

*This case study<sup>1</sup> demonstrates the use of HIVIEW and EQUITY, two decision analysis programs developed at the London School of Economics. The problem was addressed within a decision conferencing environment. For further information on the programs, decision conferencing and other services, see [www.catalyze.co.uk](http://www.catalyze.co.uk), or contact Bob Kitchen at Catalyze Limited on +44 (0)1962 715 286.*

## HIVIEW and EQUITY: The Shampoo Case Study

The managing director of an operating company, which manufactures and sells a leading women's shampoo, has been told by the head office that advertising expenditure on the product in his country is much larger than in any other country where the shampoo is sold. The MD believes that special circumstances in his country justify the large expenditure, which is mostly for television advertising, but he does not have time to try reducing the advertising in a part of the country to see what affect it would have on sales. He decides to call a decision conference attended by his marketing manager, distribution manager, production manager, several supporting staff, and representatives from their two advertising agencies.

### Evaluating options with HIVIEW

During the opening discussion that established the issues, the facilitator asked the group what they would do with the extra resource if they did reduce television advertising. This proved to be a key question, for the group had been locked into thinking only about the size of the advertising expenditure, and were intending to use the decision conference as a vehicle for rationalising the current expenditure. The question stimulated a discussion of alternative strategies. Eventually, these six options were agreed as possibilities:

1. STATUS QUO: Continue to spend the current amount on advertising.
2. CONSUMERS: Increase the number of consumers by changing the product to a family shampoo so that men and children will be encouraged to use it.
3. PROMOTION: Increase promotion of the shampoo with wide distribution of free samples.
4. PRODUCTS: Develop new hair products to complement the shampoo.
5. HI QUALITY: Develop a special high quality, prestigious product.
6. DISTRIBUTION: Improve the current distribution network for the existing shampoo.

Discussion of the pros and cons of these options was used by the facilitator to construct the value tree shown in Figure 1. The bottom-level attributes capture the main differences among the options, while the higher-level nodes express the main objectives of the company: to grow profitably while maintaining a position of leadership in the shampoo market. In addition, the group was concerned to retain as much flexibility as possible so they could respond to incursions by the competition, and because one ingredient of the current shampoo was imported, they wished to minimise the effects of exchange rate fluctuations.

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<sup>1</sup> Extracted from Phillips, L.D. (1988) People-centred Group Decision Support, In Doukidis, G., Land, F. & Miller, G. (Eds.), *Knowledge Based Management Support Systems*, Ellis Horwood.

