The Relative Cost Structures of Competing Grocery Supply Chains

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Traditionally, research into supply chain management has focused on increasing the availability of products and reducing the cost of doing so by concentrating on coordination between supply chain members. Significant improvements have been made in improving the effectiveness and efficiency of supply chains. In this paper we compare the relative costs of different supply chains for grocery products. There appear to be fewer opportunities for improvement in supply chain management by improving availability or reducing logistics costs and more in examining the internal costs of individual supply chain members. Data on one product type, margarine, is used to illustrate the substantial differences in supply chain costs for similar products depending upon the type of manufacturer and type of retail format in competing supply chains.

The term "supply chain" represents the network of organizations involved in the process by which goods are moved from producer to consumer, [1, 2, 3] and the counterflow of information needed to manage the supply chain as a single entity [4]. At the core of the supply chain for consumer products lies the vertical marketing system used by the manufacturer to distribute its goods. Different marketing systems can be used to distribute the same or similar products to the end user. Any one organization may be a member of a number of marketing systems and even more supply chains.

Supply chain management, the control of the supply chain as a whole, is seen as a significant technique towards improving channel efficiency and effectiveness. A major focus has, to date, been on the distribution and transaction costs within supply chains. The purpose of our paper is to challenge this as the main focus to optimize supply chain efficiency. We will do this by comparing the cost structures of different types of grocery retailer and the cost structures of similar products being sold via the same retailer.

Controlling Supply Chains

Control over both the marketing system and the potential to control the supply chain can be achieved by vertical integration, but this is rarely the most cost-efficient method of organizing distribution [5]. Informal control is often a more flexible option. Control of some kind is essential within a supply chain to ensure maximum effectiveness and efficiency. Control without ownership or some other legal means such as franchising can only be achieved through cooperation between supply chain members. One way of achieving cooperation is the acquisition of channel power by one member of the supply chain, power being the potential to get other members of the supply chain to alter behavior [6, 7]. Power does not have to be exercised to be effective; the potential to damage the business of another organization is normally enough to ensure compliance.

Whether power exists in the supply chain is determined by the levels of dependency between its members [8, 9]. If one retailer accounts for, say, 15 percent of a manufacturer's sales, but the same manufacturer accounts for only 1 percent of the retailer's sales, then the retailer is likely to hold power. Conversely, if the manufacturer's brand franchise with the retailer's customers is so strong that customers will not accept a substitute product, then the manufacturer is likely to hold power.

When power does not exist, control

over the supply chain can still be achieved if retailer and manufacturer cooperate, recognizing that both stand to gain if sales to the end-user increase. In reality retailers and manufacturers often appear to compete, each trying to gain greater share of the profit flows from the same supply chain, failing even to share information on what is happening in key areas [10, 11].

Despite problems in achieving control over supply chains, significant advances have been made in both supply chain effectiveness and efficiency.

Effectiveness and Efficiency

An effective business system is one which meets its desired goal [12]. An effective supply chain can be taken to be one that achieves the "assured delivery of a desired level of service" [13]. From the end-user's perspective, as a customer of the supply chain, effectiveness is simply the availability of the chosen grocery product (in usable condition) when it is required. This implies levels of in-stock availability inside retail outlets at, or approaching, 100 percent. As can be seen in Table 1 this goal has often been met in the supply chains of major grocery products.

The efficient management of a supply chain is concerned with achieving the effectiveness goal at the lowest possible cost. Again from the end-user's perspective, this means the lowest possible price. Substantial efficiencies in supply chain management have been achieved over the years such that the price of food has tended to fall in real terms year on year [14].

Research into improving both effectiveness and efficiency in supply chain management to date has concentrated on improving the coordination between and within supply chain members [4, 15, 16, 17]. The advantages of coordination through greater integration of, in particular, logistics systems, have included lower stock levels and improved customer service though more reliable product availability [18, 19, 20, 21, 22, 23]. What is left are the remaining opportunities to improve efficiency by reducing supply chain costs. What we will be illustrating is that further, substantial, cost reductions in grocery product supply chains will in the future only be achieved within the members of the supply chain. Supply chain management, we propose, should refocus its attention, in the case of grocery products at least, towards the cost structure of the supply chain as a whole and, increasingly, away from any further cost efficiencies that might be gained by better co-ordination between supply chain members.

