

Derrick's Ice-Cream Company: applying the BCG matrix in customer profitability analysis

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Abstract

This case highlights the differences in the profitability possible when different customers are in receipt of substantially the same product. It provides the opportunity to develop a customer portfolio, along the lines of the Boston Consulting Group (BCG) portfolio matrix, as part of a customer profitability analysis.

Keywords: customer profitability, BCG matrix, delivery policy, portfolio profile, purchasing pattern, inventory holding

The case

Derrick's Ice-Cream Company is located in modern premises and manufactures and distributes 30 different ice-cream product lines from its suburban base in the UK. The products are distributed by Derrick's own fleet of refrigerated trucks to six major wholesale distributors.

Annual sales are currently around the £10m level, distributed among the wholesalers as indicated in Table 1. Derrick's control about 35% of its metropolitan market, but this shrinks to less than 10% in outlying areas where there are many small competitors.

Derrick's will usually hold up to four weeks of stock in their central cold stores to meet the distribution requirements of their six major customers. The cold stores cost

Table 1. Market shares for six customers

<i>Customer</i>	<i>% Sales</i>
Ardron's Wafers	19
Butler Ices	12
Cahill's Cones	25
Donleavy Ices	9
England Wedges	14
Frankston Chocs	20
Others	1
Total	100

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approximately £500 000 p.a. to run, but excess capacity can be hired out to other noncompeting firms. This becomes especially important during the winter months when consumer demand is considerably reduced. Even during the summer months demand is highly temperature sensitive. Derrick's, therefore, bases its sales on a deseasonalized forecast, related to increases in disposable real incomes, and hopes that stocks will be adequate to cope with sequences of extreme high temperatures.

The raw materials (vegetable oil, butter, milk and sugar) are relatively inexpensive. They arrive at Derrick's by tanker and are stored on site. Ice-cream is then manufactured in two major processes, mixing and forming, followed by packaging to meet specific customer requirements.

The requirements of meeting the sometimes uniquely specific requirements of customers has been causing Derrick's management some serious headaches recently. They recognize the importance of a client-focused approach to marketing and distribution, but are beginning to feel that they are being exploited by some customers who are never satisfied with the level of service provided, however extensive it may be. The satisfaction of customer whims is beginning to cost big money, so Derrick's has determined to conduct a detailed analysis of the customers and their varying requirements. These are summarized below:

- *Ardron's Wafers* employ standard packaging and barcode reading systems. They insist on only low discounts for volume and maintain large regular orders. Consequently their delivery requests and inventory holding requirements are highly predictable.
- *Butler Ices* are located nearly 150 miles north of Derrick's base and require packaging which is unique to them. Despite their remote location, they insist on free deliveries and require large discounts for volume orders. Their internal inventory control procedures are not well developed, resulting in not uncommon requests for 'crisis' deliveries to deal with stock-outs.
- *Cahill's Cones* have the reputation of always paying on time and requiring low discounts and commissions. Their inventory holding procedures are perhaps the best in the business and they have a JIT scheduling system which is entirely compatible with Derrick's own. Deliveries require no special packaging or fleet requirements for the refrigerated vehicles.
- *Donleavy's Ices* always pay late but demand all available discounts, even when strictly they are not applicable. They insist on daily deliveries, with the requirement of additional deliveries should demand merit it. They have threatened to take their business elsewhere if all their inventory holding requirements are not met in full.
- *England Wedges* relies on bulk orders which are shipped on an infrequent basis. They require minimal volume discounts, rare visits from Derrick's personnel, and are prepared to collate sales credits and make monthly claims.
- *Frankston Chocs* are not noted for the strength of their internal organization. They are closely located to Derrick's base, but require frequent calls which extend to assistance with administrative operations and help with the merchandizing of stock and in-store displays. They initiate separate sales credits for each item of product returned and inevitably generate complex orders the detail of which is unclear, so that multiple queries follow almost every transaction.

You are required to use the above information as the basis for a customer profitability analysis using one of the frameworks suggested, or a suitable alternative, in terms of purchasing patterns, delivery policy, accounting procedures and inventory holding. Use the analysis to develop alternative strategies for the manner in which Derrick's might proceed.