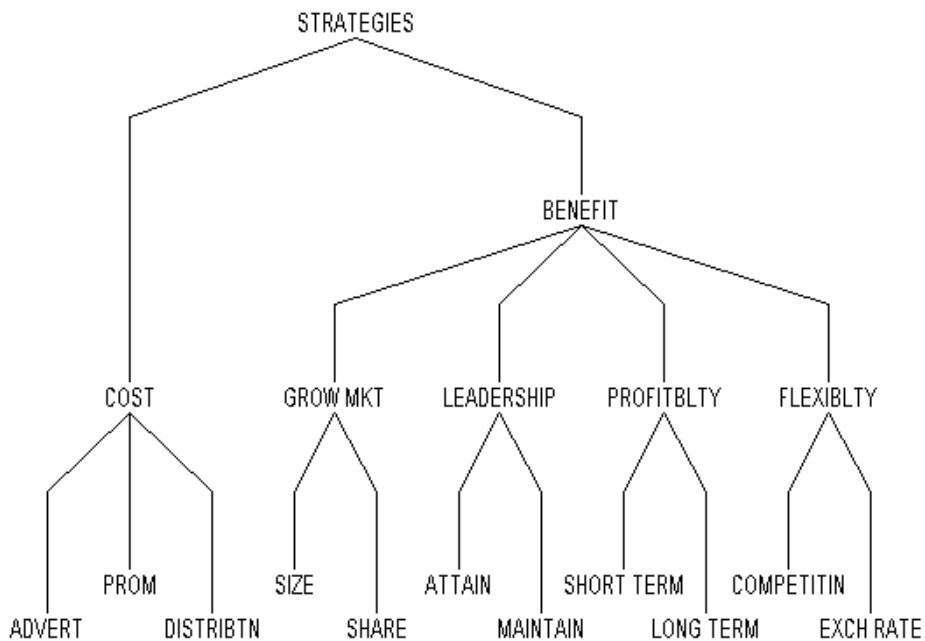


Figure 1: Value tree for the shampoo problem.

Once the value-tree was agreed, participants turned next to scoring the options on each attribute. Preference scales were used, with 100 at the top representing the most preferred option, and 0 at the bottom indicating the least preferred one. For example, improving distribution was judged by the group to be best for short term profitability because the investment would be paid back quickest, while adding more products was judged least preferable because they would take a long time to become established. (See Figure 2.)

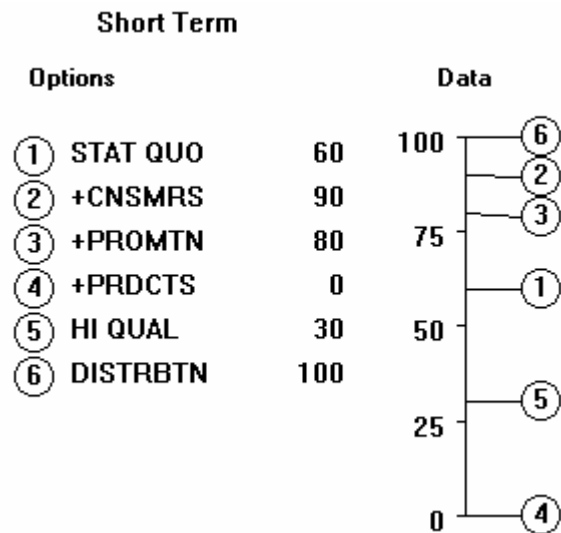


Figure 2: A preference scale for Short-term Profit.

All other options were scaled between these end points such that the differences in the numbers reflected the importance of the differences in short term profit expected from the options. For example, the status quo was scaled at 60 because the 60-point difference from option 4, more products, was judged to be one-and-one-half times as important as the 40-point difference from option 6, increase distribution. Similarly, the importance of the difference in short term profit between options 1 and 5 and between options 5 and 4 was judged to be the same. Various differences were compared to serve as consistency checks, and to ensure an equal-interval scale. Revisions were frequently made by the group to yield scales that reasonably accurately represented the

group's views. When agreement could not be reached on a particular score, it was marked with a red asterisk and later changed in the sensitivity analysis phase.

After the options were scaled on all the attributes, assessments were made of the relative importance of the attributes. These weights represent the importance of the differences between the top and bottom of the scales. For example, Figure 3 shows that the difference in short term profitability between improving distribution and more products is 80% as important as the dif-

ference in long term profitability between improving distribution and high quality product. It is the ratio of the weights that is interpretable, not their absolute values. Another way to think of the weights is that they express the tradeoffs between the scales: moving from 0 to 100 on the short-term scale is equivalent to moving from 0 to 80 on the long term scale. This fact is used in helping a group to assess the weights; a simple paired-comparison technique makes the assessment understandable, if not easy.