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Table 1
Sterling Weighted Distribution Levels

Product Category	Any	Brand	1st Leading	2nd
Instant Coffee	100	100	95	95.5
Mayonnaise	98.5	97.5	84	72.75
Margarine	100	99.5	96.5	93.5
Washing-up liquid	100	99	93	86.5
Toothpaste	100	98.5	95.5	93.5

Source: A.C. Nielsen, Period Average February 1992 – February 1993, British Grocery Retailing.

Competing Grocery Supply Chains

The typical grocery supply chain extends from the farmer through a primary and possibly secondary manufacturer and on to a retailer, possibly via a wholesaler, before the product reaches the shopper, the end user.

Transport and warehousing businesses are involved at the interfaces between each member of the supply chain. Three major trends in the grocery sector are relevant to this paper. The first is the increase in both the concentration and centralization of retailers. In Britain for example 7 national chains account for 83% of all grocery sales [24]. Two, Sainsbury and Tesco, account for 44.1% of the market. Each of the large chains buys centrally and each have subsumed the wholesaler's role. They buy directly from the manufacturer or farmer for almost all of their products. They have their own distribution system. The cost structure of a supply chain for grocery products can then be taken as consists of 3 major elements, the cost of raw materials to the manufacturer, the added value of the manufacturer and the added value of the retailer.

The second trend to consider is the growth in own-brand products. The penetration of own brand rose rapidly from the 1970's, from 20.9% of sales value in 1976 to 34.9% by 1993 in Britain [25]. Since 1993 this growth rate has slowed but it is still finite. It has been conventional to see retailer's own-brands as somehow fundamentally different from manufacturer's brands [26, 27, 28] but their patterns of purchase and imagery indicate that shoppers treat them much as any other brand [29, 30]. Retailers have endeavored to achieve and maintain high quality for their own-brands by for example developing strong technical departments, such that in consumer tests consumers often prefer such products over manufacturer's brands [31, 32]. In most countries the lower purchase price of own-brand products is however still a, even the, factor in their purchase [33].

Large numbers of manufacturers exist who specialize in producing own-brand products. Supply chains of own-brands now present substantial competition to those of manufacturer branded products. No longer can branded manufacturers assume that their direct competition is from companies selling similar products, the combination of a specialist own brand supplier and a well

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Table 2
Prominent Grocery Retail Formats

Format	Sales Area Ft²	Product Lines	Comment
Superstore	30,000	20,000	Major format in North America and UK. The third generation of self-service stores.
Convenience Store	10,000	2,500	Rapid growth alongside gas stations but also stand alone.
Hypermarket	100,000	50,000	50% non-food lines. Major format in France and much of Scandinavia.
Warehouse Club	100,000	5,000	Membership access for retail. Wholesale operation. Bulk purchase. Mainly USA.
Discount Store	9,000	1,000	Growing share in Europe, well established in West Germany and Denmark.
Supermarket	15,000	12,000	Declining format worldwide. The second generation of self service stores.

