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Applications

EVALUATING ALTERNATIVE RETAIL REPOSITIONING STRATEGIES

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A methodology is provided for examining the impact on profitability of a significant change in the merchandise portfolio of a retailer. Such repositioning is essential to maintain competitiveness in a rapidly changing environment. At the same time, management is often reluctant to undertake such changes because they risk undermining the long-term core business. A model is provided which incorporates both short- and long-run estimates of the trade-off of new business generated against old business lost as a result of the change.
(Retail; Marketing; Positioning)

A central facet of modern retailing management is repositioning—adapting the business to a changing retail environment. A retailer's existing positioning base is continually being eroded by maturing markets and aggressive competitors seeking opportunities for profit and growth. Often the repositioning required is small and gradual—a natural evolution into new generation merchandise, broadening assortments or updated methods of presentation. Sometimes, however, the repositioning has to be more radical—a switch into new types of stores, a change into major new merchandise areas or a total re-presentation of the stores. Such changes are much riskier and harder to evaluate. They are riskier in that the abrupt change can lose existing customers without successfully creating a new customer base. They are harder to evaluate in that it may take many months or even years before the beneficial effects of the changes are fully realised in new customer loyalties and shopping patterns.

This paper presents an approach to modelling this important class of radical repositioning problems. The following sections first review the relevant literature and show its limitations for handling repositioning-type problems. Then a model is developed based upon a case study of a large, European multiple fashion store group. It shows how a diversification from women's 'traditional' fashion merchandise into sportswear was planned and evaluated. The experimentation and modelling forecast the short and longer term sales and profit generated from the new merchandise area and also examined its impact on the traditional business.

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Review of the Literature

The strategic decisions of today's retailers are becoming more central issues in marketing and consumer behaviour. One reason is that with increasing concentration in retailing, the larger chains obtain growing channel power. Whereas consumer theory has traditionally placed brand choice as the focus of analysis, there is evidence that consumers are turning to shopping strategies rather than brand decisions. Darden (1979) cites several factors suggesting the priority of store choice: (1) many studies indicate that decisions about where to shop often *precede* brand choices (e.g. Tauber 1972); (2) many consumers choose retailers' private labels in preference to manufacturers' advertised brands; (3) consumers often use the reputation of a store to reduce perceived risk (e.g. Hisrickt 1972); (4) shoppers frequently see a shopping trip as an opportunity for social interaction rather than purely an economic event (Darden 1983). Such factors suggest that shop rather than brand choice may often be the variable of primary interest in a model of consumer behaviour.

Research into how consumers choose shops is usually dated from Martineau's (1975) concept of store image. Reviews of the stream of studies in this area have been presented by Wyckham, Lazer and Crissy (1971), Lindquist (1975), May (1975), Ring (1977), Pessemier (1980), Paterson and Kerin (1983), and Downs and Haynes (1984). But despite the vast literature on store image and positioning the theoretical and practical implications are rather disappointing. As Rosenbloom (1983) concluded:

> Direct evidence of a link between a store's image and its capacity to attract and maintain patronage is difficult to obtain. The evidence that is available is usually fragmentory and indirect and does not provide a sufficient basis for proving in a rigorous way the relationship of store image to consumer patronage.

To overcome the limited ability of image models to predict patronage three possibilities have been proposed: more complex models, more sophisticated measuring instruments, or the reliance on more direct indicators of the results of strategic repositioning. More complex models, of the type advanced by Sheth (1983), are useful for providing a common framework and means of communications, but such approaches have not proved too fruitful in marketing. Methodological problems and lack of data have left such theories largely untested and unused. Peterson and Kerin (1983) suggest more complex statistical methods to isolate the effects of store image on sales. Again progress here is still exploratory, and there are fundamental reasons why store image will invariably account for only a small proportion of the variance in store patronage. Consequently, the most reliable means currently available of evaluating alternative repositioning strategies is via experimentation and direct sales measures. This last approach is the one employed here.

Issues in Repositioning

Positioning refers to the target market segment(s) served by the retailer and the differential advantage it is perceived to offer. Repositioning strategy is the conscious effort on the part of the retailer to change its segments and/or differential advantage. Strategically, the problem is to reposition to maintain a match between the changing retail environment and the firm's offer to the market. Three types of repositioning strategy can be identified: zero, gradual and radical repositioning. *Zero* repositioning occurs where the company maintains a continued focus on its initial target market segment and competitive advantage despite a changing retail environment. Inevitably, over time, the business becomes nonviable as the changing nature of customer expectations and competitive offers creates an increasing 'gap' between what it presents and the market requires. *Gradual* repositioning refers to the regular, generally small, adjustments the firm makes in its merchandise and methods of presentation to maintain a continuous match between the requirements of the competitive retailing scene and its own offer. *Penneys* in the US and

Marks and Spencer in Great Britain are two retailers which have managed such strategies with considerable success over many years.