BRANCH	+CNSMRS +PRDCTS DISTRBTN							CumWt
	Wt	STAT	QUO	+PROMTN	HI	QUAL		
* SHORT TERM	80	60	90	80	0	30	100	6.3
* LONG TERM	100	60	60	60	60	0	100	7.8
TOTAL		60	73	69	33	13	100	14.1

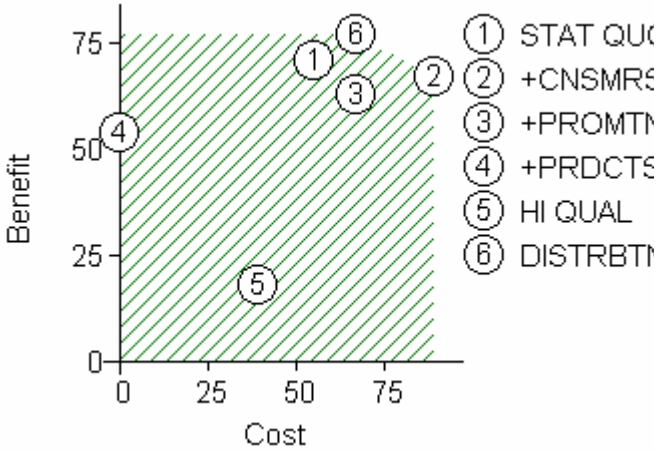
Figure 3: Scores and weights for the two Profitability criteria.

Next, the weights are normalised by dividing each by their sum to give two numbers that add to 1.0, and a weighted average of the scales is computed. This is shown in Figure 3 as the TOTAL row. (The last column, CUMWT, is the product of the normalised weights at each branch from the top of the tree down to the branch shown.) This weighted averaging process is repeated at each node in the tree. Thus, the weighted average of all 8 benefit attributes provides a single benefit scale, and similarly a single cost scale is computed as the weighted average of the 3 cost scales.

Each option, then, is characterised by a pair of numbers, a weighted-average cost and a weighted-average benefit. Rather than assigning weights to these objectives to give a single scale, it is instructive to look at all options in a benefit versus cost space (Figure 4).

Options 4 and 5 are clearly less good than the others; 5 is low in benefits and 4 is costly (since preference scales are shown, a high number on the cost scale means less costly). The figure also shows that more distribution is both cheaper and more beneficial than the status quo, so should be preferred. Options 2 and 3 are both less costly than the status quo, but also slightly less beneficial. Options 2 and 6 are on the outside boundary, indicating that only they would ever be chosen by the model, depending on the trade-offs between costs and benefits.

Several changes were then made to the model by the group. For example, debate about the appropriate weight on costs led to the sensitivity analysis shown in Figure 5. The total weight on costs is varied over its full range from 0 to 100, and the score of each option at the given weight is calculated and displayed by the computer. At the current weight of 50% on costs (and,so 50% on benefits), option 2 is most preferred, overall, but if the weight on costs falls below 30%, then option 6 is preferred. Several participants felt that costs were relatively unimportant and that option 6 was very attractive. However, other changes to the model suggested that options 1, 3 and 6 were all tenable.



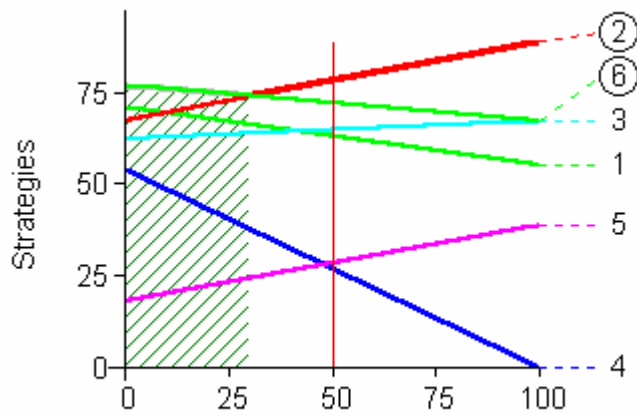


Figure 5: Sensitivity analysis on Costs.

After considerable exploration of the model, the group shifted their view of the problem. They began to recognise that the distribution of available resource between advertising, promotion and distribution was the real problem. The modelling had transformed their thinking, shifting them from defending the advertising expenditure, to thinking about resource allocation among their key activities.

