Research Papers
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WP 27/2000

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Recipes for Success - Product Development Benchmarks in the UK and German Food Industries

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October 2000

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Acknowledgement: The research was funded by the Design Council and the EPSRC (Engineering and Physical Sciences Research Council, Grant GR/L16835), whose support is gratefully acknowledged.

Abstract

Product innovation is recognised as a key determinant of sustainable business success. Many studies have tried to identify 'best practice' in product development and to offer prescriptive advice to companies. However, these prescriptions are often indifferent to the trade offs which exist between different forms of new product development (NPD) organisation, and have been strongly geared to industries which either operate on a large scale or are strongly R&D orientated, such as the automotive or electronics industries. It is not clear to what extent prescriptions from these industries also apply to domestically oriented, mature industries.

To address this issue, this study set out to identify good practice in new product development in the food industry. It comprised a benchmarking study of new product development that included both quantitative benchmarks of NPD performance and practice, and qualitative information about companies' NPD processes. The study focused on UK food companies, but also analysed a number of German companies to highlight critical features of the UK model of new product development. Altogether the study covered 33 food processing companies.

The results of the study show that product innovation in the food industry is ubiquitous. However, most new developments are modifications of recipes around a common product 'platform'; major concept and process innovations are rare. Accordingly, spending on NPD as a percentage of turnover is low.

The correct identification of market needs represents the key challenge faced by companies in the food industry and requires substantial effort and skill. Issues of manufacturability and supplier involvement in development were generally addressed without too much difficulty. As most product innovations concern modifications to established product platforms, the inputs of Manufacturing or suppliers were rarely seen to be of critical importance.

Key roles of senior management included the selection of projects and the elicitation of the commitment of different functional departments to new product development goals. Formalised processes were an important method of empowering the Development function vis-à-vis other departments, and thus achieving better development outcomes.

Comparison of UK practices with those in Germany showed that companies in the two countries found similar organisational answers to similar problems. However, there was also national variation, with German companies showing a longer-term orientation and tighter, more structured organisational forms and processes.

Introduction

Product innovation is recognised as one of the prerequisites of sustainable business success. Whereas traditionally much emphasis has been put on increasing manufacturing efficiency through improved work organisation, more recently attention has shifted to firms' ability to continuously develop marketable new products. In terms of the broader economic environment, this shift of attention reflects a self-reinforcing cycle where accelerating technological and organisational change has induced fast changing market demands and thus a rising need for new products and services, which in turn have hastened the rate of technological and organisational change.

Companies have therefore been eager to improve their new product development processes to meet these new challenges and academic research has tried to identify the drivers and determinants of successful new product development. A number of landmark studies have aimed to condense these into a set of prescriptive 'best practices' of new product development (e.g. Clark and Fujimoto 1991; Cooper and Kleinschmidt 1996; Leonard-Barton 1995).

The *Centre for Product Innovation Research* (CePIR) at the University of Cambridge has conducted a number of benchmarking studies of new product development in the electronics, automotive and audio industries under the sponsorship of the Design Council and the EPSRC (see Oliver et al. 1999, 1997a, 1997b, 1996; Haake et al. 1999). As part of this research CePIR has also developed tools to assess the performance of product development processes.

Still, the present understanding of successful new product development is strongly biased towards large scale or high-technology industries which are typically marked by high R&D expenditures and strong international competition. Most studies have neglected the fact that more mature and domestically oriented industries represent the largest part of manufacturing employment and output. A better understanding of product development performance in these sectors can therefore make a major contribution to a country's productivity and of wealth.

Many studies of product development practices have identified the strengths and weaknesses of different approaches by using cross-national comparisons, in particular comparisons between Western and Japanese practice (see Clark and Fujimoto 1991; Westney 1993; Birou and Fawcett 1994). This study makes use of the added insights of cross-national comparisons

by including a number of German food companies whose product development practices are compared to those of the UK model.

Based on past research, several generic determinants of successful product development can be identified. These can be broadly summarised as:

- The ability to read the market, namely identify consumer needs, and incorporate these into the development process.
- The ability to incorporate technological information into the development process in a way which is matched to consumer needs. This also implies the ability to incorporate the concerns of manufacturing and suppliers into the development process.
- The ability to maintain and improve these abilities through a process of learning, which in turn requires the consistency over time between NPD activities and the direction of the company.
- The ability to implement these organisational processes in a way that minimises costs, and maximises speed and adherence to planned targets.