Teaching note

There has been surprisingly little written in the accounting literature about customer profitability analysis. In the main this has comprised exhortations in the professional journals for practitioners to pay attention to other than product profitability (e.g., Arandarajan and Christopher, 1987; Shapiro *et al.*, 1987; Bellis-Jones, 1989; Smith, 1993; Connolly and Ashworth, 1994; Foster *et al.*, 1994). There have been case-based approaches (notably the celebrated Kanthal case in Cooper and Kaplan, 1991), but surprisingly few empirical studies. Frameworks are established for analysis in Howell and Soucy (1990), Foster and Gupta (1994), and Smith and Dikolli (1995) but reports of field studies are rare (e.g., Hart and Smith, 1998; Shanahan, 2002). Thus, over a 15 year period, there are fewer than one major paper per year devoted to CPA, suggesting that researchers perceive product profitability to be a difficult enough issue, and that the problems associated with CPA appear insuperable. A challenge indeed for future researchers!

Analysis of the profiles of the six firms which provide Derrick's customer base allows the classification of their requirements in terms of:

- purchasing patterns;
- delivery policy;
- accounting procedures; and
- inventory holding.

This analysis,¹ following Smith and Dikolli (1995), is detailed in Table 2. The narrative descriptions provide a qualitative 'feel' for the relative costs of each of the customers. This 'feel' can be quantified by allocating a numerical indicator to each of the attributes. Although this approach can only be approximate, and is limited by the availability of the case information, it does facilitate the ranking of the customers in terms of the costs of providing service. If a score of +5 is allocated where a customer has the best possible attributes; 0 where the customer is neutral, or no information is available; and -5 where the customer has the worst possible attributes, then by rating each customer on each attribute between these limits we can generate a composite cost index. A typical response is detailed in Table 3.

The fact that there is no information available in some categories is problematic, as is the judgement required in assigning a particular numerical score. This is a *decision-making under uncertainty* scenario here which requires a trade-off between reliability and relevance: we know that our scores cannot be 'right' in an absolute sense, but if the

¹ The Howell and Soucy (1990) framework is similar, but more detailed, and suggests the measurement of a number of expense categories not detailed in the case: cost of volume discounts; size of agents' commissions; cost of product maintenance; cost of sales support; distribution expenses; shipping frequencies; freight fleet requirements; sales credits; settlement discount costs; debtor collection support; order processing; inventory support; distribution support; holding requirements.

Table 2. Derrick's Ice-Cream customer requirements

	<i>Ardron's Wafers</i>	<i>Butler Ices</i>	<i>Cahill's Cones</i>	<i>Donleavy's Ices</i>	<i>England Wedges</i>	<i>Frankston Chocs</i>
Purchasing patterns	<ul style="list-style-type: none"> require low discounts on volume orders 	<ul style="list-style-type: none"> require large discounts for volume orders 	<ul style="list-style-type: none"> require low discounts and commissions 	<ul style="list-style-type: none"> demand available discount, even if not applicable 	<ul style="list-style-type: none"> require rare visits from personnel 	<ul style="list-style-type: none"> require frequent calls extending to assistance: with admin, help-in-store
Delivery policy	<ul style="list-style-type: none"> delivery requests predictable standard packaging maintain large regular orders 	<ul style="list-style-type: none"> 150 miles away unique packaging insist on free delivery 'crisis' deliveries 	<ul style="list-style-type: none"> no special fleet requirements for refrigerated vehicles JIT scheduling no special packaging 	<ul style="list-style-type: none"> insist on daily deliveries, additional deliveries if demanded 	<ul style="list-style-type: none"> infrequent shipping minimal volume discounts 	<ul style="list-style-type: none"> close location to base require frequent assistance
Accounting procedures	<ul style="list-style-type: none"> no information available 	<ul style="list-style-type: none"> poorly developed internal control procedures 	<ul style="list-style-type: none"> reputation for paying on time 'best in the business' accounting procedures 	<ul style="list-style-type: none"> demand all settlement discounts, even if not applicable always pay late 	<ul style="list-style-type: none"> collate sales credits and make monthly claims 	<ul style="list-style-type: none"> initiates separate sales credits for each item returned multiple queries before each transaction can be completed require frequent assistance weak internal organization
Inventory holding	<ul style="list-style-type: none"> predictable delivery requests 	<ul style="list-style-type: none"> 'crisis' deliveries insist on free delivery to remote location 	<ul style="list-style-type: none"> compatible scheduling systems 	<ul style="list-style-type: none"> will take business elsewhere if requirements are unmet 	<ul style="list-style-type: none"> infrequent shipping of bulk orders 	