### Creating the best portfolio of options with EQUITY

The next morning was devoted to developing a new model that expressed the resource allocation issue. The distribution, promotion and advertising managers were each asked to explain their current strategies and to consider alternative strategies that would require significantly more, or less, resource. These strategies are shown in Figure 6. The current distribution strategy was to distribute the product to 60% of the country, but with more resource it would be done quicker and better. With even more resource, the distribution manager would urge nation-wide distribution. On the other hand, if he suffered a cut in the current level of resource, he would simply distribute to fewer areas. The promotion manager considered 3 strategies, the advertising manager, 5. Altogether  $4 \times 3 \times 5 = 60$  combinations of strategies are possible (though some combinations don't make sense!).

5			+ nationwide
4	Nationwide		Increase frequency
3	SQ. quick & faster	Heavy sampling	<b>SQ: 80% area</b>
2	<b>SQ: 60%</b>	<b>SQ: sample price off</b>	Cut back freq only
1	Fewer areas	None	Cut back area & freq
	<b>DISTRIBUTION PROMOTION</b>		

Figure 6: Strategies for the resource allocation model.

Next, the total cost of each strategy was determined. For the status quo, data were available, but for other strategies judgments about costs were discussed and agreed by the group. The group then evaluated the strategies using preference scales on the three key objectives, growth, leadership and profit.

Two sets of weights were assessed: one set, within criterion weights, expresses the trade-offs between the three areas, the other, the between criteria weights, the trade-offs among the three criteria. For example, the weights assigned to the growth scales for distribution, promotion and advertising were 100-30-100, respectively. These show that the differences in preference between the top and bottom of the growth scales in distribution and advertising are equally important, while moving from 0 to 100 on the growth scale in promotion is 30% as important. The across criterion weights were judged to be 100-10-10 for growth, leadership and profit, respectively. These show that the importance of the differences in the strategies is greatest for growth (because the market is still growing), that leadership (which is already established for this product) and profit (currently high) are 10% as important.

The computer takes a doubly weighted average of the three benefit scales in each area with the result that each strategy is characterised by two numbers, a cost and a single benefit. Thus, the total cost and total benefit of all 60 combinations (here called packages) can be calculated.

The computer displays the curve of the most beneficial option for each level of total cost (Figure 7); all others lie somewhere in the shaded area.

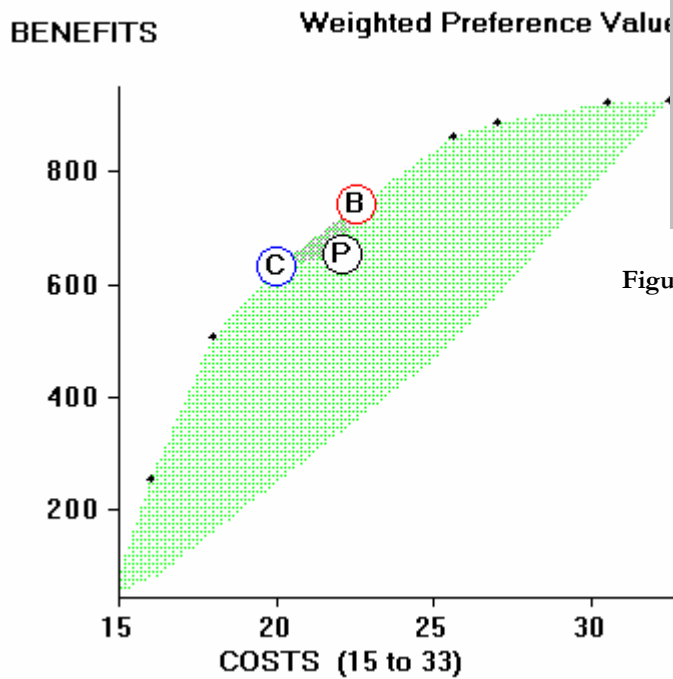


Figure 7: Evaluation of the Status Quo (P), a better (B) package and a cheaper (C) one.