This report first provides an overview of the UK food industry and of our research approach. The next part briefly describes the companies who participated in the study, their NPD activities and the specific projects which were covered in the course of this research. We then consider the organisational practices in terms of the interfaces between Development and the other main actors involved in the development process. These other actors include Marketing, customers (retailers and end-customers), Manufacturing, suppliers, senior management and other functional departments such as Purchasing and Logistics. The penultimate section will present a comparison of organisational practices of UK and German food companies. The main findings and their implications will be summarised in the final section.

Research Approach

At the outset of the project, desk research sought to identify an appropriate sector within which to conduct a benchmarking study of new product development performance.

Food manufacturing was selected for a number of reasons. First, food manufacturing plays a significant role within the UK economy - consumer spending on food was £42.5 billion in 1997, representing 8.4 per cent of overall consumer expenditure (*Keynote*, 1998). Secondly, there are a large number of food manufacturing companies in the UK varying in size from multi national corporations to small firms; for example 7,510 food manufacturing businesses registered for VAT in 1998 (*Keynote*, 1999). A large pool of comparable companies is highly desirable in a benchmarking study. Thirdly, the food sector is fast moving, typically with short product lifecycles. Therefore product development plays a core role in the everyday business of food manufacturing. (*The Grocer* 1999). Finally, there is a distinct split within product development in the food industry, where manufacturers often produce goods under their own brand as well as undertaking development for large retailers such as TESCO or Marks and Spencer. These product development processes have several interesting points of difference, which are brought out in this report.

This research focused on a number of sub sectors of the food industry where new product development activity was especially vigorous and where the product development process was complex enough to give us rich qualitative and quantitative data. This resulted in the exclusion of refining, milling and other basic food operations and the inclusion of the following sub sectors:

- Frozen and chilled ready meals
- Ethnic food
- Confectionery
- Snack food
- Yoghurt and value added desserts
- Specialty Bread
- Health Food
- Sandwiches

As Table 1 demonstrates, the majority of these sectors have seen a significant growth in sales in recent years.

Table 1: Sales and Growth Within Food Industry Sub Sectors

Sub Sector	Value of sales in £ (year)	Growth per year
Yogurt	1 billion (1997)	N/A
Frozen and chilled ready meals	1.13 billion(1997)	+ 32.4 % (1993-1997)[1]
Snack Foods	2.01 billion(1997)	+ 14.6% (1993-1997)
Confectionery	5.45 billion 1998	+ 23.8 % (1993-1998)
Bread products	2.8 billion 1998	N/A
Sandwiches	3.3 billion 1998	+ 22.5% (1993-1997)
Ethnic Food	594 million 1998	+ 58.4% (1993-1998)

[1] Chilled ready meals only. Source: *Keynote* (1999)

Following sub sector selection, a sample of 100 companies was identified. The companies were identified via market research literature, trade associations, internet searches and direct investigation of the products on the shelves of food retailers.

Initial written approaches were made to these firms, followed by telephone contact during which companies were asked to commit to completing a 14 page benchmarking questionnaire and participating in a two hour face to face interview. Of those companies approached, 33 agreed to participate, of which four were located in Germany. The benchmarking questionnaire was sent to the companies prior to the interview, allowing them to complete it in advance of the face to face visit, at which time their responses were reviewed.

The questionnaire was an adaptation of a tried and tested product development assessment tool developed by CePIR and used in several other sectors. It comprised two sections, the first covering general information on the company and product development practices, the second covering detailed information pertaining to a recently completed new product. Data were requested on issues such as lead times, schedule slippage, cost slippage, the functional make up of project teams and so on.

The face to face interview covered similar issues to the questionnaire but focused upon drawing out the 'story behind the numbers'. These interviews were conducted with personnel who had had direct roles in the projects covered by the questionnaires. The majority of

interviewees were from the Development function, but on occasions personnel from Marketing were interviewed as well.

The Companies and Product Development Activities

The companies covered by this study reflect two key characteristics of the food industry, namely its strong domestic focus and the uneven economies of scale found in different market segments. Thus, the average percentage of sales going to exports amounted to only eight per cent with nearly a quarter of companies not exporting at all. The low level of exports may be explained primarily in terms of the high relative transport costs in the food industry. One crisp manufacturer described this as follows:

> ‘‘The low export share has to do with the shipping costs in the sense that we are effectively packing air. Most of the products we have in the UK are replicated through other manufacturers, national operators, on the continent. ... It pays to produce at a local level. The only product we have seen go around the world is one where you have a stacked product. It has all the air taken out, effectively, so it concentrates the weight into a smaller area and then becomes viable - and it is sold at a premium price.“

Low levels of exports may also be partly explained in terms of distinct national tastes though these may be decreasing in importance.