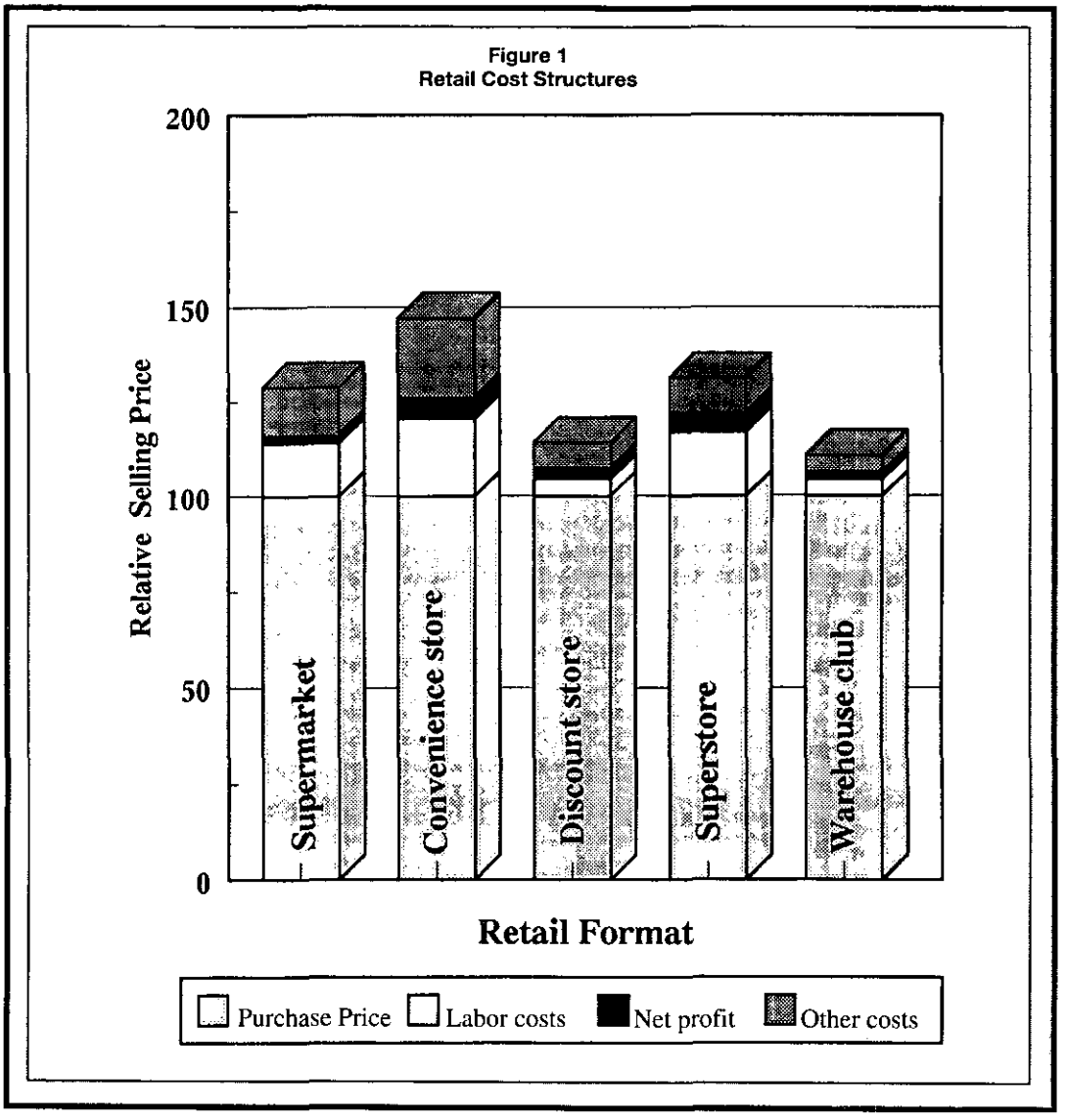
Source: Reference [34]

known retailer represents significant competition.

The final trend is the proliferation of grocery retail formats (Table 2). Around much of the western world the main grocery retail format has become either the superstore or the hypermarket. In Britain and the USA, hypermarkets in the sense that they would be understood in Scandinavia or France are not prominent. The superstore with some 30,000 sq. ft of selling area (slightly less in Britain) and the even larger hypermarket offer the shopper convenience: a one stop shop with car parking but the sheer size of these formats makes them inconvenient for small purchases. Small shops, trading as convenience stores, have seen a substantial growth in numbers. Finally there has been a growth in two discount formats, small shops selling a limited range of products in utilitarian premises offering little service, the so-called "grocery discounters," and large warehouses combining whole-saling with retailing to shoppers, who pay an annual fee to join what are called "warehouse clubs". The second generation of self service food stores, generally known as supermarkets, has tended to lose market share of the grocery trade [34], but the supermarket is still a major format.