One particular package, the status quo in each area, is shown: it is point P (proposed). Also shown is a better point, B, and a cheaper point, C. These three points show that the current strategy can be improved. The changes are shown in Figure 8: distribute quicker and better (level 3), drop promotions (level 1) and keep the current level of spend on advertising (level 3). In other words, advertising isn't the problem; it is the allocation of current resource as between distribution and promotion that can be improved.

The group agreed that the current promotion campaign was feeble; it should be dropped or done right. They then asked to see a new proposed package: level 3 in distribution and promotion, but cut back in advertising to satisfy head office. This is shown as point P in Figure 9. It costs a little more than the current plan, 23.0 instead of 22.1, but it is almost on the curve. Even there, a trade-off between advertising and promotion is identified by the model, but the group decided that this new package was very attractive, partly for reasons not included in the model.

5			
4			
3	C	B	P B
2	P	P	C
1		C B	
	DISTRIBUTION		ADVERTISING
		PROMOTION	

Figure 8: Changes from the Status Quo (P) to a better (B) package or a cheaper (C) one.

The managing director immediately authorised three actions: (1) the two advertising agencies were told to cut their budgets by 10% and were asked to put forward proposals to accomplish the reduction, (2) the promotion manager's budget was doubled and he was asked to submit a new promotion campaign within two weeks, and (3) the distribution manager was asked to put forward a new plan for quicker and better distribution. Within the month all strategies had been implemented.

## Conclusions

Thus, starting with one problem that had been imposed externally, the group ended by considering a different set of issues which were more fundamental. It was the group, not the computer or the model, that recognised the real issues. The computer and the model made a contribution, but they were only part of the whole which can be considered as a socio-technical system.

The case also demonstrates an error in decision making that is so universal it deserves a name. It might be called the single-option fallacy: attempting to analyse a single option. Most people do this by weighing up pros and cons; if the pros outweigh the cons, you go ahead, if the other way around, you don't. The fallacy is in failing to do the same thing for the alternative. Suppose, for example, that the cons outweigh the pros for an option you are considering. You

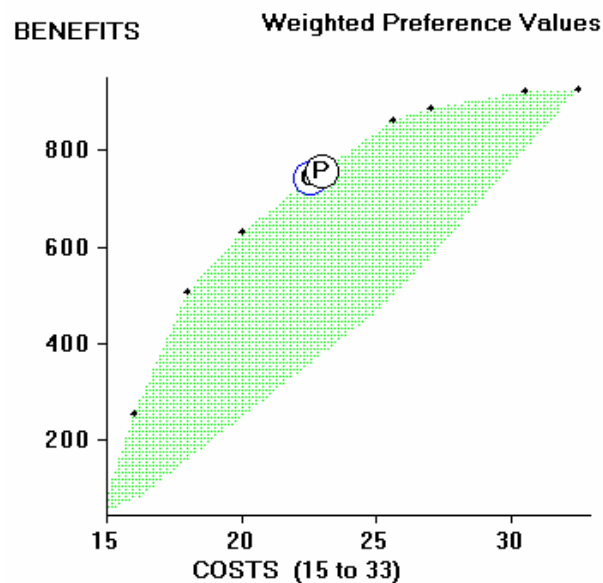


Figure 9: Evaluation of the new proposed package.

then reject the option. But perhaps the cons outweigh the pros even more for the alternative, which you implicitly accept by rejecting the option! You might be badly off by accepting the option, but you are even worse off by accepting the alternative.

As applied to the case, the group was prepared to consider the pros and cons of the advertising budget, believing that the pros outweighed the cons. But when participants' attention was shifted to alternative uses of the available resource, an insight about the real problem emerged, enabling the group to develop a deeper understanding of the issues and to agree a new plan of action that included a cut in advertising expenditure. In short, weighing up pros and cons of a single option is mere rationalisation; comparing pros and cons of alternative options is real analysis.