can be produced almost instantaneously giving greater flexibility and permitting the balancing of intuitively competing objectives. The 'what-if' model also gives the manager the ability to consider what might have been. This is achieved by examining historical data and evaluating the effect of past alternative strategies/tactics in order to provide guidance on future choices.

'What-if' modelling can be used for almost any decision where alternatives or uncontrollable variables exist. For example it can be used to analyse product cost - 'What-if' the engineers union negotiate a 35% wage rise? Or it could be used to examine different stock holding possibilities - 'What happens if the lead time on a given supplier changes?' It is also particularly useful in investment appraisal where many possibilities can be considered to give a more accurate assessment of the potential risk. Often it is helpful to consider the most

pessimistic, the most optimistic and the most likely outcomes of a forecast situation and this can be easily achieved through a 'What-if' model. Indeed once the model is developed a full sensitivity analysis can be produced by changing each major variable in turn to note its effect on the outcome. Thus with a computer model the manager is relieved of the tedium of the calculations and can get on with the job decision making.

'What-if' modelling is particularly useful in annual planning which because of constraints and targets tends to be an iterative process with the first shot rarely being totally satisfactory. Variables can be altered and the results displayed almost instantaneously until the desired outcome is achieved.

2. Financial modelling packages

As computer modelling requires considerable expertise computer bureaux have developed ready made 'packages'. These are suites of computer programs which enable statements in a particular modelling language to be input into the computer and run.

Language packages normally contain the following facilities, often in the form of modules.

i. Data management — Many systems (e.g. budgeting) require efficient storage, updating and editing of data. Computer packages are particularly adept at handling large amounts of data in convenient forms.

ii. Report writing — As the user often wants the output produced in a particular form, comprehensive report writing modules are available. These allow the printouts to be in the format and phraseology required by the user.

iii. Analytical routines — Models can be used to simulate the implications of various assumptions. These simulations can be deterministic (i.e. examining what happens if specific inputs are changed) or probabilistic (i.e. considering a range of possible outcomes to help understand the degree of risk involved). A further facility sometimes offered is backwards iteration, that is setting a target and determining the

required level of relevant variables to achieve that target. Similarly optimisation packages can often be linked into the main package.

iv. Financial analysis — These normally include such things as D.C.F., ratios, project evaluations and so forth.

v. Statistical routines — Various forecasting routines, regression, curve fittings and normal statistical measures are usually included.

As well as these, ancillary packages may be available from the computer bureaux which can be added on to the basic package. Examples of these are linear programming and access to the C.S.O. data bases.

As 'what-if' models follow accounting principles they are well suited to this building block approach. The inputs and outputs are simple to construct and understand and are set out according to standard accounting practices. Also they often use an English-type language to define the relationships between variables so no knowledge of a computer language is required.

These language packages have brought computer modelling within the reach of most divisions by minimising the cost of developing models and reducing the dependance on specialists and systems analysts.

3. Modelling Languages

This section aims to describe three representative packages available to the Dunlop Group, as an aid to divisions wishing to gain an appreciation of some of their main features.

The three languages described are:

F.C.S marketed by E.P.S. Consultants Limited

ORACLE " " A.D.P. Network Services Limited

PROSPER+ " " I.C.L. Dataskil Limited

These descriptions concentrate on the general characteristics of each language (rather than providing a comprehensive list of their capabilities), and takes the form of:

(i) A description of the principle sections of a model in each language.

(ii) An annotated example of a simple model taken from either the user manuals or from the promotional material.

3.1 F.C.S.

(i) General Characteristics

A model in F.C.S. is divided into three sections:

Logic section

Data section

Report section

Logic section

This defines the variables to be used and identifies each with a number and a name. The relationships between variables can be defined by either using the variable numbers or their names. For example given two variables:-

```
: 10 'PRICE'
: 20 'VOLUME'
```

the relationship for Revenue can be written as

```
: 'REVENUE' = 'PRICE' * 'VOLUME'
```

or

```
: 'REVENUE' = 10 * 20
```

Data Section

The purpose of this section is to input the required data. In the above case the data required would be for the 'PRICE' and 'VOLUME' elements of the model. These can be defined either directly as data or can be set via a selection of growth factors. For example

20 G, 5000, 6

would provide a Geometric growth (of 6%) in 'Volume' (Variable No. 20) from a base level of 5000 units/period

Alternatively (as in all of these languages) data can be held on a file which has been previously input.

Reporting Section

Here the report format is specified by declaring the row numbers and periods to be shown. Various options exist for speeding up this process including the 'Display' feature which allows all variables used in the model to be displayed as a simple report.

Once the model has been run, various changes of either a temporary or permanent nature can be made to the Logic or to the Data. Also facilities are available to perform sensitivity analysis (in which the model is re-run with a percentage change to one or more input variables), and backwards iteration (where for example a target value for 'revenue' is given and the computer calculates the required volumes).

(ii)Example Model

The example of a simple model(below)indicates how the cash flow can be calculated over the next 6 annual periods. The logic is input using the 'Build Logic' command, and this is followed by the command 'Build Data'. The calculations are then performed and the 'Display' facility is used to ouput each period and all rows. (The source of this example is a demonstration of the F.C.S. package by E.P.S. Consultants Limited)

F.C.S. Example Model: Cash Flow Calculations

```
SYSTEM: *FCS
PERIODS?6
COMMAND:

COMMAND:BL
  BUILD LOGIC
LOGIC FILE:/.PAT
INPUT
10'PRICE'
12'VOLUME'
14'REVENUE'=10*12
16'RM COST/U'
18'VAR LA C/U'
20'OTHER VC /U'
25'VAR  COST'=(16SUM20)*12
30'FIXED COST'
34'GROSS PROF'=14-25-30
36'TAX RATE'
38'TAX' -£=  TAX(34,36)
40'PAT'=34-38
44'NET FIXED ASS'
46'WORK CAP RATIO'
50'WC'=46*14
52'%ROCE'=40%(50+44)
56'CASH FLOW'=34-38LAG1.-(50-50LAG1.)-44PER1.
58'NPV'=56 NPV AT 15.
END
COMMAND:BD
  BUILD DATA
DATA FILE:/.DAT
INPUT
10U3*1,*1.1
12G900,8
16G.4,4,5,6
18A,.1,8
20U*.03
30L1,70,5,90
36U2*52,3*48,*50
46A 1500,-7
46G,.2,-1
END
COMMAND:CA
  CALCULATE
COMMAND:DI
  DISPLAY
FST PERIOD,LST PERIOD?
ROW NUMBERS
?
```

Input the 'Logic' of the model.