The uneven economies of scale, on the other hand, are reflected in the strong variation of annual sales varying from less than £2 million to £800 million with an average of £189 million. Numbers of employees reflect these variations in scale. The average number of employees is 1,627 but they vary from 30 employees to 9,000+. Economies of scale refer not only to manufacturing costs, but also to marketing costs. As one crisp manufacturer commented:

> ”Barriers to entry are very low. There are probably about twenty players in the market place from the really, really small to the massive. Costs of entry are well under £1 million if you want to go into this market place, with second hand kits, maybe an organic or a niche sector. And in fact some people have come in for less than £100,000. So there are no scale benefits in that respect. The real scale comes from advertising, the costs of that, and to have a snack which is sustainable with advertising support, you have got to be achieving about 2.5 to 3 per cent of the value share of the particular segment you are operating in.”

In contrast, a manufacturer of frozen pizzas emphasised the role of scale economies in manufacturing:

> "There are enormous economies of scale. The level of investment for a first class pizza are enormous. We have millions which we invest per production line. These are extremely costly facilities, which present high entry barriers for new competitors, but this also means that we have to operate at high scales to work economically. Put differently, smaller scales imply higher prices at which we cannot sell in the market... our main competitor recently invested about £60 million into two new pizza lines."

Nevertheless, the figures underestimate the level of concentration in the food industry, as many of the business units analyzed in this study were part of larger concerns, which were managed in a more or less centralized way. The food market is split into broadly two segments: (a) more mature markets with significant economies of scale in manufacturing and marketing and with oligopolistic market structures and (b) evolving markets with more limited economies of scale and more dispersed market structures. The different levels of concentration are imperfectly reflected in the market share reported by the companies, as the reference markets differ widely in size and complexity. Average market share reported by the companies was 20 per cent.

Many of the UK companies were enjoying double-digit levels of growth with annual growth over the last three years averaging 17 per cent. However, the most rapid growth occurred amongst companies in the newly evolving sector of specialty foods, in particular ethnic foods. Companies with the lowest growth rates were oligopolistic players in mature market segments such as chocolates or crisps. Average profits amounted to about 6.7 per cent of turnover with a minimum of 0.8 per cent and a maximum of 17.6 per cent (see Table 2).

Table 2: Company Characteristics

	Average for last three years
Annual sales	£189 million
Number of employees	1,627
Profit as % of sales	6.7%
Annual growth	17%
Market share*	20%
Exports*	8%

*Average for the preceding 12 months

In the food industry, market dynamics differ significantly between the more mature and newer market segments. In more mature segments such as chocolate bars, biscuits or crisps there is little overall growth and product development is used by the different players to safeguard their respective slices of the market. In newer segments such as ready made meals and ethnic food, product development very often creates new markets in the first place, or at least makes a significant contribution to their development.

From the perspective of the consumer, several trends drive opportunities for new product development, especially in new market segments. First, increases in working hours mean that consumers have less time to prepare their food and less time to spend time eating it. This implies higher demand for ready-made meals, and for snacks, confectionery and sandwiches - products that offer quick nourishment. This trend has been helped by the availability of devices like microwaves that speed up the cooking process. Secondly, an increased awareness of health and dietary issues has fuelled product development within the vegetarian, confectionery and snack food sectors. Finally, increased foreign travel – starting with the package holiday revolution in the 1970s – and the growth in ethnic restaurants has fostered demand for ethnic dishes. This started with basic sauces and marinades, but has become more and more sophisticated.

However, given these pressures for new product development, the amount spent by the food companies in our sample on new product development was strikingly low, averaging just under one per cent of sales, and rising above two per cent in only one case. This seems to reflect several aspects of product innovation in the food industry. First, product innovation in the food industry can be broadly separated into product variations and major concept and process innovations:

> ”We do between 40 and 50 projects annually. Of these, true innovations are about six. They cost more manpower. However, the others also swallow up a lot of resources. Per year, we have about four to five seasonal products, two, three different cakes on top of these. As a result about 15 of these projects are of a tactical nature”.