Radical repositioning occurs when management makes a major, discontinuous shift into new target markets and/or competitive advantages. Examples include Kresge's successful launch of the *K-Mart* operation or *Sears'* aggressive shift into financial services. Radical repositioning is necessary when the positioning 'gap' is large or potentially too great to be closed by gradual repositioning. Such a situation arises when there is a sudden shift in the retailer's marketing environment, or more frequently, when its management have failed to effectively gradually reposition over a long period.

Management frequently delays recognising a radical repositioning situation, much preferring to believe that the health of the business can be restored by more gradual repositioning. The latter preserves continuity, uses skills already possessed by the business and involves little short-term risk. Radical repositioning—an innovative leap into new market segments or a completely new mode of presenting the stores—requires new expertise, involves significant short- and long-term risks to the business and is much harder to evaluate. Radical repositioning often involves risking substantial capital investments in redeveloping the stores. It may entail a commitment to a new, unproven retail concept. Invariably it risks causing disenchantment among the business's loyal customers satisfied with the traditional positioning of the business.

To model repositioning effects, therefore, it is essential to distinguish between the *main effects* of the innovation and the *cross effects* on sales to existing customers. The main effect is the sales increase from giving the new product space or additional space. The cross effects are the results this new product introduction has on the sales of other products. The cross effect has two components. First, there is a "cross-space" effect due to the decrease in the space devoted to other merchandise lines. Second, there is a "cross-product" effect due to carrying a different merchandise mix. The former effect must be negative, the latter can be of either sign. In principle, management could avoid the negative cross-space effect by building larger stores. Cross effects can be further decomposed into sales to existing customers and to new ones. The latter is always zero or positive while the former may be of either sign.

Measuring main and cross effects and so reducing the risks involved is not easy on account of the time lags which inevitably characterise radical repositioning. Four specific types of lag can be identified. (1) *Delayed-response effects* occur, particularly for fashion and durable goods which are purchased infrequently, so that the full effects of radical merchandising changes may not be seen for a considerable time. For example, a shopper might be impressed on seeing the store's new selection of sportswear, but having just purchased these items elsewhere, may not be in the market for another year. (2) *Threshold effects* may mean that small, initial changes in the positioning might have little impact, until after a point, a big effect on preferences occurs. (3) *Shopping habits* mean that both new customers attracted to the store's repositioning and existing customers who are dissatisfied by it take time to develop new loyalties and shopping patterns. (4) Finally, *competitive responses* will eventually evolve to limit market share gains and take advantage of changes caused by the strategic repositioning of the store. The gains may be smaller and the losses greater once competitors have fully reacted to the initial repositioning strategy. Our study focuses on the first three areas—we do not directly model competitive responses.

Case Study

An actual repositioning problem faced by a major European fashion retailer provides a useful illustration of a methodology and estimation procedure. The retailer was the leading womenswear chain in the country with over 200 stores. Its major segments were in the age groups under 15 and over 25 years. In recent years the margin and sales performance of the Group had been eroded by slower growth of its traditional female apparel market and by greater competition from specialists. The latter included both discounters and operators segmenting the market by life style and limited line merchandise assortments.

In the early 1980s marketing staff identified sportswear as a high growth market. An early attempt to introduce some trial sportswear lines had, however, been disappointing. Marketing attributed this to a failure to allow the merchandise to gain a critical mass either in floor space or range. A conservative top management were concerned about two issues. First, the strongest market for sportswear was in just that age group, 15–25 years, which the business had traditionally failed to attract. Second, they believed that any major attempt to attract this segment by changing the ambience and style of the store would risk losing the traditional older client base. The dilemma facing management was balancing the downside risk of the sportswear strategy with the need to provide a bigger test of its potential.