Input Data

Simple Output Report

		1	2	3	4	5	6	
10	PRICE	1.00	1.00	1.00	1.10	1.10	1.10	
12	VOLUME	900.00	972.00	1049.76	1133.74	1224.44	1322.39	
14	REVENUE	900.00	972.00	1049.76	1247.11	1346.88	1454.63	
16	RM COST/U	40.00	41.60	43.68	46.30	49.08	52.02	C
18	VAR LA C/U	10.00	10.80	11.60	12.40	13.20	14.00	C
20	OTHER VC /U	3.00	3.00	3.00	3.00	3.00	3.00	C
25	VAR COST	477.00	538.49	611.80	699.53	799.30	912.76	
30	FIXED COST	70.00	75.00	80.00	85.00	90.00	95.00	
34	GROSS PROF	353.00	358.51	357.96	462.59	457.58	446.87	
36	TAX RATE	52.00	52.00	48.00	48.00	48.00	50.00	
38	TAX	183.56	186.43	171.82	222.04	219.64	223.44	
40	PAT	169.44	172.09	186.14	240.55	237.94	223.44	
44	NET FIXED ASS							
46	WORK CAP RATIO	20.00	19.80	19.60	19.41	19.21	19.02	C
50	WC	180.00	192.46	205.77	242.01	258.76	276.67	
52	%ROCE	94.13	89.42	90.46	99.39	91.95	80.76	
56	CASH FLOW	173.00	162.50	158.22	254.53	218.79	209.32	
58	NPV	830.46	.00	.00	.00	.00	.00	

3.2 ORACLE

(i) General Characteristics

A model written in ORACLE has two main sections:

(a) Input of the Model

(a) Input of the Report Format

a) The Model

The ORACLE model is used to define the data required, the relationships between variables and the text that can be associated with the variable.

Data is input as a time series and is identified by a dataname only (e.g. 'SALES'). Constants (where only one value is held) are described by a ZName, which is a short name beginning with a character Z (e.g. ZPR for a single value of price).

The relationships between the variables of the model are defined by a statement linking the variable names such as:

INV = INV(T-1) + PROD - SALES

(Inventory = Opening Inventory plus Production less Sales)

or

REV = PRICE * VOL

In addition to these names, more meaningful descriptions in English (e.g. Debtors days cover (Trade Only)) can be used in the output report.

b) The Report Format.

This section of the processing involves the input of report headings, column headings and layout of rows. The model is called by a command in this part of the process and calculations are performed. The calculations are automatically repeated for each period in turn to provide a full set of results.

Other facilities available with ORACLE include the 'Demand/Type' option in which the processing of the model can be halted, a request to the planner for additional information made, and then this new information used to complete the processing of the model.

This package can also provide a means of access to the 'SUPERSTAT' package which is capable of graphical and forecasting analysis.

(ii) Example Model

The model given as an example takes sales and production volumes, and calculates inventory levels, fixed costs, labour costs, and material costs. The total costs are inflated at a 5% rate, and the Gross Profit/Loss calculated. This is carried out for four quarters which are added together for an annual position.

(The source for this example is the ORACLE mannual.)

ORACLE Example Model: Sales & Production Planning

Stage I Input the model.

$ TYPE MODEL 111

```
MODEL 111
00100 ;SALES AND PRODUCTION MODEL
00200 PERIODS 4
00400  DATA ZPR .9
00500 DATA ZINF 5
00600 DATA ZPROD 1
00700 DATA ZSALE 1
00800 DATA INV(0) 620
00900 DATA SALES 1500 2000 2350 2750
01000 DATA PROD 1700 2200 2600 3000
01100 SALES=SALES*ZSALE
01200 DATA FIXC 300 350 400 550
01300 LAB = .35*SALES
01400 MATL = .25*SALES
01500 COST = SUMROW(FIXC,MATL)
01600 IF SALES LE PROD GOTO 1800
01630 ZSTCK=INV(T-1)
01660 TYPE SALES,PROD,ZSTCK
01700 DEMAND ZPROD
01800 PROD = PROD * ZPROD
01900 INV = INV(T-1) + PROD - SALES
02000 REV = SALES*ZPR
02100 TCOST = INFLAT(COST,ZINF,1)
02200 GP = REV - TCOST
02300 LIMIT EXTCOL SALES,GP
02400 EXT1 = PER1+PER2+PER3+PER4
02500 TCOST;INFLATED COSTS
02600 ZPROD;PRODUCTION FACTOR
02700 GP;GROSS PROFIT/LOSS
02800 REV;REVENUE
02900 INV;INVENTORY
03000 PROD;PRODUCTION
03100 COST;BASIC TOTAL COSTS
03200 MATL;MATERIAL COSTS
03300 LAB;LABOUR COSTS
03400 FIXC;FIXED COSTS
03600 ZPR;PRICE
03700 ZINF;INFLATION FACTOR
03800 ZSALE;SALES FACTOR
03900 ZPROD;PRODUCTION FACTOR
04000 END
```

NOTES

--- Comment line

Initial Data

Calculation Phase

---- 'Extra' column = Columns 1 - 4

Item Descriptions

Stage II Input Report Format

$ TYPE REPORT 111

```
REPORT 111
00100  MEDIUM TTY
00200 DATA;15TH-DECEMBER-1984
00300  DASH
00350  BRACKET                                          Report Headings
00400  CENTRED
00500  TITLE;SALES AND PRODUCTION PLAN
00600  UNDERLINE;*
00700  BLANK
00900  MODEL  111                                       ------ Call to run model 111
01000  HEADINGS; 1ST QUARTER,2ND QUARTER,3RD QUARTER    Column Headings
01050  HEADINGS;4TH QUARTER,TOTAL FOR YEAR
01100  SCORE ;-
01200  SELECT 1-5
01300  PRINT SALES,#,PROD
01305 OUTPUT INV:INV(1-4),INV(4)
01310 BLANK
01325 SUBTITLE 4;COSTS
01335 UNDERLINE;=                                       Row Layout
01350 SHI 0
01400  PRINT FIXC,LAB,MATL
01425 SCORE:=
01435 PRINT COST
01455 BLANK
01500  PRINT TCOST,#
01525 PRINT REV
01550 SCORE:R;=
01575 PRINT GP
01580 SCORE:R;*
01600  END
```

Stage III Output of Report

$ PRINT REPORT 111

15TH-DECEMBER-1984

SALES AND PRODUCTION PLAN
****

	1ST QUARTER	2ND QUARTER	3RD QUARTER	4TH QUARTER	TOTAL FOR YEAR
SALES	1500.0	2000.0	2350.0	2750.0	8600.0
PRODUCTION	1700.0	2200.0	2600.0	3000.0	9500.0
INVENTORY	820.0	1020.0	1270.0	1520.0	1520.0
COSTS					
========					
FIXED COSTS	300.0	350.0	400.0	550.0	1600.0
LABOUR COSTS	525.0	700.0	822.5	962.5	3010.0
MATERIAL COSTS	375.0	500.0	587.5	687.5	2150.0
BASIC TOTAL COSTS	1200.0	1550.0	1810.0	2200.0	6760.0
INFLATED COSTS	1200.0	1627.5	1995.5	2546.8	7369.8
REVENUE	1350.0	1800.0	2115.0	2475.0	7740.0
=======					
GROSS PROFIT/LOSS	150.0	172.5	119.5	(71.8)	370.2
**********					

3.3 PROSPER+

(i) General Characteristics

A PROSPER model consists of a group of fixed format statements of which the three main types are:

Direct Input

Calculation

Print a line of output

Direct Output (Format 2)

The basic unit of information in PROSPER is a 'forecast' which is a series of time based data. Each forecast is referenced by a unique forecast number. Data can be directly input to a forecast by a statement of the type defined as 'Format 2'. For example sales volume for four quarters could be input into forecast number 200 by the following statement :-

Format No.	Forecast No.	Data name	Start Year	Period	Data
2	200	SALES VOL	1979	1	500,200,900,400

(The time structure of a model is defined in the first statement of the model, but can be amended at a later stage if desired)

Calculation. (Format 5)

Arithmetic calculations are performed on forecasts by referencing only the forecast number. For example, if 'Price' were held in forecast 100, 'Volume' in forecast 200, and 'Revenue' was required to be calculated and kept in forecast 300, the calculation statement could take the form:-

Format No.	1st Forecast No.		2nd Forecast No.	(Keep)	3rd Forecast No.
5	100	x	200	K	300

This format statement would calculate the revenue for each of the time periods in the model.