Product variations thus make up the majority of product innovations in the food industry and typically involve only limited expenditure. Thus, a typical product innovation in the food industry is relatively inexpensive in development costs *per se*. The most extreme case in this respect is represented by sandwiches where most innovations are simply minor product

variations:

> "Anybody can just put lots and lots of new sandwiches on the shelf. But what happens with sandwiches, the sandwich buyer gets bored very quickly, and so the life of one product may only be twelve weeks, and so it is a quick turnover. We have, for example, launched 45 products this year, and only 25 of them are still on the shelf."

A large proportion of the cost of major concept and process innovations is typically absorbed by other budgets as such innovations usually involve capital investments and advertising costs. The advertising costs of a new branded product can easily exceed the development costs *per se* by a factor of ten.

The low incidence of radical innovations is also reflected in the low level of patenting activity amongst the food companies, approximately half of whom had not registered any patents during the three years leading up to the study. Around a quarter of companies had registered just one patent. The maximum number of patents registered by any company was 12, the overall mean was two.

Table 3 : New Product Development in the Food Industry

	Average
Product development costs as % of sales	0.85%
Number of people in NPD	15
Number of products launched per year	28
Percentage of sales coming from products launched in the preceding two years	30
Number of patents over the last three years	2

All companies but one had dedicated sections or units with the brief of looking after product development activities. The outlying company was one of the smallest companies in the study, with less than 50 employees. On average, there were approximately 15 people in each department, typically comprising food technologists and chefs, engineers or chemists. The largest specialist product development department had 71 staff, but there were several with three people or less. The average is strongly influenced by a few large companies with large NPD departments. A number of companies in our study also had access to dedicated research facilities of the group to which the company belonged. These specialised in more basic forms of research, in particular in the area of food chemistry.

Despite the small size of many of the departments, product development activity was intense and the average number of products launched in the 12 months preceding our study was 28. As mentioned above, this largely reflects the frequency of product modifications rather than major innovations. In tune with this, the significance of new products to sales was high – overall, 30 per cent of sales came from products launched in the preceding two years. Nearly one quarter of the companies in the study drew 50 per cent or more of their sales from recently launched products.

Project and Product Characteristics

Eighty eight per cent of the projects covered by the study involved only low levels of product or process innovation, and were essentially reconfigurations of tried and tested ingredients and processes. On average, companies had prior experience with approximately 75 per cent of the ingredients that comprised the new products in the study.

However despite the routine nature of most projects, three were major innovations, which accounts for the variation in development costs seen in Table 4. These projects were characterized by major tooling investments, large expenditure on market research and major pushes to break into new product areas. For example, one company was developing a new type of highly innovative and technically complex confectionery. They commissioned a large amount of market research before developing the product and commissioning a dedicated, state-of-the-art factory in Eastern Europe. This represented a large investment in absolute terms, though it was modest in relation to the company's annual turnover.

Most routine projects comprised flavour extensions, changes to the formulation of recipes, or changes to portion size. Although significant market research was often needed to gauge consumers' tastes, the ingredients and processing methods required for the new products were usually well known to the company.

Food manufacturers typically specialized in particular sub-areas such as reduced fat or *'lite'* products. Retailers often approached the specialist manufacturers with requests to produce retailer 'own brand' products, and 46 per cent of products were developed in conjunction with retailers.

Table 4: Product and Project Data

	Mean	Minimum	Maximum
Percentage of ingredients with which the company had previous experience	74%	0%	100%
Months elapsing between launch of a previous generation product	67	0	396
Percentage of products developed in conjunction with retailers	46%	0	100%
Total development cost (£)	£1,490,989	£375	£27,000,000
Total Cost of Product Development (£)	£ 414,416	£375	£ 7,000,000
Total cost of process development (£)	£1,246,558	£ 0	£20,000,000

New product development processes in the food industry follow a distinct pattern. Development teams usually consisted of a minimum of two people, typically a product manager (from Marketing) and a Development manager (often a food technologist) with the product manager in many cases acting as the project leader. Depending on the nature of the project, an engineer, food chemist, chef or another food technologist might complement these two players in the 'core' development team. In the projects examined, core development teams comprised four people on average - quite small compared to those found in other sectors. Core development teams met formally about every two weeks and informally once a week. However, individual members typically met more frequently, often on a daily basis during certain phases of the project.

