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Screening Multi-Attributed Strategy Alternatives:
An Empirical Evaluation in SBU Planning

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Screening Multi-Attributed Strategy Alternatives:
An Empirical Evaluation in SBU Planning

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SCREENING MULTI-ATTRIBUTED STRATEGY ALTERNATIVES

Abstract

The paper examines the evaluation of a strategic business decision involving several market strategy alternatives with multiple objectives. An example involving a company in the shoe industry is presented in which the process of generating alternatives, identifying evaluation criteria and selecting the most appropriate alternatives are described. This is followed by a discussion about the elicitation of multi-attributed preference structures and the advantages and disadvantages of such screening approaches. The actual decision process is catalogued and the use and effectiveness of the multi-attributed model in the implementation phase is assessed.

SCREENING MULTI-ATTRIBUTED STRATEGY ALTERNATIVES

Introduction

The paper examines the role of certain screening procedures in facilitating the resolution of a strategic marketing decision with multiple criteria, which involved a choice amongst policy options. It is argued that a sensible screening procedure should be intuitively simple and appealing to the decision-making group, as well as capable of being performed effectively and quickly. The aim of this screening process is to provide insight about the available options, and at the same time encourage further discussion about the more worthwhile options.

A case history drawn from the shoe retailing industry is presented as an empirical test of such screening concepts. The company, Bally U.K., Ltd., is well-established and its major interest lies in the shoe industry. In addition, it has related investments in fashion accessories such as handbags. It also has an established reputation as a high quality, premium price manufacturer and retailer of shoes.

The British company, a wholly owned subsidiary of the Swiss parent, operated both as a wholesaler and retailer in the shoe business. Their strategic concerns focussed around the problem of how to arrest the long-term decline in their imported men's shoe business owing, in part, to exchange rate problems. The concern was made even more relevant given the parent company's desire to expand its range of retail shoe stores in the United Kingdom.

The aim of the study was to examine the application of multi-attributed utility and related decision analysis approaches to the

analysis of a strategic business problem in a real environment. Previous papers (see Lock and Thomas (1979), Kunreuther and Shoemaker (1980), Behn and Vaupel (1981)) have argued that such approaches have had little impact on strategic business problems and have, therefore, yet to live up to their theoretical promise.

The problem faced by Bally U. K. can be categorized as ill-structured, unprogrammed and of strategic concern to the organization. In Hofer and Schendel's (1978: p. 27) hierarchies of strategy, this problem involves strategy at the business (SBU) level since it focuses upon how to compete in a given industry and/or product market segment.

Two screening models were used in the analysis. The first model, which is not examined in detail here, uses a form of risk simulation [Hertz and Thomas (1982)] to evaluate alternative options in the form of probability distributions of net present value, as well as a number of other criteria, such as net cash flow. The second approach involves the use of two forms of multi-attributed models to aid in the determination of the preferred strategy alternative. The model forms used were conjoint-analysis (a ranking model) and the Churchman-Ackoff (1954) model (a rating model).

In the following sections there will be an examination of the problem structuring process and the analytic results generated, as well as some discussion about the implementation of the results in practice. Some conclusions about the usefulness of multi-attributed screening models will be drawn.

The Problem Structuring Process

The environment of declining sales and rising prices affected not only the retail part of Bally's men's shoe business, but also the wholesale area. Below a given volume the percentage of markdowns increases sharply and this, coupled with a reluctance to deal in small volume lines, makes the product much less attractive to the independent retailer. Furthermore, retailers tend to define themselves as trading in a given price band, and as Swiss shoe prices rose faster than locally manufactured shoes, they fitted into the ranges of fewer and fewer independent retail outlets. In fact if London, with its overseas visitor trade, were excluded, the decline would appear even more serious.

In an effort to keep retail prices competitive, the temptation existed to cut margins in Bally's own outlets. However, such action was likely to have a severe effect on the wholesale trade and hence on the company's ability to sustain the Bally brand of high fashion and quality in the market place as a whole. Furthermore, the action was likely to undermine the exclusive nature of the Bally outlets and diminish their special appeal in contrast to other retail chains. For all these reasons, it was seen as important to sustain a position in the men's shoe market.

The company also needed the men's shoe business to sustain the expansion of its retailing operations. A new store requires a lower share of the market to achieve viability if it obtains that share in both the men's and ladies' market rather than in the ladies' market

alone. Moreover, the men's market has higher net margins in value terms than the ladies' business and is also much less price sensitive.