Print a line of Output. (Format V)

The simplest form of output is to print a line giving the contents of a forecast. The statement to print the contents of forecast 300 calculated above could be:

Format No.	Side Heading	Forecast No.	No. of periods to print.	No. of cols.
V	TOTAL REVENUE	300	4	4

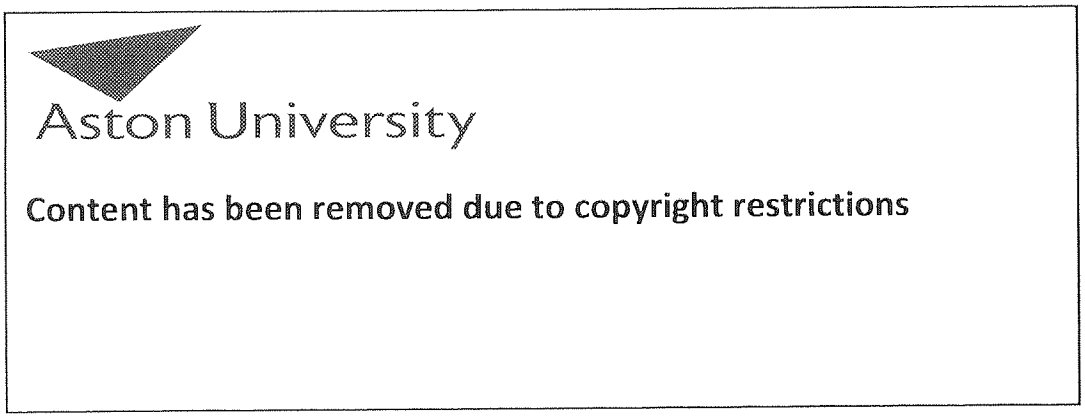
Other facilities avaiable in PROSPER include graphical output, and production of tables, use of trend data, calculation of DCF rates, forecasting techniques. The latest versions of the package include facilities for the planner to design 'user screens' by which information can be displayed and/or input in an improved format.

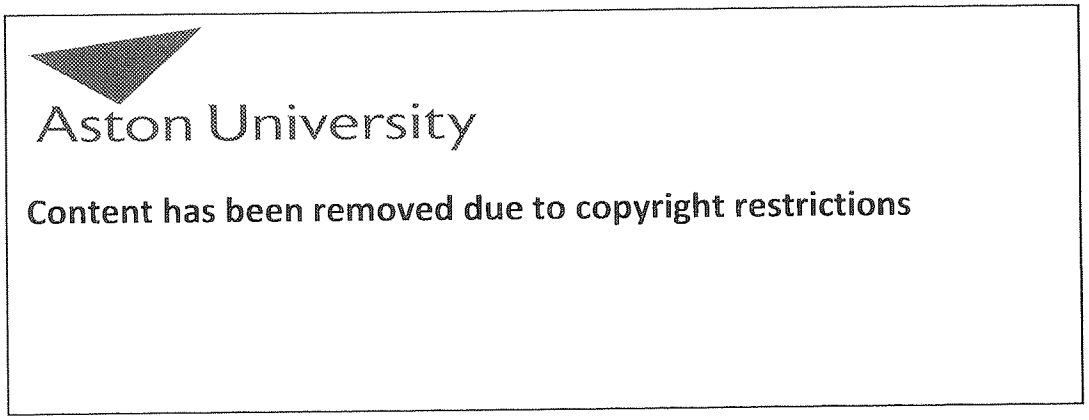
(ii)Example Model

The model shown as an example takes the revenue and direct costs associated with three product groups (PG1, PG2, PG3) and uses them to calculated Gross Profit. The overheads are calculated, and used to generate a forecast of Profit before Tax.

(The source of the model is the PROSPER manual.)

PROSPER+ Example Model: Calculations of Profit before Tax using 3 Product Groups.




Aston University
Content has been removed due to copyright restrictions

4. Applications of Computer based financial models within Dunlop

4.1 Introduction

Having broadly outlined the concept of financial models and modelling packages, it may now be helpful to consider their more specific applications within Dunlop.

Firstly, to get a clear picture of how financial models are developed it is useful to look at their construction. The first stage of development is where all the standard relationships which operate within the system are input. For example: Total Variable Cost of Sales = materials plus labour plus variable overhead; or Gross Contribution = revenue minus variable cost of sales.

These relationships are constructed within the package until the bones of the system in terms of the various calculations (relationships), are completed.

The second stage of development is to input the assumptions about the various variables and their growth rates. This can be done in several ways, the example below shows how it would be achieved within PROSPER.

Aston University

Content has been removed for copyright reasons

The data within these models is derived from three sources:

i. Manually input, for example the rate at which machinery is to be depreciated.

ii. By linking to another section of the model, for example stock levels in the finance forecast could be derived from the trading account.

iii. By calculations within the model itself, for example gross contribution is derived from revenue minus total costs within the trading account model.

As computer modelling has useful applications to most of Dunlop's financial systems the chosen examples are merely representative of possible uses.

4.2 The operating plan system

By constructing a comprehensive model of the O-plan and the relationships within the system, various planning assumptions and decisions can be tested.

At present the time taken to develop the plan precludes any fundemental changes in order to meet the final constraints. For example often the first attempt at the plan does not produce a satisfactory level of profit to meet the profitability objectives or the funds constraints.

Adjustments at this stage have to be made 'below the line', and therefore fundemental changes to volume and mix are precluded.

With a comprehensive operating plan model various policy decisions can be tested against the constraints and rapid feedback obtained on the results. Thus an iterative process of plan development is possible to help achieve a solution which is closer to the optimum.

It is helpful to look at each stage of the model construction starting with the sales forecast.

The sales model forecasts sales volume and price and therefore by multiplication revenue can be obtained. These forecasts can be constructed within the package using various statistical techniques (regression, moving averages, etc.) or input from marketing department forecasts. At this stage volume forecasts per product and per size can be entered into a capacity planning model to ensure the right mix and volume is achieved on various machines.

The trading account can be produced by forecasting total variable costs (using, for example, various assumptions on costs of labour and raw material) and by inputting revenue from the sales model to derive gross contribution. Similarly, various assumptions on fixed overheads and their growth rates can be entered thus obtaining P.B.I.T.