Such a test would need to meet three requirements. First, it should allow a critical mass to be achieved—estimated by marketing as requiring up to 10 percent of display space. Otherwise, it was felt that there would be insufficient room to display the range and achieve competitive parity in impact with outside specialists. Second, besides an accurate estimate of the sales generated from different space allocations to sportswear, it was necessary to estimate what losses or gains would occur in the traditional ranges. Cross effects are likely both because the older merchandise areas would have to give up space to make it available for the new department, and because the repositioning will change customers' perceptions of the store. These cross elasticities will be negative if traditional shoppers are disaffected by the new direction, or positive if the lines complement each other (e.g. dresses and accessories). Third, any procedure must estimate whether longer term effects exist—whether there is a lag in the adaption of the market to the new range of products. In such a case, immediate sales may either under- or over-estimate the value of the change, depending upon the pattern of long-term elasticities and cross elasticities.

Model Specification

In this section a model is proposed which contributes to the resolution of these dilemmas. Its aims are to (1) estimate the effects of alternative repositioning allocations of retail space and merchandise, and (2) lead to an allocation which maximises the profits of the retailer subject to certain relevant constraints on the decision variables.

Certain assumptions are built into the model. First, a new positioning strategy will not have its full impact on sales immediately. As discussed above, lags in customer and competitive reactions will mean that carryover effects may occur. For example, when a new product range is introduced many customers will not see it immediately, and even when they do see it, some will not be in the market for it at that time. Second, the demand structure of the model has to incorporate both the main and cross effects of changes in merchandise-space assortments. The main effect is the increased sales of the product accruing from the additional space allocated to it. Such a change occurs with the increased impact on the customer and the greater breadth of merchandise in the range. Cross effects are sales changes in other products resulting from the repositioning.

Finally, the model must reflect the realistic constraints inherent in any repositioning situation. In particular, management usually sets minimum and maximum bounds to the space they are willing to permit any product group to possess.

To represent these effects a number of functional forms are possible. In line with previous work (e.g. Lee 1961, Corstjens and Doyle 1981) and broad empirical findings in this area (Curhan 1973), a general polynomial form is postulated. This provides the least restrictive functional form for estimating the shape of demand relationships. To provide a simple model of carryover effects the popular geometric decay function and Koyck transformation is used. (For a discussion of the statistical assumptions behind this and related lag models, see Parsons and Schultz 1976, Clarke 1976.)

The unit demand for an individual product group (holding other sales mix factors constant) is then:

$$q_{it} = \alpha_i s_{it}^{\epsilon_i} \prod_{\substack{j=1 \\ j \neq 1}}^{k} s_{jt}^{\epsilon_{ij}} q_{it-1}^{\lambda_i} \tag{1}$$

where q_{it} is sales of product group i in period t, s_{it} is the floor space (square metres) allocated to product i in period t, and λ (<1) is the retention rate, measuring the carryover effect of previous space decisions. The following space elasticities can easily be derived:

$$\epsilon_i = (\partial q_{it}/\partial s_{it}) s_{it}/q_{it} = \text{short-run direct space elasticity,}$$

$$\epsilon_{ij} = (\partial q_i/\partial s_{jt}) s_{jt}/q_{it} = \text{short-run cross space elasticity,}$$

$$\epsilon_i/(1 - \lambda_i) = \text{long-run direct space elasticity,}$$

$$\epsilon_{ij}/(1 - \lambda_i) = \text{long-run cross space elasticity.}$$

If M_i is defined as the contribution margin of product i, the retailers objective function can be defined as:

$$\text{Max } \Pi_t = \sum_{i=1}^{K} M_i q_{it}$$

$$= \sum_{i=1}^{k} M_i [\alpha_i s_{it}^{\epsilon_i} \prod_{\substack{j=1 \\ j \neq 1}}^{k} s_{jt}^{\epsilon_{ij}} q_{it-1}^{\lambda_i}] \tag{2}$$

subject to

$$\sum_{i=1}^{k} s_i = S^*, \tag{3}$$

$$s_i^L \leq s_i \leq s_i^U, \qquad i = 1, \ldots, k. \tag{4}$$

The constraint (3) is a capacity constraint, and (4) are managerial constraints which provide upper and lower bounds to the space allocated to any merchandise grouping. Lower bounds may be set because management believe a product group is strategically important to the business and must have a critical mass of space. Upper bounds may be set to prevent some products changing the character of the store by obtaining too much space.