Table 3. Customer requirements index

<i>Criteria</i>	<i>Customer</i>					
	<i>Ardron</i>	<i>Butler</i>	<i>Cahill's</i>	<i>Donleavy</i>	<i>England</i>	<i>Frankston</i>
<i>Purchasing patterns:</i>						
• Discount required	4	-3	5	-5	4	0
• Quality of organization	5	-2	5	-1	5	-5
<i>Delivery policy:</i>						
• Delivery distance, etc.	0	-5	0	0	0	5
• Unique packaging required	5	-5	5	0	0	0
• Urgent order frequency	5	-3	4	-4	5	-3
<i>Accounting procedures:</i>						
• Payment record	0	0	5	-5	0	0
• Credit returns handling	0	0	0	0	5	-5
<i>Inventory holding</i>						
• Volume of sales	4	2	5	1	3	4
• Order frequency	5	3	3	-5	5	-3
Total	+28	-13	+32	-19	+27	-7

Table 4. Log transformations of relative market share

<i>Customer</i>	<i>Market share</i>	<i>Relative market share (M)</i>	<i>LN (M)</i>
Ardron's Wafers	19	0.76	-0.27
Butler Ices	12	0.48	-0.73
Cahill's Cones	25	1.25	0.22
Donleavy Ices	9	0.36	-1.02
England Wedges	14	0.56	-0.58
Frankston Chocs	20	0.80	-0.22

approximations still allow useful inferences to be made then they will have been worthwhile.

Following Kotler (1994, p. 70) the relative profitability of each customer is measured in terms of its contribution to Derrick's by way of sales. This is calculated as:

$$\frac{\% \text{ Market share}}{\% \text{ Share of market leader}}$$

and is fractional for all customers, except the market leader, calculated as:

$$\frac{\% \text{ Market share}}{\% \text{ Share of closest competitor}}$$

These are detailed in Table 4 after converting to the log format recommended by Kotler (1994).

These tables provide the data which forms the basis of a BCG matrix, representing respectively the horizontal (relative market share) and vertical (cost basis), the former using a log natural transformation. The conventional axes of the BCG matrix are 'relative market share' (as a proxy for cash inflow) and market growth (as a proxy for cash outflow); here 'cost' is substituted for the 'market growth' variable. The two axes are represented together in Figure 1, with grid lines positioned at $Y = 0$ (a neutral cost position) and $X = 1$ (i.e. $\text{LN} = 0$) to identify market leaders.

The use of market share relativities, relative to the performance of the industry leader, and a log scale on the horizontal causes some problems in practice. Only the industry leader will have a 'relative market share (M)' greater than one, so all other competitors will have negative log scores on the horizontal axis. Consequently only one company can appear to the left of the central vertical, meaning that there can be a 'star' company or a 'cash cow' company, depending on cost levels, but not both! Alternatives to this standard Kotler (1994) approach might, therefore, be explored in practice.

The approximations in the data-gathering make it difficult to argue a unique correspondence of company to BCG category, even though the relative positioning of the companies is in less doubt. However, it is possible to demonstrate the robustness of outcomes by questioning some of the assumptions and evaluating their sensitivity:

- 'volume of sales' is represented above within a simple 1 to 5 ranking. It might be argued that consistency demands a ranking over the full range of -5 to $+5$, which would produce different absolute scores. Thus, if the complete 11-point ranking

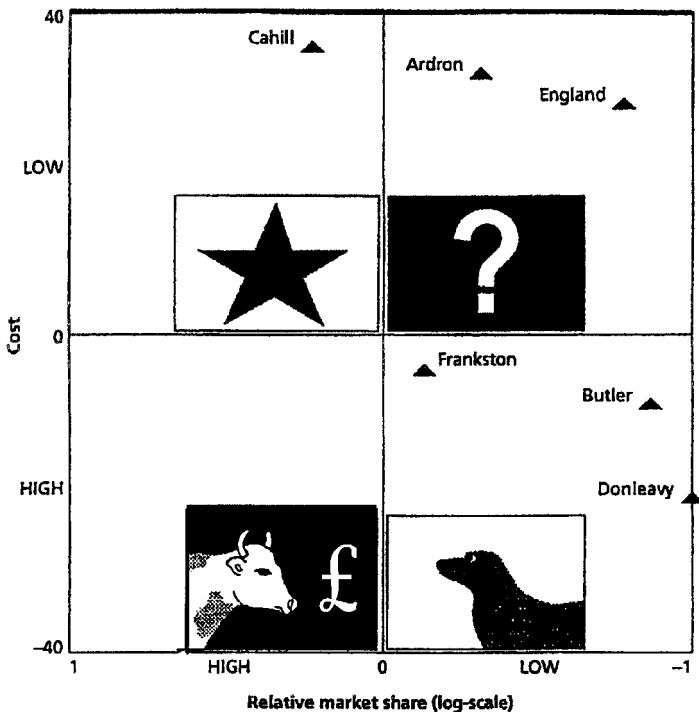


Fig. 1. BCG matrix for customer profitability portfolio.