Each of these formats has a different cost structure. Average gross margins range from as high as 32% in convenience stores to as low as 10% in warehouse clubs in America [35]. Figure 1 takes Food Institute data for the USA and converts this to the retail selling price, (ignoring any sales tax, or VAT) of the same item purchased from suppliers at 100 units. The lowest selling

Figure 1
Retail Cost Structures



price of 111 is at the warehouse club, the highest at the convenience store is 147, some 32% higher. Such comparisons are somewhat misleading, there is a subscription to pay at the warehouse club, and products usually need to be purchased in bulk, but the pattern demonstrated by Figure 1 is a reliable indication of the scale of difference in costs to the end-user in buying the same product due solely to differences in the cost structure of competing retail formats. The differences will vary between countries and between different exponents of the same format but they will be of the same order of magnitude as they represent fundamental differences in the capital and labor costs of each format. Labor costs are relatively high in smaller stores unless they operate the limited service, narrow range policy of the discounter. Capital costs are higher for a superstore than for a discounter, therefore profit margins need to be higher to produce similar figures for return on investment.

Differences in cost structure result, then, more from fundamental differences in the philosophy behind each format, rather than from differences in the effectiveness of their operators.

Differences in cost structure result, then, more from fundamental differences in the philosophy behind each format, rather than from differences in the effectiveness of their operators. A superstore for example offers a wide selection of a very wide range of products. Levels of ambience and standards of presentation are generally very high. Products are merchandised on shelving by the labor intensive process of manually extracting product from cases and placing them, sometimes singly, onto shelves. Assistance is given at the checkout to help shoppers pack their bags. Labor-intensive services such as in-store bakery and delicatessen are offered.

Such stores can employ over 100 staff. By way of contrast a limited range, discount store carries, as its format name implies, a far smaller number of core grocery items at very low prices. Stock turnover is therefore very high. Product is often displayed on pallets or half-pallets. Shoppers insert coins to release shopping carts and their money is only returned if they return the carts to the cart park. Long lines are the norm and there is no help with packing. Such stores operate with as few as 4 full time equivalent staff. Sales and profit per employee figures are far higher in such discount retailers [36] but the profits needed by them are also lower proportionally than their superstore rivals because of the lower costs of the more utilitarian discount stores and their higher stock turn.

Table 3 presents one comparison of the return on capital for a superstore and a discounter illustrating just the benefits of the high stock turnover achieved by many discount stores [37].

Table 4 presents one comparison of the total return on capital of a superstore with a warehouse club. The lower capital cost of the club format compensates for its lower net profit.

Our analysis thus far contains one fundamental weakness from a supply chain perspective. An assumption has been that all products sold by the retailer have the same gross margin. The figures we have used are the average gross margin for all the products sold by the retail format. In reality each retailer will vary the gross margin particularly on the products it chooses to price promote.

We examined the management infor-

Table 3
Relative Profitability of Superstores and Discounters

	Superstore	Limited Range Discounter
Gross Margin %	26	13
Operating Costs %	19	10
Operating Margin %	7	3
Stock Turnover	25	40
Sales/sq ft/wk	£12 – 18	£8 – 10
ROCE %	21	35

Source: Reference [37]

mation of one medium sized retail business who operate superstores, convenience stores and discount stores. The selling prices of the same product varied between store types as we expected but the difference in gross margin between different products selling in the same store type was far greater than we expected. The range for the few products we examined was from 42% to minus 20%. The higher gross margins were generally made on odd sizes of own-brand products and the negative margins on a number of promotional lines. It became clear to us that the only way of understanding fully the cost structure of a grocery supply chain was to analyze the cost structures for the supply chains of individual product lines.