To develop the balance sheet policy decisions are required on the time delays on assets and liabilities, depreciation rates, capital investments and so forth. Also any required ratios can easily be calculated at this stage. From the balance sheet and the profit and loss account the cash flow can be developed and again the effect of different assumptions (length of debtors, size of stocks, etc.) can be tested.

An O-plan model therefore allows management to get a much better view of a range of possible alternatives in terms of their external and internal environments.

4.2 The strategic plan system

Financial models for the S-plan can, if required, be as detailed as those for the O-plan; in fact an O-plan model extended over five years could be used. However, as in this model it is the effect of strategic decisions that primarily interests management, concentrating on the major variables is normally sufficient.

A common approach to S-plan modelling is to set up a model of the company's position at present and project this forward according to inflation and market growth factors. This is the 'natural forecast' assuming no strategic intervention on the part of management. The results of this can be compared with the long-term objectives and various strategies can then be run in the model to close any gap between the 'natural forecast' and those desired objectives. Management might, for example, examine a range of effects achieved through entering a new market or producing a new product. Alternatively, they might wish to know the long-term effect/cost of extending production facilities. Again, as with O-planning various assumptions about the future can be tested. For example the most optimistic/pessimistic/likely economic environments can quickly be examined against a set of strategic decisions thus giving a range of likely outcomes.

4.3 Monitoring and reviewing

Once the O-plan model has been developed a monthly sales breakdown by product and size can be added in to facilitate monthly monitoring. When actual monthly results become available these can be input into the model allowing monthly and year to date variances to be rapidly calculated.

Similarly, updates such as the March and September reviews and the provisional results are relatively simple matters to construct using the year to date figures.

4.4 'Operational' level systems

This area of possible applications for modelling techniques involves the more frequent part of the planning process covering day-to-day or week-to-week decisions. The variables used by such models often involve non-financial quantities such as actual stock levels, actual units produced, as well as financial quantities (e.g. unit material cost). These models can assist in taking decisions at this operational level and thereby present the opportunity to improve the running of the factory or production unit in the short term. These tend to be some of the most fruitful areas of modelling, and their use can be integrated into the actual operating procedures of the division. The main areas of operational models can be described as :-

(i) Production Planning and Control.

This broad area can be divided into the following sections:

- Production/Materials scheduling, where a limited resource such as machine time, or volume of a specified raw material, has to be shared between several conflicting demands. This area is suitable for either simulation models or models using optimisation routines such as linear programming. The results of such models could be a suggested production programme.

- Inventory Control, involving the calculation of maximum and minimum stock levels, for example. These models could link with Sales/Marketing models and thereby provide information on expected demand for products and sales (volume) forecasts. Such systems could use links to conventional data processing systems to access stock records and this would ensure that up-to-date information is used by the model.

- Distribution. This can be regarded as an area often overlooked by developments in techniques such as this. Application of the modelling approach could involve models for planning the utilisation of vehicle capacity, vehicle scheduling or selection of routes.

(ii) Product Costing Systems.

These systems involve the calculation of unit material costs, labour costs, and variable overheads through to the calculation of factory variable costs and total variable costs. The use of

modelling in this system enables the effects of possible cost or price changes to be examined. This is particularly important when the price of a major raw material (e.g., Synthetic Rubber) is due to be increased. Alternative price increases could be tested and the effects on unit costs examined.

(iii) Marketing Models

A further type of operational models aims to analyse a segment or part of the market to provide insight into the operating environment and more specifically to assist in forecasting sales. Such models can be econometric (whereby the 'economic indicators' believed to be associated with demand for the product are examined) or can be based on extrapolations of past trends. Examples of such models are the competitor analysis models and economic research which are used in Corporate Planning Department.

4.5 Ad hoc systems

These models are used on an infrequent or irregular basis to solve specific problems that arise. Each is tailored to that problem and therefore can only be applied to that area only or to a closely allied area.

Typical examples are:-

Discounted cash flow Analysis

Analysis of Rebates (for Group Purchasing deparment)

Project Evaluation (e.g., those being developed by Overseas Group.)

4.6 Consolidations

The aggregation and subsequent adjustment of financial data from several sources can be an extremely lengthly and time consuming process. This is of importance to those wishing to consolidate divisional results, subsidiary companies, or trading groups together. The consolidation process often involves a hierachical structure which can, in itself, be the subject of a model.

Alternatives can then be examined which may take the shape of:-

"What would be the effects of a fall in cash flow in Division X on the overall group position?"

or

"What would be the effects of a change in the exchange rate used by this company on the groups' profit and loss account?"

5. Conclusions

The aim of this report is to provide an appreciation of the concept and uses of financial modelling. It is hoped that the usefulness of financial modelling to Dunlop divisions and groups has now been established.

APPENDIX E

Appendix Relating to the Concepts Behind Budgetary Planning

APPENDIX E1

DISTINCTION BETWEEN TACTICAL AND STRATEGY PLANNING

Naval historian A.T. Mahan defined the concepts of strategy and tactics thus:

> "strategy is everything upto the point of contact ..... at contact in battle, tactics begin."[1]

The distinction between strategy and tactics is far from clear, and is not an easy distinction to make as it tends to vary with the nature of the decision being taken. Ackoff (1970) correctly suggests that:

> "The distinction is relative rather than absolute." (p.4)

However, it is important to distinquish between the two for operational reasons, the demarkation being more than merely a semantic question. Primarily it ensures that the right level of analysis takes place for the right level of decision. Thus for example quantitative analysis in detail by lower management over a five year forecast horizon is not particularly apt for a strategic decision.

By making such a distinction it helps to ensure that respective plans concentrate on what they are supposed to: the strategic plan on broad qualitative thinking and the tactical plan on detailed, mainly quantitative, planning. Thus the Strategic Plan should become the document for isolating key issues which affect divisions, without becoming involved in the day to day operational problems.

Hussey (1978) helps distinguish between the two types of planning with the following definition:

1. As quoted by Schleh (1979)

> "Strategic planning is carried out by chief executive and his first line executives. It is concerned with the broad concept of the company in the future and the provision and allocation of total resources to produce market opportunities to realise the company's profit potential through selected strategies - tactical planning, which embraces all the detailed plans and actions involved in implementing it can be undertaking by the first line executives who report to them." (p.24)

Thus Hussey sees the distinquishing features being: who is it done by and with what aim.

Steiner (1969) defined tactical planning along the lines of budgetary planning, that is:

> "the detailed deployment of resources to achieve strategic plans." (p.37)

More specifically tactical plans are approaches which have been developed in order to turn the broad strategy into practical action within the present environment. A broad strategy being defined as factors of major significance to the deployment of resources in order that the organisation may respond to its environment to achieve its objective.

Steiner produced the definitive list which isolated distinguishing features been strategy and tactics. It is perhaps helpful to summarise Steiner's list such that a clear picture of distinction can be obtained.

1. Level of conduct - strategic planning is the soul province of top management while tactical planning relates to, and should be done by, lower management.

2. Regularity - strategic planning is irregular and continuous in that a division should continually scan for opportunities but the timing of decisions must be irregular, as and when opportunies occur. Tactical planning should follow a fixed and cyclical timescale.