Some action had already been taken. The company had already decided to import a limited number of men's shoes from Italy and brand them with the Bally imprint. Although this had been done previously for a number of ladies' product lines, it was considered to be an exceptional circumstance because of possible deleterious effects on the Bally brand image and possible cannibalization of the sales of Swiss shoes.

In the process of evaluating the current situation, the decision-making group in the company identified a number of possible strategies. It should be noted that any strategies selected would be subject to ultimate approval by the Swiss parent. Through a probing and debate process the decision-making group considered a set of policy options which included:

- (1) Do nothing, i.e., continue with the sales of Swiss men's shoes and limited imports from Italy.
- (2) Expand the sales of bought-in Italian shoes.
- (3) Persuade the Swiss parent company to reduce the transfer price.
- (4) Import shoe parts from Switzerland for assembly in England, thus increasing the U.K. value-added component.
- (5) Manufacture men's shoes in their only existing U.K. factory, which would involve a plant expansion and tooling-up investment.
- (6) Develop a new men's shoe manufacturing site at another site in England.
- (7) Subcontract to an existing local manufacturer. This might involve a loss of business skills, technology and expertise and lessen the organization's competitive edge.
- (8) Purchase a small shoe manufacturer.

These strategy alternatives were not necessarily mutually exclusive and were referred to as policy components. They were additionally complicated by the influence of such important decision variables as price and manufacturing capacity, and by the Chief Executive's specification of a cut-off hurdle rate for acceptance of any policy option. A similar process (see Aschenbrenner (1977)) involving lengthy discussion and debate was followed in identifying the set of criteria by which the options should be judged. The following list emerged from discussions with decision-makers:

- (1) Contribution and its distribution through time.
- (2) Investment requirements (including working capital).
- (3) Market share (in terms of pairage).
- (4) Speed of erosion (i.e., rate of loss) of pairage and rate of recovery.
- (5) Bally image: the brand and its survival.
- (6) Feasibility of manufacture of Bally shoes.
- (7) Impact on retail business (e.g., expansion).
- (8) Impact on Swiss parent.
- (9) Impact on wholesale business.
- (10) Ability to present a range of men's shoes.
- (11) Bally U.K., Ltd. corporate objectives.
- (12) Demands made on management resources and skills.

Some of these criteria involved a certain amount of overlap. In order to clarify the nature of these potential overlaps it was necessary to identify measures for each decision criterion.

The first two, contribution and investment requirements were combined into net cash flow measures through time (over a five-year planning horizon). They were divided, however, into wholesale and retail cash flows, which to an extent also incorporated criteria 7 and 9. The market share criterion was measured in terms of the distribution of the total sales volume per annum (again over a five-year planning horizon). As will be seen in the analytic discussion, these three criteria (or attributes) were used as dominant criteria in the conjoint-analysis multi-attributed models.

The next stage was to structure the options further, screen them and obtain an insight into preferred policy options. Thus, analytic models were used to aid problem formulation and solution.

ANALYTIC METHODS AND MODELS

Each of the policy components involved many variables which are probabilistic in nature e.g., demand and manufacturing costs. A risk and decision analysis model (see Hertz and Thomas (1982)) involving simulation was, therefore, developed for each policy option. It produced such output variables as net present value, net cash flow and sales volume for each option for each year of the five-year planning horizon.

The Churchman-Ackoff Rating Method

At the same time as this simulation model was being developed, the Group Chief Executive rated the various policy options by using one of the more common multi-attributed screening models, namely, the Churchman-Ackoff approach. This is a matrix approach in which the matrix consists of a set of subjectively assessed scores for each

option (defining the rows) against each relevant dimension (defining the columns). On assigning relative weights to each dimension, the weighted score can then be computed for each option. In formal terms, if s_{ij} denotes the score of option i on the j^{th} attribute, and w_j the relative weight given to attribute j , then the score S_j , where

$$S_j = \sum_j s_{ij} w_j$$

is used to rank the options. This procedure has been widely used, particularly in evaluating research and development projects, e.g., Williams (1969).