Because the model is inherently nonconvex, conventional optimisation techniques are not suitable. Linear programming is inapplicable given the nonlinearities involved. Also the more familiar nonlinear optimisation techniques will not ensure globally optimal solutions due to the general polynomial forms employed. Geometric programming provides an appropriate procedure for this type of problem, however. As explained elsewhere (Corstjens and Doyle 1979), GP places no constraints on the structure of the objective function or on the types of constraints. The solution procedure is based upon a transformation of the signomial programme into a 'reversed programme' which can then be solved for a global optimum using the branch and bound algorithm of Gochet and Smeers (1979).

Parameter Estimation

The retail group studied had a turnover approaching $200 million generated from four main departmental groupings, daywear, outerwear, accessories and children's wear. A fifth area—sportswear—was considered the candidate for development. Table 1 shows the margins budgeted for the five departments together with their average percentage space occupancy across the stores. To facilitate estimation and operationalise the model it was necessary for management to specifically define the constraints they wished to impose upon any new allocation of space. After a series of meetings it was determined that sportswear would be limited to a maximum of 20 percent of the space in any store and the minimum space allocated to the current departments would be set as shown in Table 1. Further to constrain an unacceptable positioning shift, management determined that daywear should account for at least 20 percent and outerwear at least 35 percent of floorspace.

Data to estimate the response functions were obtained via experimentation. Because sportswear was a new product area, cheaper and less disruptive cross-sectional or time series data alternatives were not available. Experimentation has, of course, a number of advantages. It can overcome the identification problem—the dilemma of which is the independent variable in an association between shelf space and sales. Also to use equation (1) it is necessary to hold other factors constant. The use of randomisation techniques and appropriate experimental designs allows the effect of space to be effectively parcelled out from these other factors. Finally, as the experimentor has discretion, data can be generated over a wide range of space levels rather than being restricted to perhaps the narrow band currently being observed within the stores.

Senior management were enthusiastic about the idea of an experiment but concerned about the costs and potential disruption of their normal pattern of operating. To produce a workable compromise we developed a replicated quasi-fractional factorial design which limited the number of shops involved to only 16 (under 10 percent of its outlets) with the remaining shops acting as a control group. (For a full discussion of fractional factorial designs see Cochran and Cox 1957.) We were also able to satisfactorily build into the design the space constraints which management thought were practical. In addition, the merchandising department were involved at an early stage in the redesign and presentation of the flows affected by the changes. Finally, management understood the importance of monitoring price and other retail mix variables across the shops to maintain comparability.

After the organisational arrangements were agreed, a random sample of 16 stores was taken from the largest 80 stores in the Group (smaller stores were excluded as it was judged infeasible that sportswear would play a significant role in their development due to a shortage of floor space). Sportswear was allocated at 0, 5, 10 and 20 percent of space in selected test stores and an array of the four traditional lines was assigned to produce a balanced design which met the constraints set by management. Sales were carefully monitored for each of the following 12 months. At the end of this period the effects were estimated.

TABLE 1

Space Allocations, Margins and Constraints for Existing and Proposed Merchandise Departments

Product Group	Space Allocation %	Gross Margin %	Min Space Constraint %
Sportswear	0	52	20*
Daywear	29	40	20
Outerwear	26	46	15
Accessories	27	50	20
Childrens	18	36	15

* Maximum allocation.

TABLE 2

Direct Space Elasticities over Time

Product Group	Direct Space Elasticity at month: 1	3	Long-term	λ	Months to Long-term
Sportswear	0.127	0.263	0.361	0.65	11
Daywear	0.105	0.182	0.207	0.49	7
Outerwear	0.081	0.101	0.101	0.20	3
Accessories	0.093	0.166	0.190	0.51	7
Childrens	0.136	0.245	0.285	0.52	8

Since the matrices of observations on the independent variables are identical, OLS provided the appropriate estimation procedure (Srivastava and Dwivedi 1979). Space allocations (per square metre) were regressed against sales results for the 16 observations making up the experiment. To use the log-linear model it was necessary to replace the zero square metres for sporting goods in the control stores with a small positive integer (see Naert and Waverbergh 1980).

Table 2 shows the direct space elasticities estimated for the product groups together with the number of months before the longer-term effects can be judged. These estimates are the average elasticities calculated across the sample space changes. The estimates suggest that there was little difference between the product groups in short-term responses to space changes. A ten percent increase in the space allocated to either sportswear or daywear generates something over a 1 percent sales increase in the period the change takes place. However, for sportswear (and to a smaller extent childrenswear) the elasticity is considerably longer after three months. The full effects of the sportswear change are not felt for almost one year. The long-term effect of space changes for sportswear are three times that for the traditional outerwear department. Such a pattern makes sense intuitively. Initially few customers are aware of the Company's expansion into sportswear. It takes time for awareness and preference to build up, only after a period does the range become an integral part of the shopping environment.