Product Line Cost Structure Analysis: Margarine

In this next section we present data on one product category to illustrate the insights that can be gained by analyzing the cost structures of the supply chains for a single product category.

We have chosen to present data on so-called sunflower margarine as our data is relatively complete and the analysis is typical of the products we have analyzed thus far in our research.

Our approach is to work back from the retail selling price of a competing group of products identifying the purchase price from the manufacturer and its purchase price of ingredients and other raw materials from its suppliers. Not all companies in the supply chains we wanted to examine have co-operated with our research and those that have were given a guarantee of anonymity. Hence the names of retailers, manufacturers and brands are all omitted from the following analysis. Some figures are actual values, some are our estimates. We believe that the errors in any such estimates are unlikely to affect any of our conclusions.

Margarine is a generic term that includes a number of different types of product. Margarine was first introduced as a butter substitute in the 1930s. Since then new formulations including products high in polyunsaturated fat, low fat spreads and blended spreads have gained market share. Together with butter they constitute the 'yellow fat' product sector. Sources differ as to the market size in Britain but, in 1992, around 500,000 tons were sold yielding 800 million in sales value [38, 39]. As Table 5 demonstrates, margarine sales dominate the sector by volume but as prices are lower than for butter, the value of margarine sales is similar to that of butter. Within margarine sales there has been considerable growth in sales of polyunsaturated products often called sunflower margarine. This one product variant dominates margarine sales. Own brand sales of margarine account for more than 30 per cent of volume. The leading manufacturer's brand has a 24% market share.

Polyunsaturated margarine is made by blending edible oils including a high percentage of sunflower oil. Formulations vary from brand to brand and can change over time in response to changes in the relative price of the various oils. In the analysis which follows we used the ingredient declarations and the results of interviews within companies to estimate the formulation of individual brands and thus the cost of raw

Table 4
Relative Profitability of Superstores and Warehouse Clubs

	Superstore	Warehouse Club
Sales Area (sq ft)	40,000	100,000
Gross Margin %	25.9	11.9
Operating Costs %	15.1	7.5
Operating Margin %	10.8	3.5
Contribution Costs (£m)	20.0	10.0
Return on Investment (%)	17.1	14.0

Source: Goldman, Sachs, private communication.

materials entering the supply chain.

Table 6 contains data on the retail selling price (expressed in pounds per kilogram) of one size of sunflower margarine in a number of retail outlets. Each of the outlets belonged to a different organization. Both convenience stores (G and H) were independent retailers who would have purchased from a wholesaler such as F. The three leading manufacturer's brands were all available in the larger stores. Smaller stores carried fewer product lines and one discounter carried one product selling under a brand name exclusive to them. Five of the 7 stores offered an own-brand product (either under the store name or one they controlled) at a significant discount to any manufacturer's brand. This discount ranging from 45% to 24% against the brand leader in the larger stores. In the one discounter who offered the leading brands, the saving was much higher, 70%, even though the leading brand was already cheaper than in our other outlets. Our analysis indicated that both discounters were selling their own brands well below the price they would have paid to their suppliers.

We analyzed the cost structure for each product in each outlet. The following analysis is for Supermarket A. We obtained their purchase prices for each product and analyzed the cost structure of each manufacturer. For one product we obtained detailed cost figures for production and overheads allowing us to estimate the figures for all other products.

We obtained detailed cost figures from a supplier of the main raw materials used to manufacture margarine (vegetable oils) to estimate the purchase prices of each brand.