3. Frame of reference - strategic planning normally considers whole divisions or the Group and is the source of all other planning. Tactical planning is often concerned with sub-units responsible for implementing the strategic decisions. As Ackoff (1970) puts it:

> "The more functions of an organisation's activities are affected by a plan, the more strategic it is." (p.5)

4. Risk and uncertainty - because of the timescale and the nature of decisions, both risks and uncertainties tend to be greater in strategic planning.

5. Sources - generally strategic planning is concerned with uncontrollables and tends to be more subjective, while tactical planning is more involved with controllables and tends to be more objective.

It can be seen from the foregoing that strategic planning is concerned with major resource allocations affecting the broad direction of the firm, while tactical planning deals with current and immediate problems in the light of the longer term direction.

APPENDIX F

Appendices Relating to the Budgetary Planning and Control System

APPENDIX F1

DUNLOP

HEAD OFFICE

To P.M. Rossiter, General Manager, Corporate Planning.

From T.J. Kelsall, Planning Research Officer, Corporate Planning.

Ref TJK/KB

Date 11th November, 1980. Ext 565

Paper on the present state of Dunlop's Planning System

Attached is a paper which it is hoped might prompt a renaissance of planning in Dunlop. It is not a detailed analysis of the failings of the current system, but rather tries to act as a springboard to encourage discussion and, more importantly, action. The paper therefore merely states problems (which I am willing to elucidate upon) while concentrating on solutions.

The ideas contained have been sparked off by the apparently deliberate shift away from planning in Dunlop. Although it is recognised that such a shift is considered necessary for survival, it is bound to lead to significant problems. The solutions proposed rest on the belief that top management wish to continue with some form of centralised planning and that in doing so must come to terms with the fact that planning is really only worth doing if it is done well - which means committing resources to it.

Some of the suggestions proposed could well be termed radical but it is felt that given the current performance of planning in Dunlop, this is no time for a reactionary approach.

T.J. Kelsall

Dunlop's Planning system - a suitable case for treatment?

Planning philosophy in Dunlop has taken a distinct shift in emphasis during the past two or three years. In its early stages of development Dunlop's central planning system rapidly adopted objective and often complex approaches. These approaches appeared to promise that management would be able to control their own destiny. This promise was unfulfilled and led to disenchantment with the systems themselves giving a lack of credibility to the concept of planning. Many of the systems subsequently fell into disused - computer programmes, categorisation and even strategic planning itself - and Dunlop shifted back to more simple subjective methods of planning.

The reason for this shift in emphasis seems to be that Dunlop was trying "to run before it could walk", as systems were created which were not backed up by divisional planning competence or data. This in turn led to the failure to commit the necessary resources needed to develop and implement planning.

Current research in Dunlop tends to indicate that failures in the planning system are not due so much to shortcomings in the components of the system, but more the way in which these have been linked together and subsequently operated. Although each of the basic elements has certain defects, the overall system appears fundamentally acceptable and would operate effectively if the relationships between the components could be strengthened. In order to do this the planning system itself, as well as its various components, needs to be examined.

Within the system there are three main types of plan: Corporate, Divisional Strategic and Operating; each of which should be inextricably linked by both the funds allocation and the control system. Unfortunately the essential links between the various components, which help ensure higher plans are turned into action, have not been operated effectively. As a result, it is uncommon for higher plans to result in direct action, thus suggesting there is little point in making them.

The failure of the funds allocation and the control procedures to forge the link between plans can be attributed to several factors. In theory the funds allocation should act as the key dirigiste tool in Corporate Planning's arsenal for implementing Group strategy. In practice the divisional allocation has been abdicated to trading groups, and because of forecast inaccuracy the system does not adequately link strategic and operating plans. Similarly, in

/ Continued .....

reality no formal monitoring or follow-up procedures exist for controlling the S-plans, and post-mortems on the O-plan rarely appear to take place.

The failure of divisions to respond to the expansion of planning in Dunlop has also been a key factor in preventing its success. Divisional planning has tended to become a routine of "forecasting" (as opposed to planning) via extended budgeting, which has produced a degree of accuracy which is derisory. Generally the aim has become one of satisfying Head Office requirements by providing them with unimaginative and unsupported(able) data.

Similarly, the decline of the planning system has been further hastened by Dunlop's financial and commercial position. This has resulted in a predetermined shift at the centre away from planning and towards survival. In reality this is a non sequitur as it attempts to separate two highly related concepts. Under recessionary conditions the only companies which grow, or even survive, are those who plan aggressively and strategically to keep market share and profitability. Without this type of planning it is a downward spiral with more aggresively thinking competitors eating away at the business.

From this it should be seen that Dunlop must now commit resources to establishing effective and comprehensive planning. The current reliance on extended budgeting will do nothing, long or short term, to change our present path.

Identification of problems and assessment of possible solutions

In the past various elements of the planning system have been examined with improvements being suggested in relative isolation. Little attempt however has been made to solve the major underlying problem in the form of the weak links within the system. For an effective approach to planning to be developed it is essential to first examine the whole system and its interrelationships and subsequently analyse the individual components within this broad framework.

For the purposes of this report it is easier to describe the system's interrelationship and the individual component problems via an analysis of each component.

/ Continued .....

Corporate Plan: Although not strictly in position to make comments on this this part of the system, it strikes me that there should be formal and regular (if not continuous) systematic monitoring of the Corporate Plan, rather than the spasmodic approach of the present system. In particular these reviews should assess the impact on the plan of changes in the basic assumptions and the degree of implementation occurring.

Similarly, the links between the Corporate Plan and other parts of the planning system should be reviewed in detail to ensure effective implementation can take place.

Strategic Plan

Essentially there are three major problems with the current S-plan system: the divisional strategies are generally weak; the projections are unrealistic; and the plans are poorly implemented. Examining each in turn:

1. Divisional strategies are generally weak

Solutions:

i) The root cause of this problem seems to be that divisions have difficulty in identifying strategic issues and relating them to their division. One only has to examine 1980-4 or 1981-5 S-plan and see how poorly divisions planned for the well predicted recession, to realise the weakness of some of our strategic planning. One way round this problem is to establish a formal channel of communication to operate during S-plan development in an effort to produce a plan mutually acceptable to divisions, trading groups and Head Office. Other large companies (e.g. ITT) have adopted such an iterative approach which frequently results in beneficial modification to the plan.