People from other departments tended to enter and leave the core team as projects moved through their different stages. In the initial phases functions such as Sales and Marketing, were heavily involved, followed by Manufacturing, Packaging and Purchasing and later Distribution and Sales again. The average 'wider development team' comprised 15 people. Development teams were typically overseen by committees or 'steering groups' in which the major functions were represented, usually comprising around five people.

While the small size of product development teams in the food industry makes their co-ordination relatively straightforward, the large number of projects that individual

development managers had to handle simultaneously increased planning complexity significantly. Project leaders typically led seven projects at any one time.

Table 5: Project Development Teams

	Average
Number of people in core development team	4
Number of people in wider development team	15
Number of people in steering group	5
Frequency of formal meetings of core development team	Every 15 days
Frequency of informal meetings of core development team	Every 7 days
Number of projects simultaneously led by the project leader	7

Reading the Market

One of the key determinants of successful new product development is the ability of companies to 'read the market' in order to produce products that meet customers' needs and desires. The positive correlation between the incorporation of customer needs throughout the new product development process, and the overall market success of the end product has been highlighted by many observers (Cooper 1979, Malidique and Zirger 1984, Griffin and Hauser 1993).

Seventy two per cent of companies exceeded their forecast sales of the product within the first year in the market, indicating that the products were generally well received by customers. Several distinct approaches to reading the market were identified. In addition to these, a number of tools and techniques were used to ensure that products were market-focused. These are discussed below.

Four main approaches to reading the market were identified. These were:

- Brand led development
- Retailer led development
- Manufacturer own label product development (reactive and proactive)
- 'Instinct led' development.

Brand led development. A proportion of the companies interviewed were multi national corporations with well-known brand names providing an umbrella identity for a series of individual products. In these cases, the incorporation of brand values and customer perceptions of the brand were crucial to the new product development process. The approach to reading the market within brand focused companies was distinct in two main ways. First, the process was typically managed by someone from a marketing function, usually carrying the title of 'brand manager'. The purpose of this was to ensure that the new product stayed consistent with existing brand values. Secondly, the cost of the development, especially in terms of advertising expenditure tended to be much greater. In the light of this, the effort directed to consumer research and 'reading the market' was high.

Market research in the brand-led developments frequently used consumer groups to generate new product ideas and also to test the feasibility of early product specifications. Some companies extended the use of these to 'blue sky' research with specific occupational groups. For example, one snack food manufacturer used groups of teachers and journalists to discuss their ideas about the future of a specific brand, as well ideas for new 'fantasy' products.

Retailer led development. About half the projects in the study were for 'own label' products for the major retail chains. These products were usually direct copies of branded products which the retailer displayed close to the branded product, but at a slightly lower price point. The typical process of product development for these products kicked off with interaction within the retailers between Product Managers and Marketing. At this stage, product lines which offered potential to attract customers away from branded goods to cheaper, own label versions were identified. Specifications were then created, detailing a broad set of criteria for the new product range. This specification was presented to the NPD manager at the food manufacturer, who together with the development team (Marketing, Production, Development, Recipe Chefs) produced samples for presentation to the retailer. These samples were largely be based on reconfigurations of the branded product which the retailer wished to copy.

Once retailers have selected their desired products, the food manufacturers conduct tasting sessions with consumers to refine the product attributes. Allowing consumers to interact with specific product prototypes provides the food manufacturer with valuable information relating to the appearance, price and sensory qualities of the product. For example a sandwich

manufacturer who was having problems in narrowing down the combination of flavors available in a new range of sandwiches commented:

> "The panel was very useful to us because there were certain features of some of the products that we had nagging doubts about, and it confirmed those doubts."

Once the specification was agreed, retailers then typically took responsibility for the promotion of the product.

Own label product development. In the development of own brand goods by the food companies, the development process was mostly overseen by a new product development manager with inputs from Marketing and Production. Marketing effort was generally greater in dynamic and growing sub sectors such as ethnic food, snacks and confectionery.

Companies within the dynamic sub sectors generally had a proactive attitude to product development; they were enthusiastic about innovation and the challenge of bringing new concepts to the market. In these cases more emphasis was placed upon innovative methods of drawing in the views of customers and ensuring that these were addressed in the final product. Companies in more mature sectors, such as dairy products, tended to have minimal marketing involvement, and their new product development efforts were reactive, often undertaken to defend market position. These frequently took the form of 'me too' products (direct copies of competitors' goods). Consequently effort was usually concentrated on the technical analysis and reformulation of competitor products. Marketing personnel functioned as market monitors and relayers of information, rather than integrated members of the NPD team.