Table 5
Yellow Fat Volumes ('000 tons)

	Butter	Margarine	Low Fat Spreads	Blended Spreads	Total
1986	168	291	74	37	570
1987	163	293	74	46	576
1988	139	286	82	51	558
1989	118	278	85	56	537
1990	117	264	87	56	524
1990	115	260	91	62	527
1992 (est)	113	255	92	65	525

Source: Reference [38]

Table 6
Retail Selling Prices for Polyunsaturated Margarines £/Kg

Retail Format	Supermarket	Superstore	Superstore	Discounter	Discounter	Wholesaler	Convenience	Convenience
Code	A	B	C	D	E	F	G	H
1st Brand	1.88	1.96	1.96	1.78	N/A	1.62	2.00	2.00
2nd Brand	2.46	2.60	2.60	2.44	N/A	N/A	N/A	N/A
3rd Brand	1.88	1.96	1.96	1.80	1.68	1.68	2.36	N/A
1st Own Brand	1.04	1.48	1.48	0.54	N/A	N/A	N/A	N/A
2nd Own Brand	1.40	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 7 summarizes our cost data for the products sold in Supermarket A.

We lack data on the true profitability of each product as we, the retailers and the manufacturers were unable to allocate all supply chain costs fully to individual products. In this analysis we have then assumed that each supply chain member makes the same net profit on all products. This allows us to use the profit percentage in the manufacturer's and retailer's annual reports to indicate a notional profit for each product. We were able to obtain good data on stockholding and distribution costs for each product for both retailer and manufacturer. We were also able to obtain good data on transfer prices between raw material suppliers and manufacturers and manufacturer and retailer. Deducting the costs we knew or could calculate leaves a residual figure which contains a mixture of additional costs or profit over and above the notional profit figure. We include the notional profit figure for comparison with the other costs in the various tables.

Figure 2 presents the data in Table 7 graphically. The relative cost to the consumer is indexed on the retail selling price of the 1st Brand at 100. The proportion of this cost attributed to the oil producer (the main raw material supplier), the manufacturer and the retailer are shown. What is clear from Figure 2 is that the relative cost structure of the supply chain is dominated by the manufacturer's total costs.

Table 8 shows the total supply chain stock and distribution costs as a percentage of the selling price to the consumer calculated from the figures provided to us of average transport and warehousing costs and our estimate of the capital cost of stockholding. These are the costs that supply chain management normally focuses upon. They are still large by comparison with the notional profit figures for both retailer and manufacturer but they are insignificant compared with the differences in cost structures within the different manufacturers.

For example if the stock levels in the supply chains could be reduced to zero the reduction in total cost would be less than one percent of retail selling prices. The creation of a zero stock supply chain for margarine could not create a substantial benefit for the end-user. Although there could be noticeable benefits for either retailer or manufacturer in their profitability. The figures in Table 8 are lower than average

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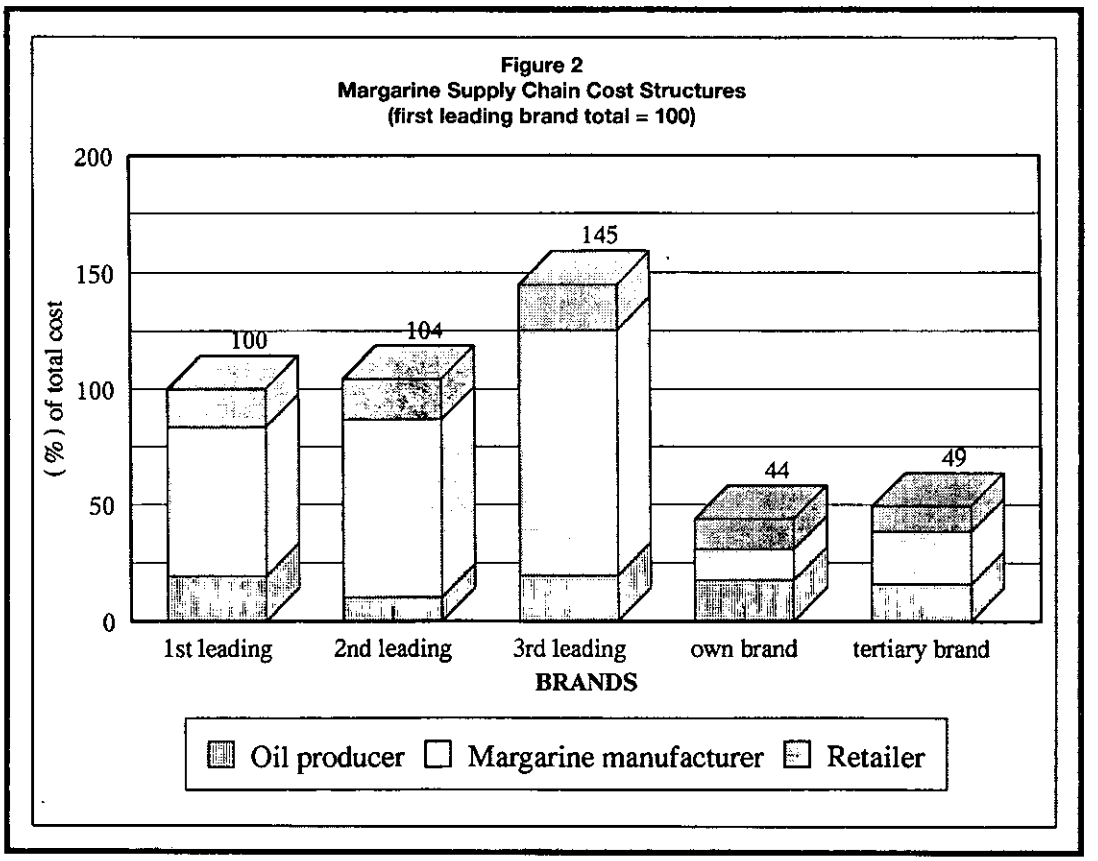