It is envisaged that such an important conceptual change in planning philosophy could be adopted relatively simply. For example, early in the year divisions would submit a brief, but well thought out, one or two page trial plan. Where necessary, some divisions would make a formal presentation to the Trading Group/Corporate Planning aimed at expanding their strategic thinking. All divisions however would be involved in some discussion, and possibly amendments, before the final development of the plan.

ii) To assume that divisional management are sufficiently well trained in planning to develop aggressive and effective strategies is simply naive. Their sights are still clearly oriented towards operational management, and asking them develop competent strategies without giving them substantial educational support and training merely results in S-plans which resemble extended operating plans. An examination of current S-plans adequately demonstrates that in many cases Head Office guidelines are not sufficient assistance. The envisaged educational role should be fulfilled by planning specialists (and Corporate Planning should ensure they fulfil that function) and should take place in three stages:

a) Invite representatives of divisions to attend seminars, given by Corporate Planning, on practical approaches to strategy formulation.

b) Using predetermined criteria, single out the Group's poor planners and send a Planning Consultancy Team (who should be specialists in the markets rather than divisions) to discuss ways of isolating key strategic issues in their markets.

c) For mediocre divisional planners, repeat the excerise done in 1979 where Corporate Planning isolated issues which were of strategic significance for each division and asked them to concentrate on these points in their plans.

iii) The planning system should be structure such that it forces divisions to produce plans which are more resilient to change (e.g. three levels of funds allocation). A reader should be convinced that a plan is resilient to a range of possible outcomes in the explicitly stated assumptions, and that it would not be outdated by minor changes in the environment. Regular reviews of the basic strategic assumptions, with assistance from the centre, should take place. Similarly, the plans should include comprehensive sensitivity analysis of the basic assumptions so that the effect of a range of possible outcomes could be reviewed.

With the increased resilience to change, which will be greatly assisted by subordinating tactics to the O-plan and leaving only broad strategies in the S-plan, it is envisaged that the majority of divisions should normally only produce an annual strategy paper.

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This paper would review, rather than revise, relevant factors for the coming year as well as outlining the effect of the changing environment. The paper should merely be an implementing device and divisions would only develop new strategies after discussions with the centre,who should be convinced that a fundamental change in the business has occurred.

iv) Plan vetting procedures should be improved by Corporate Planning constructing specific guidelines for auditing and reviewing S-plans. More importantly however, the Department should develop indigenous knowledge of Dunlop's markets and should review market share (and other indicators) in relation to some interfirm comparison data base.

Obviously the iterative approach to plan development would contribute significantly to the effectiveness of subsequent vetting.

2. Plan projections are unrealistic

Solutions:

i) If quantitative accuracy is to improve, divisional analysis of their past strategic variance should form an integral part of plan development. Similarly, from a central viewpoint, forecast credibility (cf report on Variance Analysis) should play a major role in the allocation of funds and the vetting of strategies.

ii) Total commitment should be obtained from the divisional director on the key performance indicators which he has set himself, and these will represent the targets against which he will be measured. Such a system will require improved formal monitoring and follow-up procedures.

iii) The inability to forecast accurately should not necessarily give planning a bad name, forecasting being only one input to the strategic planning process. Dunlop should however make a deliberate effort to keep quantitative data at a bear minimum on the basis that if you really can't forecast accurately five years ahead then there is little point in having the detail.

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3. Plans are poorly implemented

Solutions:

i) Although the S-plan should be the culmination of fairly detailed analysis, the strategies themselves should be broad enough to cover a range of likely outcomes in the basic assumptions. These strategies can then be made detailed via the generation of tactical alternatives in the annual plan.

ii) A formal S-plan monitoring procedure should be established, perhaps involving a biannual review and presentation of strategic implementation to Corporate Planning and trading group staff.

iii) The percentage of funds agreed in the S-plan to those allocated in the O-plan must be improved by having three levels of funds allocation and thus giving the means (resources) to implement the strategy (cf Appendix 1).

iv) A form of action schedule in the O-plan which links directly back to the S-plan should be instituted so the reader can see how the strategy is being implemented.

Operating Plan

The problems of the current O-plan system have been elucidated in some detail in the Budgetary Planning report (which is specifically concerned with the link between the strategy and the annual plan), so comprehensive analysis is not required here. However one or two problems and possible solutions are worthy of emphasis.

1. Extreme optimism is generally present in the financial projections

Solutions:

i) Encourage post-audits of variances as a starting point for plan development (cf. variance report).

ii) Ensure that the S-plan targets, although motivational, are not too stretching and that they, rather than some externally imposed target, form the basis of the plan. Similarly the targets should be linked directly to the funds allocation via the cash conservation scheme.

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iii) Divisions should be aware that forecast credibility will play a major role in funding decisions. Similarly, the centre should use linear transformation and other techniques (cf. Variance report) to adjust the forecasts. Such approaches help ensure funding decisions are based on more realistic data.

2. Vetting and monitoring procedures are ineffective

Solutions:

i) Corporate Planning should aim to significantly improve its knowledge of markets. In reality the Department no longer has the resources or the desire to effectively operate Planning Consultancy Teams on a divisional basis. In any case it is perhaps of more importance that Corporate Planning concentrates on markets or SBU's rather than single divisions. For this reason the individual teams should become specialists in key markets of importance to Dunlop.

ii) To be able to effectively vet a plan it is essential to have volume and contribution schedules on a per product basis mandatorily supplied (some trading groups already voluntarily supply this). Without these figures the whole procedure of plan vetting is questionable. Any assessment of realism, strategic consistency, and internal consistency are at present based on consolidated financial figures which tell us very little indeed about the business.

Although it is not the province of Corporate Planning to become involved in the detailed operations of a division, it is our function to ensure realistic implementation of the strategy, within the funds allocation, occurs. Without product profitability information such an operation is impossible as the "shape" of the business cannot be adequately determined.

iii) Research suggests that, even at trading group level, strategy is not at the forefront of management's thinking. To help ensure strategic implementation takes place, and to improve the links between divisions and the Department, it is proposed that Planning Consultancy Teams sit on the relevant O-plan challange meeting. Such a system would allow Corporate Planning to follow its O-plan comments through to their natural conclusion.

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Funds Allocation

Above all the other components in the planning system the funds allocation is the one aspect where objective techniques are crucial. Indeed the funds allocation should be a precision tool by which Corporate Planning implements its broad strategic policies. It is therefore of great concern that a move towards subjective techniques has occurred when funds are so limited and accuracy of allocation is more critical than ever.

1. The allocation no longer acts as strategic tool

Solutions:

i) If Corporate Planning wish to operate a portfolio approach to strategic management funds must be allocated on a divisional, rather than on a trading group,basis. For this to be realistically possible it may mean much greater contact with trading groups over the divisional allocation. At the end of the day the allocation must rest in the hands of the board (with the assistance of Corporate Planning) and not some lower, less objective, level.

2. The allocations bear little resemblance to the S-plan requests because the S-plan projections bear little resemblance to reality

Solutions:

i) S-plan vetting procedures must be improved so that the resulting plan is not only achieveable, but may even be slightly pessimistic in profitability terms. Similarly prudent reserves should be maintained to take account of any reasonably predictable shortfall from the divisions.

ii) Three levels of funds allocation/request should be established for the S-plan (cf Budgetary Planning report). Level one will be the minimum survival level for each division taking into account its category. Turnover to working capital targets and ratios should be used to link this to volume changes. Level two would be a contingency level which

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would take into account some cut in the funds available. Divisions would thus be asked to develop a strategy which takes into account less funds than considered necessary to survive in their current state/ category. The level of cut, which may vary from year to year, would have to be defined by the Department taking into account such things as uncertainty, previous necessary reductions, etc. Level three would ask the divisions to quantify the effect of any additional funds which may or may not be available depending on trading conditions. That is to say, divisions would, at this level, 'bid' for any marginal funds which might become available through improved trading conditions or surplus reserves. These additional funds, if available, would then be allocated on the basis of the categorisation of the business, the predicted marginal return, and the forecast credibility of the division. The divisions would thus be asked to develop and commit themselves to strategies which would take account of various possible trading conditions throughout the Group and thus S-plans would become resilient to changes in the level of funds available.