Table 5. Alternative scores for ‘volume of sales’ category

	<i>Version A</i>	<i>Version B</i>
Ardron	2.6	1.25
Butler	-0.2	-3.125
Cahill	5	5
Donleavy	-1.4	-5
England	0.6	-1.875
Frankston	3	1.875

were applied to sales over the range 0% to 25%, the Version A scores of Table 5 would be produced; if the ranking were applied to the sales of the six major companies (i.e., 9% to 25%) the Version B scores are produced.

- The ‘order frequency’ category of ‘inventory holding’ also suggests alternatives. While the extremes (‘infrequent shipping’ for England, and ‘daily deliveries’ for Donleavy) are straightforward, it is not absolutely clear what the implications for delivery frequencies would be for ‘predictable requests’ (Ardron), ‘crisis deliveries’ (Butler) or ‘JIT scheduling’ (Cahill) – the latter could potentially be demanding despite its apparent compatibility with Derrick’s systems. The alternatives of Table 6 are thus generated.

Combining the A/B/C/D alternatives above, with the more certain elements of the Table 3 matrix of customer requirements, generates four more sets of scores, presented in Table 7. Table 8 compares the final scores for the original matrix and the four alternatives and highlights their close similarities.

The split between positive scores (ACE) and negative scores (BDF) is common to all the alternatives. CAE is the consistent order for the ‘best’ performers, except where pessimistic assumptions are made regarding the impact of Cahill’s JIT scheduling. FDB is the consistent order for the ‘poor’ performers except where optimistic assumptions are made regarding Butler’s order frequency. Other interpretations are possible, but they are unlikely to produce a radical reordering of company performance.

In the light of the similarity of these alternative profiles, the more important issue becomes the recommendations that might be made to improve Derrick’s position.

The BCG matrix highlights the position of Butler Ices and Donleavy’s Ices as ‘dogs’, which are very expensive to service but which, nevertheless, are together responsible for

Table 6. Alternative scores for ‘order frequency’ category

	<i>Version C</i>	<i>Version D</i>
Ardron	5	4
Butler	-5	-3
Cahill	5	0
Donleavy	-5	-5
England	5	5
Frankston	-5	-5

Table 7. Alternative customer requirements indices

	Alternative 1						Alternative 2					
	A	B	C	D	E	F	A	B	C	D	E	F
Purchasing: Discount	4	-4	4	-5	0	0	4	-4	4	-5	0	0
Organization quality	4	-5	5	-4	5	-5	4	-5	5	-4	5	-5
Delivery: Distance	5	-5	0	0	0	0	5	-5	0	0	0	0
Packaging	5	-5	5	0	0	0	5	-5	5	0	0	0
Urgency	5	-5	5	-4	5	-5	5	-5	5	-4	5	-5
Accounting: Records	0	0	5	-5	0	0	0	0	5	-5	0	0
Credit returns	0	0	0	0	5	-5	0	0	0	0	5	-5
Inventory: Sales volume	2.6	-0.2	5	-1.4	0.6	3	1.25	-3.125	5	-5	-1.875	1.875
Order frequency	5	-5	5	-5	5	-5	4	-3	0	-5	5	-5
Total	30.6	-29.2	34	-24.4	20.6	-17	28.25	-30.12	29	-28	18.125	-18.125

	Alternative 3						Alternative 4					
	A	B	C	D	E	F	A	B	C	D	E	F
Purchasing: Discount	4	-4	4	-5	0	0	4	-4	4	-5	0	0
Organization quality	4	-5	5	-4	5	-5	4	-5	5	-4	5	-5
Delivery: Distance	5	-5	0	0	0	0	5	-5	0	0	0	0
Packaging	5	-5	5	0	0	0	5	-5	5	0	0	0
Urgency	5	-5	5	-4	5	-5	5	-5	5	-4	5	-5
Accounting: Records	0	0	5	-5	0	0	0	0	5	-5	0	0
Credit returns	0	0	0	0	5	-5	0	0	0	0	5	-5
Inventory: Sales volume	2.6	-0.2	55	-1.4	0.6	3	1.25	-3.125	5	-5	-1.875	1.875
Order frequency	4	0	0	-5	5	-5	5	-5	5	-5	5	-5
Total	29.6	-27.2	29	-24.4	20.6	-17	29.25	-32.125	34	-28	18.125	-18.125