figures quoted for all logistics costs for grocery products in European distribution of 9 to 10 per cent of retail sales value [40] and considerably lower than equivalent figures for North America. In Europe there is limited potential to reduce retail selling prices by better logistics management. In the case of margarine there is very little potential and, as our figures are based on a more detailed calculation than the estimates in other published information, we wonder whether the potential is being exaggerated generally.

One problem facing the various members of the grocery supply chain over the last 8 years has been increased price pressure caused by the recession and the well publicized price promotion of the discount grocery sector. The real price of margarine fell between 1986 and 1992 [38] but this was accompanied by a slight fall in the prices of vegetable and fish oils. From 1992 to 1994 these raw material prices increased rapidly, in the case of Sunflower oil by 40%.

Leading brand manufacturers can respond in one of two ways to maintain their relatively high selling prices. They can seek to maintain or enhance the perceived value of their brands through creative advertising or genuine product innovation or both. Alternatively they can cut their internal costs. Quite clearly from Figure 2, the internal cost structures of branded manufacturers of margarine are dramatically higher then those of own-brand suppliers. Little is known as to why, but their high costs cannot be explained away simply by higher marketing costs alone.

Suppliers of own-brand products are often accused of parasitic strategies, copying the innovations of their branded competitors rather than creating markets themselves. To an extent such criticism is justifiable. In the case of margarine there has to be some doubt as to who are the true innovators as in one blind consumer test an own-brand was preferred to all other products tested [31]. An earlier blind test concluded that differences in price in margarine could not be justified by differences on perceived quality [41]. Can brand imagery continue to sustain the differences in the prices shoppers pay for similar or even inferior products? The very

Table 7
Supply Chain Cost Structure Estimates for Supermarket A in £ per kilo

Product	Consumer Price	Retail Book Profit	Distribution	Stock Costs	Other Costs/ Profit	Manufacturer Price	Raw Materials & Packaging	Stocks	Production Costs	Advertising	Distribution	Other Costs/ Profit	Supplier Book Profit
1st Brand	1.88	0.049	0.062	0.005	0.225	1.547	0.501	0.004	0.072	0.05	0.04	0.743	0.137
2nd Brand	1.88	0.049	0.067	0.005	0.094	1.666	0.396	0.004	0.060	0.120	0.041	0.987	0.058
3rd Brand	2.46	0.064	0.089	0.008	0.087	2.214	0.584	0.005	0.070	0.043	0.045	1.424	0.043
1st Own Brand	1.04	0.027	0.025	0.003	0.361	0.626	0.369	0.001	0.072	0.000	0.038	0.122	0.024
2nd Own Brand	1.40	0.036	0.037	0.004	0.388	0.935	0.435	0.002	0.072	0.000	0.038	0.357	0.031