3. The funds allocation is based on far too subjective and unsystematic methods.

Solutions:

i) Completely revise the categorisation procedure to make it a logistically acceptable approach. The procedure, which should form the basis of the allocation, ought to isolate the key issues on which that allocation is based. Also the process should take place at the same time as the Department's review of strategy.

ii) Forecast credibility should play a much greater role in the allocation (cf. Variance Analysis). The allocation must, by the nature of the system, be heavily based on the strategic plan forecasts. It is clear from previous analysis that, even after standardising for different levels of uncertainty operating on the divisions, some divisions consistently forecast better than others. (Incidentally, Corporate Planning has an important role to play in determining just why some divisions do forecast better than others.) The open use of forecast credibility weightings in the funds allocation should encourage divisions to submit much more accurate forecasts. As realistic forecasts are one of the major inputs

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in strategic portfolio management, the end result should be a much more efficient Corporate and Strategic management process.

Control

The current planning system largely ignores control and follow-up procedures (particularly in S-plans), presumably on the basis that once the plans have been vetted, monthly operating statements will ensure they are implemented. It is my belief that ignoring control is a fundamental and serious deficiency in the present system.

1. Initial challenge process is weak

Solutions:

i) Improve the link between H.O. and the divisions via the proposed iterative process such that a "contract" can be agreed in the form of the plan. Both sides will be expected to give total commitment to this plan, which will be agreed as being a realistically achievable document.

ii) With the advent of the annual strategy document, fewer S-plans will be submitted. This should allow Corporate Planning more opportunity to visit divisions during the year in order to gain some appreciation of their strategic problems and the realism of the plans.

2. Monitoring procedures are weak

Solution:

i) Divisions should submit quarterly/biannual reports on progress against the strategic route (including action schedules). These reports should include an analysis of the current environment and in particular how changes in the market (competition) might affect strategic implementation. Although the aim of these reports is to review strategic implementation, it is accepted that such a concept cannot, because of uncertainty, be tied down to specific timings. However these reports would give divisions the opportunity to describe how things are moving in their environment and the effect that this has on their strategy. Such a document also helps to force divisions into formally considering change.

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3. No formal follow-up procedures exist

Solutions:

i) Top management should decide what procedures it wishes to initiate for failure to achieve plans. This may take the form of pay incentives (undesirable because of manipulation); funds incentives (as in forecast credibility and cash conservation); formal presentations to Corporate Planning on how the division intends to get back on strategic course; etc.

ii) As soon as the final yearly results are available, divisional management should prepare a written submission to the trading group, and thence to Corporate Planning, concerning achievement of O-plan. This paper should not be a list of excuses but should rather aim at isolating factors which are relevant in developing future plans. Also divisions which display particularly large plan/actual gaps should be subject to a formal post-mortem conducted by the trading group and/or Corporate Planning. Similarly, divisions should be encouraged to attempt analysis of variance along the lines suggested in Appendix D in the variance reports.

A final factor which is worthy of consideration is the changes required to improve Corporate Planning's role in the planning system. Essentially these are as follows:

1. The rapidity of change in the economy is well accepted and Corporate Planning have a major role to play in assessing the effect of this change on the Group. This could be achieved by more comprehensive scanning and discussion of the environment.

The following approach might be adopted. Firstly, re-establish monthly departmental meetings with a formal agenda to: identify change, its effects on the group, and possible Dunlop action. Secondly, as we are the only focus for long term planning, from time to time (4-6 months) the department should meet to formally consider the long/very long term (say up to 2000) and speculate on its possible relevance to Dunlop. The format for such meetings/seminars might include each member of the department preparing a brief note on various environmental factors (political, techno-logical, demographic, etc.) and their possible impact on Dunlop's long term planning.

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2. To assist in plan vetting and funds allocation/sanction decisions Corporate Planning should develop a data bank of information. This data bank should include divisional profiles made up of comparable charts of key indicators (past and predicted) and brief outlines of strategies; market forecasts (possibly bought in); and interfirm comparison data (for example as supplied by dataStream Ltd.). By combining these components Corporate Planning should be able to gain an appreciation of how divisions are moving in relation to both the whole industry and individual firms within that industry.

Implementation

In the past centrally produced plan guidelines have tended to be rushed through lack of time. The proposals of this paper represent a major exercise which will involve all the resources of the Department over some considerable time. Because of the size of the task, and the timing in relation to the planning cycle, it is important to start as soon as possible. As already stated the aim of such an exercise is not to approach the system on a piecemeal basis (S-plan followed by funds allocation followed by O-plan etc.) but to first consider major changes required to the whole system such that the planning process "gels" together. For example, radical changes cannot be made to the funds allocation after the setting of the strategic plan guidelines on which the funds allocation will be based. Such an approach will help ensure that the links between the various components are to some degree strengthened. The following timetable is provided to give a rough sketch of the required tasks:

End November:	Department meeting to introduce the problem and the task.
Beginning December:	One day symposium to specifically identify major problems with each component in the present system.
	Allocation of problems for solution to teams within the department.
Beginning January:	Circulation of outline papers on possible solutions from various teams.
Mid January:	One day symposium to discuss and agree best solutions on the whole planning system thus resulting a broad outline for the new system.

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End January:	Construct and circulate within Department new S-plan guidelines.
Mid February:	Agree new S-plan guidelines with PMR
Mid February - Mid March:	Two teams i) Detailed analysis of the system for funds allocation and proposals for improvement. ii) Revising of categorisation procedures and review other portfolio techniques.
Beginning March:	One day seminar for divisions on approaches to S-planning.
Beginning March:	Identify divisions specifically in need of help with S-plan development.
Beginning - End March:	Visit/write to identified divisions.
Mid - End of March:	Those divisions revising strategy submit trial S-plan.
Beginning of April:	Review and consolidation of trial S-plans
Beginning to Mid April:	Divisions given guidance or O.K. for plan development.
Mid to End April:	Divisions submit full S-plans and those not revising strategy submit annual strategy document.
Mid April to Beginning May:	Full review and challenge of plans and strategy documents with some divisions giving formal presentations - possibility of rejection and resubmission.
Mid April to Beginning May:	Categorisation
Beginning to Mid May:	Funds allocation directly related to S-plan and optimising the three levels of requested funds.
Beginning of May to Beginning of June:	Development of annual planning system guidelines.
Beginning of July:	Half yearly review of strategy implementation.
End October:	Divisional submission of annual plan.