The main value of the Churchman-Ackoff procedure is in its intuitive appeal as a simple formalization, and this probably accounts for much of its popularity. It also provides an overview of the problem and its issues, and a sensitization to the nature of the trade-offs which may exist between the problem attributes. As a decision model, however, it does assume that the attributes are considered independent and that preferences are adequately represented by the implicitly linear scoring measure. Edwards (1976) provides some empirical support for the linear additive model. He argues that even if this linear scoring measure is not a totally adequate representation of preferences, it can still provide a sensible basis for handling the multiple attribute problem (perhaps at the level of a first-order ranking). This is because of the added measurement problems in relaxing the rather strong assumptions of a linear, additive form of scoring rule (see Keeney and Raiffa (1976)) and moving to a more complex multi-attributed model.

The experimental process adopted for the Chief Executive's assessment of the Churchman-Ackoff model was as follows. He was first asked to give the 12 decision criteria (attributes) already listed a rating from zero to ten, where zero would represent no importance whatsoever, and ten would denote a vitally important attribute.

The Chief Executive was then asked to rate seven alternatives (policy options) (the eighth, manufacture at a new site in England, was eliminated) on a scale between zero and ten, where ten would imply that the criterion requirements were wholly met, five that they were adequately satisfied and zero that they would not be satisfied at all. The scores for each alternative were multiplied by the importance rankings for each alternative and then summed for each option. The resultant scores are shown in Table I.

Insert Table I Here

The favored options were: purchase of another company, reduction of the Swiss transfer price, and assembly of Swiss parts in the existing U.K. plant. Purchase of another company was seen to be the most strongly favored alternative.

It should be noted, however, that this analysis was performed before the Chief Executive was aware of the results of the simulation model. Once these results were obtained, there was further discussion amongst the decision-makers. This provided some additional insights about the characteristics of the policy alternatives and the most important decision attributes. The next stage was, therefore, to give closer consideration to the preference structure for the multi-attributed set of outcomes.

Conjoint Analysis Preference Model

It was originally intended to use a conjoint measurement approach for the whole set of attributes. Unfortunately, as difficulties were encountered in persuading the decision-makers to perform the required ranking exercises, it only proved possible to use the conjoint analysis approach for the configurations of the three criteria: retail and wholesale/manufacturing cash flows, and sales volume over the first five years. Rankings for these criteria were obtained from another of the main decision-makers, who also completed a rating exercise for the remaining more qualitative attributes (for details see the qualitative rating output in Table 3).

For the conjoint analysis experiment, three different levels on each attribute were defined in order to generate the hypothetical alternatives. A full design of three levels on three attributes yields 27 alternatives. A reduced Latin square design with 4 levels on each attribute had previously been considered but had been found less satisfactory. The highest and lowest values on each attribute were taken from the ranges of the simulation results. The middle level was chosen as approximately bisecting the interval between highest and lowest. The combinations were examined to check that ranking them required genuine trade-offs to be made.

Insert Table 2 Here

The attribute levels for the composite model linking the major quantified attributes are shown by way of illustration in Table 2.

Where it was possible to identify best and worst alternatives for a subset, these were numbered 1 and 27 respectively. It had been

found that this provided useful anchoring for the ordering task. The rest of the alternatives were allocated unique numbers between 2 and 26 on a randomized basis. The alternatives were printed on cards, shuffled and presented to the subject with a set of instructions.

Conjoint analysis algorithms decompose overall orderings of multi-attributed stimuli or alternatives into estimates of the relative partial utilities of the attribute levels. The package that was used is capable of testing a range of functional structures, including the most commonly used analysis of variance model, which is the basis of Kruskal's MONANOVA package (Kruskal and Carmone (1969)). Whilst it was anticipated on the basis of a large number of other empirical studies (Dawes and Corrigan (1974)) that the linear additive model would prove more than adequate, a number of alternative models were tested.

Kruskal (1965) defined a measure for the goodness of fit for non-metric models called stress. A stress value in the region of 0.05 to 0.08 was defined as a stopping value for the search for an appropriate model, combined with the principle of parsimony in preferring models with fewer independent terms.

On this basis, linear models were immediately found to give excellent fits for the sales volume and composite rankings. For the wholesale outcome rankings, the fit of the linear model was only moderate (about 0.2), but this was only marginally improved by 0.03 or so by the addition of up to 4 additional terms. The pattern of weights for the linear model was also consistently supported by the other analyses.