Table 8
Distribution Costs as a % of Selling Price

Product	Total Distribution & Stock Costs (£ per kilo)	% of Consumer Selling Cost
1st Brand	0.111	5.9
2nd Brand	0.116	6.1
3rd Brand	0.145	5.9
1st Own Brand	0.067	6.4
2nd Own Brand	0.081	5.8

high internal cost structures of margarine brand manufacturers are not untypical of those for brand manufacturers generally in the product fields we have been studying. As shoppers become more sophisticated, more willing to trust the retailer to provide products of adequate quality, irrespective of the names they carry, many manufacturers of grocery products are likely to have to reduce their internal costs. The same is true of high cost retailers. There will be a limit to the premium shoppers will pay for convenience.

Conclusions

We have demonstrated how supply chain cost structures of grocery products can be dominated by the internal cost structures of retailers and their suppliers, rather than the transaction costs between them. Thus far in supply chain management the efficient management of supply chains has focused on such interface costs. In the future we believe that management attention will change to examine the internal costs both of their own operations and those with whom they share the same supply chain.

It is interesting to compare the relative selling prices of margarine in Table 4. The selling price of the 1st Brand in convenience store H of £2.00 per kilogram and in superstores B & C of £1.96 compares with the selling prices of £1.40 and £1.04 for comparable products in Supermarket A and £0.58 in Discounters D and E. We calculate that the selling prices in both discounters are uneconomic, both retailers are deliberately losing money by price promoting an important item in the shopping basket of most families. But the selling price of £1.40 is economic for Supermarket A. An economic price in the lower cost structure discounter would, we can calculate from the data in Figure 1 be £1.24 per kilo. The product would still be profitable to make and to retail at this selling price. Such differences in supply chain cost structures of 61% (£2.00 in the convenience store and £1.24 in a discounter) appear to us to be too high to be sustainable. The slightly smaller differences between an own brand sold via a discounter and the leading brand sold via superstores of 58% is similarly difficult to see continuing in the longer term.

In the grocery sector we have a situation where supply chains for similar products are in competition. The cost differences between different supply chains are marked. At one extreme we have the high service retailer selling a manufacturer's branded product, at the other a discount retailer selling an own-brand product. The differences in cost structure of different retail formats have been well researched, but there is little published to explain the relatively low cost structure of own-brand suppliers. From our data such differences are not substantially due to the costs such as advertising incurred by brand manufacturers.

Lower cost supply chains will be needed if many existing retailers and their suppliers are to compete. Significant cost reductions can only be achieved by reducing the internal costs of both retailer and manufacturer. There is now comparatively little potential to reduce logistics and other transaction costs between supply chain members.

The dilemma facing both the manufacturers of highly branded products and the higher cost retailers who provide a wide range and extra services to customers is how to meet the price competition of own brand manufacturers and discount grocery retailers. The retailer's costs are mainly labor and premises costs. Reducing these to attract the price conscious shopper, if you are a high service retailer, risks being regarded as failing to meet the standards demanded by those who value higher levels of service.

We believe that there is greater potential for cost reduction within the grocery manufacturing sector. The differences between the cost structures of those making leading brands and those specializing in own brand are marked. Their costs of manufacturing appear to be similar and the costs of branding through advertising do not come near to explaining the differences in our data. Such manufacturers appear to be spending heavily on a wide range of administrative overheads. We predict that these costs need to be reduced for many branded products to remain competitive in the future. They have little opportunity to cut their selling prices without cutting cost. In the case of margarine we believe that many own-brand manufacturers are unprofitable because they have reduced prices too far under intense competition. Such a fate could befall some branded suppliers unless their overheads can be reduced substantially.

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