APPENDIX F2

DUNLOP

HEAD OFFICE

To Mr. P.M. Rossiter, General Manager, Corporate Planning
From T.J. Kelsall, Corporate Planning.
Ref TJK/KB
Date 8th October, 1979. Ext 346

Operating Plan Comments 1980

In response to your request I have prepared the following notes on the guidelines for this year's operating plan comments. I have stuck to the criteria you suggested last year on the basis that these cover precisely what we ought to be looking at. However I have aimed to objectify certain criteria in particular the section on realism.

The time constraint problem is greater than ever this year (cf attached schedule on Members of the Department available for O-plan comments). It is primarily for this reason that I am suggesting the provision of more detailed criteria. These will help to ensure that all the important points are covered without getting involved in the detail.

Similarly it may be useful to state precisely the aim of our comments. Perhaps something to the effect of 'To ensure a division's plan for the next year is broadly in line with the agreed strategy and funds allocation and that the plan provides the division with a realistic operating document'.

Having discussed operating plan comments with members of the Department, past and present, I have constructed the following criteria -

1. Strategic consistency

The primary task of the Department in reviewing the operating plans is to ensure that next year's plan is broadly in line with the strategy. In order to achieve this the following should be considered.

i) Ensure the plan contains elements of strategic implementation. Briefly examine last year's O-plan to ensure the division is moving towards its strategic objectives and not simply restating the same thing.

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ii) Any deviations from strategy should be queried.

iii) Where possible examine market share and growth predictions against strategy. Are they in line?

iv) Examine key financial criteria against strategy: return, margin, cash flow, sales/fixed asset ratio, sales/working capital ratio. In particular consider CCA figures.

v) Research and development. Are projects maturing as suggested in the strategy? Are new products and diversifications compatible with the strategy?

vi) Changes in the environment since the S-plan was written (particularly competitor/market analysis). Are these detailed and are effects on the implementation of strategy outlined?

2. Funds allocation

Growth in capital employed should be within the funds allocation and any discrepancies need to be seriously questioned. Other areas to bear in mind are:

i) Does the capital expenditure programme correspond with that outlined in the strategy?

ii) Do years two and three of the finance forecast look realistic in the light of year one and the balance sheet? In the past these have suffered from hopeless optimism and the hockey stick effect has been apparent.

iii) Does working capital look realistic in the light of past trends?

3. Internal consistency

A secondary function of the Department's review of the M-plan is to act as a final check to ensure there are no ambiguities or internal contradictions. However, the plan will have passed through several inspections before it reaches Corporate Planning so not too much time should be spent on the detail.

If time permits it may be worth cross-checking items where some relationship might be expected to hold. For example, a large growth in sales with working capital staying constant would be considered unusual.

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4. Realism

In terms of the plan's usefulness, both to the division and Head Office, the degree of realism present is a key factor. Optimistic forecasts and unrealistic targetry have been a constant feature of the O-plan.

The following may help to give an indication of the degree of realism present in the plans.

i) Economy

- The plan should broadly fit into the economic background as supplied by E.R.D.
- Where a division has either amended or produced its own assumptions particular note should be taken of them. They should also be checked against E.R.D.'s.
- The realism of overseas divisions' assessment of their politico-economic situation should be checked with E.R.D.

ii) Action schedules

- The reader should be convinced that these schedules tackle the underlying problems of the division. There must therefore be some realistic assessment of the problems and opportunities in the narrative section. To determine their realism from the removed position of Corporate Planning is not simple and must be fairly subjective. Last year's M-plan may help to indicate what progress has been made on previous action schedules. It is not unknown to find the same schedules appearing year on year.
- Evidence of serious omissions in the action schedules, such as failure to tackle a problem, may also indicate lack of realism.
- It should be evident from the action schedules how the strategy is being implemented.

iii) Growth in the market

- Always carefully examine claims of real growth and ensure they are convincingly substantiated in the narrative. Particularly examine any claims for increases in market share.
- Is there an up-to-date analysis of competitors' likely actions in the next year? Often these are not revised

iv) Price/volume analysis - Examination of the relationships between increases and decreases in price, volume, total market and market share can be a useful indicator of plan realism. For example increased price and volume in a stagnant market with little change in market share would be regarded as most unusual.

v) Cost trends - Cross-check labour and labour costs. Are any increases substantiated in the plan?

- Check raw material cost and wastage against previous M-plan.
- Are cost increases generally in line with ERD/MSD assumptions?

vi) Vulnerability - Is there analysis of areas in which the division may be vulnerable? This is really the function of the S-plan but the situation may require updating. For example vulnerability in respect of: competition - are they losing any competitive advantage? Geographic market - are they losing out in one area?

5. General

i) The plan is supposed to be a highly detailed and comprehensive document explaining exactly how the division intends to operate over the next twelve months. All major issues should therefore be covered in sufficient depth. Does it look as if the plan has been written to please H.O. or Trading Group H.Q. or is it a realistic operating document?

ii) Look out for subjective unsupported statements which might indicate that the division has not considered a point in sufficient depth.

iii) Ensure that all major changes against last year are fully explained. For example if the division is forecasting a 5% increase in market share is there a convincing reason why this might be so.

iv) Examine CCA figures carefully as divisions will now be reporting against these in their monthly operating statements.

v) It is important to comment on the structure of the plan if it is particularly good or bad. Likewise if there is insufficient information in the plan a comment should be made.

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vi) Comments should only be made when they are necessary. If the plan is in line with strategy and funds allocation and appears to be realistic then that is all that needs to be said.

Planners should automatically be provided with ERD's Economic Assumptions and the Funds Allocation for 1980, 1981 and 1982. Also as it is not feasible to operate in teams, it should be made explicit that the individual skills of the department should be used when required.

T.J. Kelsall.

APPENDIX F3

Monthly Operating Report Example

TOTAL TURNOVER	Month Inc./(Dec.) on Plan Year to Date Inc./(Dec.) on Plan Inc./(Dec.) on Last Year
CURRENT COST Trading Profit	Month Inc./(Dec.) on Plan Year to Date Inc./(Dec.) on Plan Inc./(Dec.) on Last Year
A.N.F.E.	Actual Plan Last Year
TRADING PROFIT RETURN (Annual Rate)	Year to Date Plan Year to Date Last Year to Date
TRADING PROFIT/ TURNOVER RATIO	Year to Date Plan to Date Last Year to Date
TURNOVER/A.N.W.C. RATIO	Year to Date Plan to Date Last Year to Date
HISTORIC Trading Profit	Month Inc./(Dec.) on Plan Year to Date Inc./(Dec.) on Plan Inc./(Dec.) on Last Year
P.B.T. (where different from Trading Profit	Month Inc./(Dec.) on Plan Year to Date Inc./(Dec.) on Plan
WORKING CAPITAL Inventories	Actual Month End Flexed Plan Month End
Debtors	Actual Month End Flexed Plan Month End
Creditors	Actual Month End Flexed Plan Month End
Net Working Capital Capital	Actual Month End Flexed Plan Month End
INFLATION ADJUSTMENTS (Month)	Cost of Sales Adjustment % to Historic COS Depreciation Adjustment Monetary Working Capital Adjustment Total
INFLATION ADJUSTMENTS (Year to Date)	Cost of Sales Adjustment % to Historic COS Depreciation Adjustment Monetary Working Capital Adjustment Total