The retail cash flow rankings yielded unsatisfactory fits with counter-intuitive signs, whichever metric model was fitted. Further examination showed, however, that one could reproduce the rankings almost perfectly with a simple set of ordering rules. The first was to choose, irrespective of actual magnitudes, options where the cash flows increased from year to year. Then the alternatives were ranked within these sets on the basis of the final year's outcome, then the next to last and so on. For the purposes of the analysis a linear model with modified weights was used for the retail cash flows.

Insert Table 3 Here

Table 3 shows the broad results of the derived composite model for this analysis as Model 1. Three other models were also tested and their results are shown as Models 2, 3 and 4 respectively. Model 2 was equivalent to an equal weighting model for the time periods, using the composite weights as the rates of trade-off between the overall streams. Model 3 was to use a risk free discount rate (14%) to combine the time periods, again using the composite weights to create the overall model. The final model, Model 4, was a pure equal weighting one across all the attributes.

All four approaches yielded the same ordering for the first three policy options. Rank order correlations over all the options for the derived model against the others were 0.927, 0.824 and 0.983, respectively. The good performance of the pure equal weight model should not be too surprising (Einhorn and Hogarth (1975)). A monotonic relation holds largely between sales and contribution across the options (Newman (1977)). In addition, there are not large scale differences

between the attributes. However, equal weighting takes one sufficiently far from the concept of cardinal utility for one to be suspicious of attributing meaning to the differences between scores. This makes sensitivity analysis difficult.

The optimal policy option was to assemble Swiss parts in England. This was compatible with continuing to market shoes imported from Italy, but did involve cannibalizing existing Swiss sales.

Comparison of Conjoint Analysis Results With Churchman-Ackoff Ratings

As has already been pointed out, the conjoint analysis rankings (and associated qualitative ratings) were assessed by one of the two chief executives. The other chief executive used the Churchman-Ackoff approach as a preliminary screening model and did not take part in the conjoint analysis approach. Whilst the conjoint analysis (and qualitative ratings) favor manufacturing options, the Churchman-Ackoff ratings point to the purchase of another company as a dominant option.

One immediate explanation for the difference is the basic interest bases of the two chief executives. The two perspectives can be thought of as a plan and a counterplan, based upon a similar problem structure and problem assumptions.

Rating methods, such as Churchman-Ackoff, would seem to be most effective in assessing the importance of attributes rather than the actual attribute scores in the context of complex strategic decisions. Apart from response biases and halo effects associated with the use of rating approaches, it would seem to be a gross underutilization of the potential information available particularly given the potential value of a decision analysis approach in this type of situation. Certainly, the

simulation models of the decision options sensitized decision-makers to the parameters and uncertainties involved in the decision problem. It gave them much greater insight than they would have had by merely performing a rating evaluation of the options.

The general level of agreement in the conjoint preference models does not justify the use of equal weighting models in strategic decisions with multiple criteria. It would appear that in the majority of business situations, problems being discussed usually involve a distinct hierarchy of relative weights, and that indiscriminate application of equal weight models might well lead to markedly non-optimal decisions where the attribute values were more disparate. Newman (1977) shows that differential weighting may make a difference when some of the attributes are negatively correlated.

The Actual Decision Process

By the end of the decision process the decision makers were less enthusiastic about any options that involved further manufacturing. They wished to retain a degree of flexibility that would not have been possible had they committed capital to the policy suggested by the conjoint analysis. Discussions were opened with a U.K. company about initially selling that company's products, and possibly later training and licensing the company to produce shoes to be sold under the Bally brand name. The importation of shoes from Switzerland and elsewhere continued unchanged.

In addition, the stabilization of the value of the pound and its appreciation relative to the lira meant that the forecasted drop in Swiss sales would be more gradual, and that British shoes would not be

competitive in price and quality terms with Italian products, except in some strictly traditional lines. The link with the British company was seen to be useful in terms of range of styles, but the risks in transferring highly marketable manufacturing skills were not deemed worthwhile in the light of the revised sales estimates.

The conduct of this decision process can be characterized as one of dialogue and debate in which analysis is used to reformulate and better understand the problem.

It could be argued that the initially envisaged screening process (Churchman-Ackoff) is a simple, naive form of a Leibnitzian inquiry system (Churchman (1971)). In other words, a single "optimal" problem formulation is developed and data is collected to support this single "view of the world."