Table 3 shows both the direct and cross elasticities of space changes (e.g. −0.03 is the elasticity of sportswear with respect to daywear). As management anticipated, while the

TABLE 3

One Month (Long) Run Direct and Cross Space Elasticities

Product Group	Sportswear	Daywear	Outerwear	Accessories	Childrens
Sportswear	0.13*	−0.03*	−0.02*	−0.03*	−1.01
	(0.36)	(−0.09)	(−0.06)	(−0.09)	(−0.03)
Daywear	−0.01	0.11*	0.03*	−0.01	−0.01
	(−0.02)	(0.21)	(0.06)	(−0.02)	(−0.02)
Outerwear	−0.01	−0.02*	0.08*	0.03*	−0.01
	(−0.01)	(0.03)	(0.10)	(0.06)	(−0.01)
Accessories	−0.03*	−0.01	0.03*	0.09*	−0.01
	(−0.06)	(−0.02)	(0.06)	(0.19)	(−0.02)
Childrens	0.01	−0.03*	0.01	−0.03*	0.14*
	(0.02)	(−0.05)	(0.02)	(−0.05)	0.29*

* Significant at 5% level.

new product range of sportswear did have a significant space elasticity it had negative effects on the sales of traditional lines. Again the cross elasticities were markedly greater in the longer term. Management explained these effects as arising from the traditional older customers' reservations about the new store layout and positioning. For the stores' usual products, cross elasticities tended to be positive: selling more daywear helped also outerwear, for example. The results also show that the cross elasticities between product groups were not in general symmetrical. The implications of these relationships for the allocation of space are examined next.

Model Results

A model was needed to transform the results of this experiment and the estimates of short- and long-term elasticities into a set of recommendations about the most appropriate allocation of space. After the appropriate transformations of the model (2)–(4), geometrical programming provided an efficient solution procedure. The branch-and-bound procedure reached a solution vector after 200 iterations and the solutions met the constraint set with maximum deviations of 2 percent.

Table 4 shows the percentage allocations of space to the five product groups resulting from the model and compares these with the way space is currently allocated on average across the stores. The model specifies an allocation of space significantly different from the current pattern. In particular, sportswear added a considerable contribution to Group profits. Despite cannibalisation of some of the company's traditional business, sportswear has a high percentage margin and a significant space elasticity. In the long run it makes sense for merchandise in faster growing markets to replace that in maturer areas. Space was cut back most on the oldest groups, daywear, outerwear and accessories. The first suffered on account of its relatively low gross margin and the negative cross elasticity relationships with the newer items. Outerwear and accessories were pruned on account of their relatively inelastic space effects. The profit figures indicate the aggregate contribution margins for the model against the current figure. As can be seen, the model suggests very significant profit improvements can be expected from an allocation procedure which optimally balances the benefits of introducing new growth products with an estimate of the longer-run impact on other items in the business.

Comparisons with Other Models

The model presented here has two unusual features. First, it recognises that there is likely to be a lag before customers fully adapt to a change in the positioning strategy of a company. Thus one cannot judge the effectiveness of a reallocation of space within the store solely in terms of its immediate effect on sales. Second, the model incorporates management's view that adding a new product group, especially when it appeals to a different target market segment, will have potentially negative cross effects. These two extensions come at a cost. The former means that the experiment had to be sufficiently extended in duration to allow the longer-term effects of the change to be estimated. The inclusion of cross elasticities in the model means that sales performance of all the products

TABLE 4

Percentage Allocation of Shelf Space from Model Compared to Existing Pattern

Product Group	1	2	3	4	5	Profit Level
Existing Allocation	0	29	26	27	18	100
Model Results	18	21	20	20	21	120

TABLE 5

Percentage Allocation of Shelf Space from Short-Term and Long-Term Effects Models

Product Group	1	2	3	4	5	Profit Level
Short-term	13	22	25	24	16	124
Long-term	18	21	20	20	21	120

TABLE 6

Percentage Allocation of Shelf Space Comparing Main Effects-Only and Cross Elasticities Models

	Short-Term Model		Long-Term Model	
Product	Main Effects	Cross Elasticities	Main Effects	Cross Elasticities
1	20	13	20	18
2	20	22	20	21
3	19	25	18	20
4	20	24	20	20
5	21	16	22	21
Profit Level	106	124	146	120

in the portfolio have to be collected and analysed. Are these complexities worth the cost, or is the usual approach of ignoring these difficulties a satisfactory compromise?