Table 8. Comparative consumer requirements index scores

	<i>Ardron</i>	<i>Butler</i>	<i>Cahill's</i>	<i>Donleavy</i>	<i>England</i>	<i>Frankston</i>	<i>Order</i>
Original	28	-13	32	-19	27	-7	(CAEFBD)
Alternative 1	30.6	-29.2	34	-24.4	20.6	-17	(CAEFDB)
Alternative 2	28.25	-30.125	29	-28	18.125	-18.125	(CAEFDB)
Alternative 3	29.6	-27.2	29	-24.4	20.6	-17	(ACEFDB)
Alternative 4	29.25	-32.125	34	-28	18.125	-18.125	(CAEFDB)

over £2m of annual sales. Change strategies must be introduced, but with a good deal of management sensitivity, especially in the short-term. A sympathetic approach, and one which recognizes the mutual benefits of changes in internal systems, should be pursued.

Priority actions revolve around making both of these customers less expensive while, if possible, maintaining their business. Strategies might include:

- *Butler Ices*
 - impose charges for their unique packaging requirements;
 - restrict free deliveries to fewer visits – those on the regular runs;
 - impose punitive charges for crisis deliveries; and
 - offer assistance from Derrick's to reorganize inventory control procedures (this offer might make the first three strategies more palatable to Butler).
- *Donleavy's Ices*
 - strict adherence to discount availability mechanism to discourage consistent late payment;
 - restrict the availability of free deliveries;
 - impose punitive charges for crisis deliveries;
 - tighter specification of mutual responsibilities with the clear acknowledgment that Derrick's is prepared to sacrifice Donleavy's business if there is not improved cooperation and better management controls.
- *Frankston Chocs* is a more marginal 'dog' and offers significant improvement opportunities. It is too big a customer for Derrick's to risk its loss (annual sales £2m), but its accounting and merchandizing procedures are expensive and need attention. Derrick's might explore closer links with Frankston in order to exploit its future potential. At the very least it might offer assistance to reorganize inventory control procedures, and ordering and credit procedures, with the ultimate aim of converting it to '?' status.
- *Cahill's Cones* is the star performer in Derrick's customer portfolio. As well as being the largest, it makes the fewest demands on Derrick's organization. Cahill are well organized and progressive, as reflected by their adoption of the latest management accounting techniques. Cahill might also provide a suitable joint-venture partner in the development of new outlets in areas where Derrick's currently exerts minimal influence.
- *Ardron's Wafers* and *England Wedges* similarly make few demands on Derrick's, being reliable and regular in their requirements. Although individually less important than Cahill, and accorded '?' status, together they account for one third of Derrick's sales.

The BCG matrix gives a simple (sometimes simplistic) overview of the current relativities in Derrick's portfolio and limitations arise in its implementation when trying to devise strict dividing lines. As noted, the textbook analysis dictates that there will only be one market leader, i.e. only one company assigned to the left-hand quadrants, and therefore only one company which is termed a 'star' or a 'cash cow' – with the requirements score determining its precise position. However, it forces us to take an overview of all customers and highlights individual contributions.

The case has been used with both undergraduate accounting students and MBA candidates, in each case in a small group situation. It has worked best when run after, or in parallel with, a basic marketing course at both levels. It has been taught as part of a topic devoted to 'activity based costing' in which the analysis has then been extended from product profitability to corporate portfolios and customer profitability. The case seeks to highlight that conventional accounting methods will fail to reveal differences in costs attributable to different customers: customer-related costs will usually be treated as period expenses, and even traditional ABC methods may have difficulty in analysing cost drivers in these areas, despite the likelihood of their being nonvolume related, because of measurement issues. Whereas product profitability emphasizes the impact of undercosted products resulting from low volumes, high wastage rates and high levels of rework, customer profitability seeks to pinpoint low volume/low margin customers who consume more than proportionate expense in servicing orders. The aim is to identify problem customers and eliminate or modify the service provided to unprofitable ones. With all groups considerable guidance had to be provided, both to illustrate how the BCG matrix might be operationalized in detail, and to encourage students to make realistic assumptions to overcome the uncertainties of the case. This has resulted in a number of alternative and innovative schemes, as illustrated above – which helped to provide a mutual sensitivity analysis of the assumptions – and confirm the robustness of the outcomes.

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