The conjoint-analysis/risk simulation model indicates a significant change in the character of the inquiry system and in the role of analysis in problem formulation. The problem formulation system becomes more complex and multi-dimensional, and is much closer to Churchman's (1971) Kantian and Hegelian forms of inquiry system. This is because several views about the problem are held, and because it is anticipated that synthesis and consensus about problem formulation should be achieved through a process of group debate and dialogue.

The discrepancy between the policy selected by the analysis and the actual decision taken illustrates the need to take into account the degree of commitment involved in a particular policy. One method might be to include an attribute to represent "flexibility." In retrospect, one could also have shown how significant revisions of the exchange rate distributions would affect the choice of option. One

should also recognize the possible unwillingness of strategic decision makers to be bound by the prescriptions of a formal model. The fact that decision makers may not adopt the policy proposed by a particular analysis does not, however, necessarily mean that the exercise was a failure. It seems reasonable to suppose that the participants gain considerably greater understanding of the problems facing them, and feel more confident in their actual choice of policy. In other words, by presenting alternative viewpoints and solutions, the analysis stimulates the process of policy dialogue and dialectical debate necessary for policy choice.

Conclusions

Perhaps the most successful screening models in the policy dialogue process were risk simulation and rating approaches. The former is useful because it provides decision makers with an understanding of the impacts of uncertainty and problem assumptions upon the set of strategic alternatives. The latter is useful because it is intuitively appealing, and can be applied simply and quickly. Thus, it provides decision-makers with a preliminary problem familiarization device, particularly in the area of attribute specification and identification.

As a feasibility study of multi-attributed and decision analysis models, this study can be characterized as partially successful. Certainly it appears that linear additive models are more than adequate as robust discriminators between strategies. The importance of this result is that practitioners can envisage multi-attributed decision models without becoming involved in a miasma of complexity of utility assessment.

The way in which strategic decisions have been conventionally approached could be considerably reinforced initially by the use of simple scoring methods (such as Edwards (1975), Churchman-Ackoff, Humphreys and Wisudha (1979), Sarin (1977) and Selvidge (1976)) to provide more rapid feedback about decision options. In this manner, multi-attributed (MAUT) models can help decision-makers explore the desirability both of the set of alternative strategies and of the criteria by which they are judged.

Whilst conjoint analysis, and other MAUT approaches, are certainly useful methods for deriving preference functions and identifying differences between decision-makers, the apparent complexity of such models can prove to be somewhat of a deterrent to application. It is suggested that simple scoring methods should be used to refine the decision-maker's view of the problem, and also to help screen the number of problem options, variables and assumptions into a feasible, reasonably simple structure before more complex strategic risk simulation and conjoint models are applied. Finally, it should be noted that the conjoint model was successfully applied to a structure that reduced the larger attribute set to one consisting of two cash flow attributes and one sales attribute.

REFERENCES

- Aschenbrenner, K. M. (1977)
"Influence of Attribute Formulation on the Evaluation of Apartments by Multi-Attribute Utility Procedures" in Jungermann, H. and G. DeZeeuw, Decision-Making and Change in Human Affairs; D. Reidal Publishing, Dodrecht, Holland, pp. 81-97.
- Behn, R. D. and J. W. Vaupel (1976)
"Why Decision Analysis is Rarely Used and How it Can Be," Working Paper, Center for Policy Analysis, Institute of Policy Analysis and Public Affairs, Duke University, 1976.
- Churchman, C. W. (1971)
The Design of Inquiring Systems, Basic Books, New York, 1971.
- Churchman, C. W. and R. L. Ackoff (1954)
"An Approximate Measure of Value," Operations Research, Vol. 2., pp. 172-181.
- Dawes, R. M. and B. Corrigan (1976)
"Linear Models in Decision-Making," Psychological Bulletin, Vol. 81, No. 2, pp. 95-106.
- Edwards, W. (1976)
"How To Use Multi-Attributed Utility Analysis for Social Decision-Making," Technical Report 00159-7-I-T, Social Science Research Institute, University of Southern California, August 1976.
- Einhorn, H. J. and R. M. Hogarth (1975)
"Unit Weighting Schemes for Decision-Making," Organizational Behavior and Human Performance, Vol. 13, No. 2, pp. 171-192.
- Hertz, D. B. and H. Thomas (1982)
Risk Analysis and Its Applications, Chichester: John Wiley and Sons, 1982 (in press).
- Hofer, C. W. and D. Schendel (1978)
Strategy Formulation: Analytical Concepts, St. Paul: West Publishing Co., 1978.
- Humphreys, P. C. and A. Wishudha (1979)
"Multi-Attribute Utility Decomposition," (MAUD), 1979, Technical Report 79-2/2, Decision Analysis Unit, Brunel University, U.K.
- Keeney, R. L. and H. Raiffa (1976)
Decisions with Multiple Objectives, New York: John Wiley and Sons, Ltd., 1976.