To evaluate the significance of long-run effects, equation (1) was re-estimated ignoring the lagged terms. Table 5 shows that if only the short-term effects are considered 28 percent less space is allocated to sportswear and 24 percent less to childrenswear. The under-investment in these areas is a consequence of their much higher lagged effects of space changes. A higher profit contribution is projected in the short-term model because it incorrectly omits the longer-term losses from the changed allocation.

Table 6 explores the effects of excluding the cross elasticities in both the short- and long-term models. Equation (1) was re-estimated without cross effects. The model results using this equation show how recognising cross elasticities does significantly affect the pattern of recommendations. If the negative effects of the sportswear business on other ranges are ignored the new merchandise is significantly over allocated. For the traditional product ranges, on the other hand, the exclusion of cross elasticities which tend to be mutually reinforcing, support the space assigned to these areas.

Discussion

Repositioning is a critical problem in retailing but evaluation of strategy is constrained by the difficulties of estimating its pay-off. In practice, retailers often approach this problem intuitively, designing a new store and merchandise portfolio which they believe is more effective than their traditional approach and then testing it in one or a small number of shops. Alternatively academics have advocated either 'store image' studies (e.g. Downs and Haynes 1984) or experimental methods for estimating the space elasticity of new products (for a review see Doyle and Gidengil 1977).

Such approaches suffer several drawbacks. First, they do not consider an optimum solution. No effort is made to establish what level of space allocation or type of format will maximise the profit potential of the business. Second, the problem that 'store image' is a very poor predictor of sales and store patronage has been discussed earlier. Third, the conventional experimental approaches do not separate short- and long-term elasticities. For new products, the immediate sales results may considerably underestimate their long-run impacts because customers take time to evaluate and respond to changes. Finally, the more traditional methods invariably ignore cross effects: increasing the space available to one product will normally increase its sales, but also affects the sales of other products within the store. Studies by Buzzell, Salmon and Vancil (1965) and Corstjens and Doyle (1981) have shown that high cross elasticities of demand are a characteristic of in-store purchasing.

The approach presented here suggests an effective methodology for dealing with these problems within a general mathematical programming framework. The objective of the case study was to show how the parameters of the model can be estimated and used in practice for evaluating alternative repositioning strategies and developing a space assignment plan for a typical retail group.

Comparisons with simpler models suggest the refinements of the model make a significiant difference to the results. Ignoring longer term effects does lead to a substantial under-investment in the new line. Also a comparison with a main effects-only model suggests that ignoring cross elasticities produces suboptimal space assignments. The general model here not only leads to superior profit performance but it has also richer explanatory power for management. The concepts of cross elasticities and long-run effects exactly mirror the concerns of management in discussing positioning strategy. They found the model and the logic behind it intuitively reasonable.

The result of the study was that management accepted all the principal recommendations. The new range was introduced with space allocations close to those inferred by the model. The two main differences were that sportswear was initially given slightly less space than recommended (around 15 rather than 18 percent) and daywear was cut back somewhat less drastically than proposed (to around 23 rather than 21 percent). After the predicted slow start up sportswear became a substantial success for the company and was introduced throughout the chain. In the two years since the experiment was concluded the only area which has failed to meet expectations has been childrenswear. Aggressive and innovative competition has been the accepted explanation of this disappointment. Profit growth was only 3 percentage points different from that predicted (up 17 rather than 20 percent), the slightly suboptimal allocations being partly compensated for by a higher achieved gross margin on daywear. Management were impressed by the success of the study in predicting both profit and sales results and a further experiment is now in preparation to test another major new growth area in the chain.

There are several areas in which further development of the model is possible. First, electronic point-of-sale data capture allows the model to be used at a more disaggregated level—for product categories, classes and merchandise demand centres as well as for whole departments or merchandise groups. Second, it should be noted that the model assumes that prices remained constant over the period. In practice, minor variations did occur, although these were not significant enough to jeopardise the parameter estimates. It is straightforward in principle, however, to extend the model to include other important variables such as price, advertising, space quality (e.g. eye level vs floor level shelving) etc. The potential for such developments lies in the general form of the model which can incorporate most of the complex relationships between space allocation and overall store performance.[1]

[1] This paper was received in April 1986 and has been with the authors 15 months for 2 revisions.

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