Kruskal, J. B. (1965)

"Analysis of Factorial Experiments by Estimating Monotone Transformations of the Data," Journal Roy. Stat. Soc., 27, B, pp. 251-283.

Kruskal, J. B. and F. J. Carmone (1969)

"MONANOVA: A Fortran IV Program for Monotone Analysis of Variance," Behavioral Science, 14, pp. 165-166.

Kunreuther, H. C. and P. J. H. Schoemaker (1980)

"Decision Analysis for Complex Systems: Integrating Descriptive and Prescriptive Components," Working Paper, Department of Decision Sciences, University of Pennsylvania, 1980.

Lock, A. R. and H. Thomas (1979)

"An Appraisal of Multi-Attribute Utility Models in Marketing," Europ. Journ. of Marketing, Vol. 13, No. 5, pp. 294-308.

Newman, J. G. (1977)

"Differential weighting in Multi-Attribute Utility Measurements: When It Should Not and When It Does Make A Difference," Organizational Behavior and Human Performance, 20, pp. 312-325, 1977.

Sarin, R. K. (1977)

"Screening of Multi-Attribute Alternatives," Omega, Vol. 5, No. 4, 1977, pp. 481-489.

Selvidge, J. (1976)

"Rapid Screening of Decision Options," 1976, Technical Report 76-12, Decisions and Designs, Inc., McLean, VA.

Williams, D. J. (1969)

"A Study of a Decision Model for R&D Project Selection," Optimal Research Quarterly, September 1969, Vol. 20, No. 3, pp. 361-373.

TABLE I

CHURCHMAN-ACKOFF POLICY SCORES

| Policy Option (Alternative) | <u>Score</u> | <u>Rank</u> |
|--------------------------------------|--------------|-------------|
| 1) Continue as Before | 372 | 7 |
| 2) Expand Branded Imports | 462 | 6 |
| 3) Reduction of Swiss Transfer Price | 523 | 2 |
| 4) Assemble in Existing Plant | 520 | 3 |
| 5) Manufacture in Existing Plant | 518 | 4 |
| 6) Link with Another Company | 475 | 5 |
| 7) Purchase Another Company | 586 | 1 |

TABLE 2
ATTRIBUTE LEVELS FOR THE COMPOSITE SUBSET

| | Level 1 | Level 2 | Level 3 |
|---------------------------------|-----------|-----------|----------|
| Wholesale/manufacturing, year 1 | -£500,000 | -£200,000 | £50,000 |
| Retail cash flows, year 1 | £270,000 | £400,000 | £530,000 |
| Sales volume, year 1 | £85,000 | £135,000 | £180,000 |

Note: Units are in pounds sterling (£)

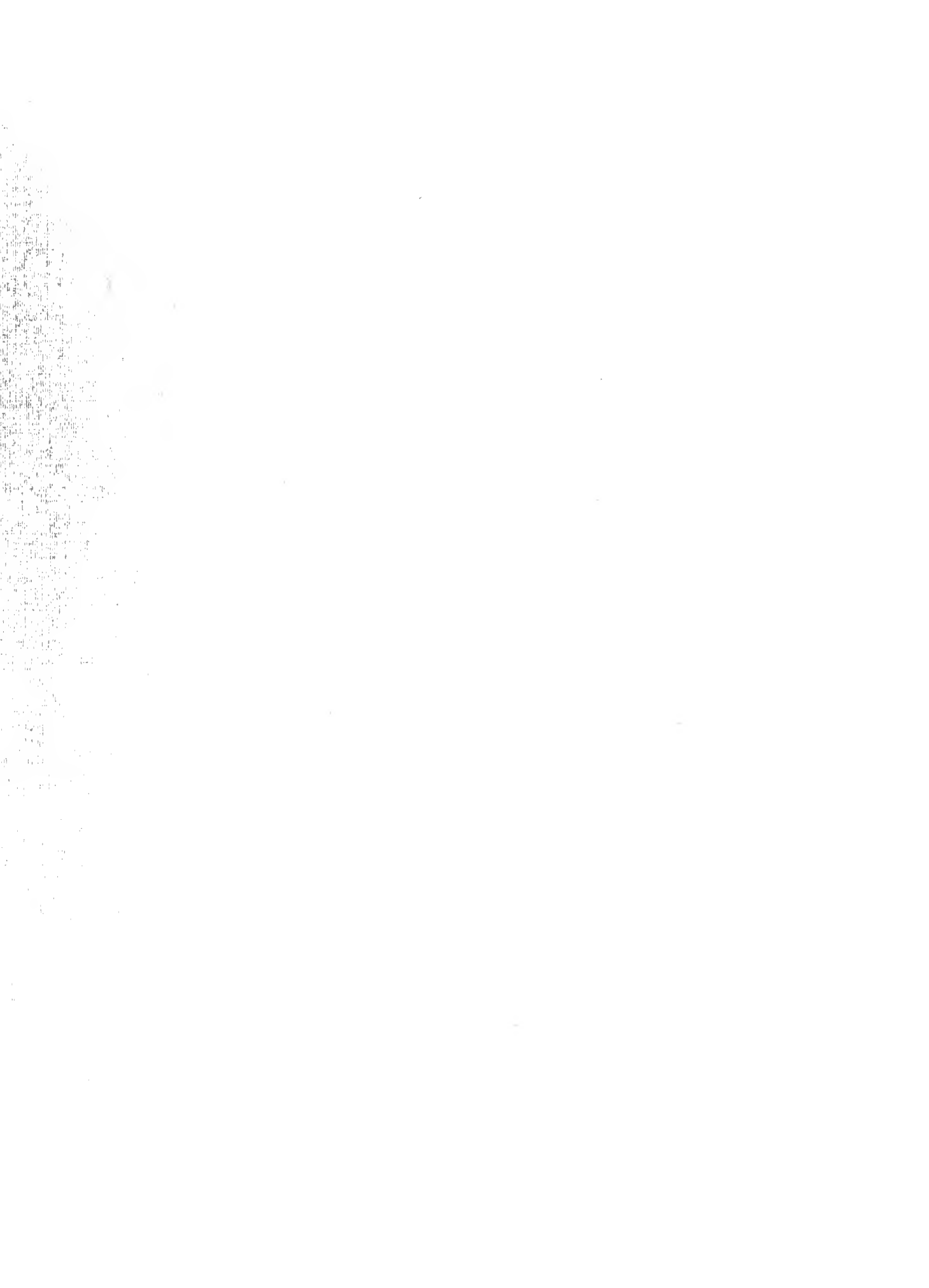
TABLE 3

BROAD DESCRIPTION OF MODEL OUTPUT⁽¹⁾

| Policy Option (Alternative) | Qualitative Ratings (2nd Decision Maker) | Alternative Models ⁽³⁾ | | | |
|--------------------------------------|------------------------------------------------------|--------------------------------------|----------|----------|----------|
| | | <u>1</u> | <u>2</u> | <u>3</u> | <u>4</u> |
| | | 1) Continue as Before | 5 | 7 | 7 |
| 2) Manuf Elsewhere in UK | 2 | 4 | 5 | 6 | 5 |
| 3) Reduction of Swiss Transfer Price | 7 | 6 | 6 | 5 | 6 |
| 4) Assemble in Existing Plant | 4 | 1 | 1 | 1 | 1 |
| 5) Manufacture in Existing Plant | 1 | 5 | 4 | 4 | 4 |
| 6) Link with Another Company | 6 | 2 | 2 | 2 | 2 |
| 7) Purchase Another Company | 3 | - | - | - | - |
| 8) Expand Branded Imports | - | 3 | 3 | 3 | 3 |

Notes

- (1) a) Synthesis has collapsed several cases for each option (e.g., mixes of price and manufacturing capacity) (Rank correlations were calculated using all case information).
 b) The data shows the ranks given to options (with 1 being the most preferred).
- (2) Note: Only the first seven options were rated.
- (3) Note: All options other than purchase of another company were considered.
 Model 1 is derived model.
 Model 2 uses composite weights trade offs between overall streams.
 Model 3 uses derived wts. to discounted output.
 Model 4 uses equal weights.



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