'Instinct led' development. Under this model, senior managers (or owners) drove product development, often with minimal involvement from the other functions within the company. New product ideas often stemmed from an instinctive 'feel' for the needs of the market. In the majority of cases of instinct-led development no consumer research was conducted to test whether the ideas matched customer requirements. Perhaps unsurprisingly, the majority of instinct-led products did not meet sales targets within twelve months of product launch.

Having established the main models of new product development, we then examined some the specific tools and techniques used to incorporate the voice of the customer into the new

product development process. All the relatively successful projects in the study used these tools and techniques. We defined successful projects as those in which products had exceeded predicted sales in the first twelve months after launch.

Formalized market research. Market research agencies were used to ascertain customer requirements amongst 60 per cent of the surveyed companies, and the average amount spent on this type of research was close to £0.5 million per annum. However as a percentage of sales, market research expenditure only accounts for an average of 0.3 per cent. This type of research took several forms. The first was gap analysis, which refers to the examination of market information published by market research companies such as Nielsen. Typically, Marketing would examine such data and identify any potential gaps in the market which suggested scope for new products. In some cases, the data also revealed opportunities to copy products that have been a success in the market place for other manufacturers (*me too* products). As a manufacturer of ready meals commented:

> "We have reports from Nielsen on a quarterly basis, that will monitor what our competitors are doing. They have been useful in terms of the product development thinking 'Oh, it is selling quite well let's have it in our range'."

A second form of formalized market research was represented by the use of market research agencies. Such agencies used a variety of qualitative and quantitative techniques to gauge consumers' opinions of new products. Opinions were normally gathered in tests conducted in different geographical locations and with different socioeconomic groups. During these sessions consumers would assess pilot products, or concepts and ideas for new products.

Informal methods. In conjunction with formal methods of market analysis, companies also used less formal methods to assess market opportunities. One interviewee described the process as follows:

> "We will visit restaurants and food outlets to work out where there are new flavors, cuisine and styles of food. We will use chefs in the market place and our own chefs to work on new ideas"

The development chefs also took previous products and mixed and matched ingredients to come up with new ideas. Direct observations from overseas were sometimes used to collect new product ideas. Food manufacturers also used supermarket buyers as sources of ideas for

new products:

> "We have a good relationship with the buyer, it is easy enough to phone them up and say 'I need your help'".

Some companies in the study subcontracted the entire early stages of their product development process, and handed over the responsibility to product development consultancies:

> "We have two product development companies that work very closely with us, one specializes in direction and vision for products, the other is more of an implementation company".

The Development-Manufacturing Interface

Design for manufacture has received a lot of attention in recent years, since it has been recognized how early design decisions can have huge ramifications for costs and quality via product manufacturability. Within some sectors, the transfer of products from development to mass manufacture can be a major source of problems. However, in the food companies, manufacturability did not appear to be a major issue. The majority of companies in the study reported that they had not experienced significant problems at the Development/ Manufacturing interface. On average eight percent of products failed to meet quality standards during the first month of production, and one percent of products failed to meet quality standards after production had settled following product launch, as shown in Table 6.

The companies who experienced the lowest levels of manufacturing-related problems (and who consequently appeared to be the most effective at managing the Manufacturing/ development interface) commonly employed the following techniques:

- A balanced approach to the integration of the manufacturing function into multi functional new product development teams
- Extensive use of pilot production
- The use of product platforms
- The employment of development staff with backgrounds in manufacturing.

Each of these will be discussed in turn.

Table 6: Manufacturing Performance Data

	Mean	Minimum	Maximum
Number of changes in the first six months of production	1	0	10
Percentage of products failing to meet quality standards during the first month of production	8%	0%	41%
Percentage of products failing to meet quality standards after production has settled post product launch	1%	0%	6%

A balanced approach to the integration of Manufacturing. Several companies reported that they found the best way of integrating the manufacturing function into the new product development process was to phase Manufacturing's input in and out at particular stages. Manufacturing were typically closely involved at the up-front concept stage of projects. Their function at this point was to provide a 'sanity check' for the development team and to ensure that new product concepts were feasible to manufacture. During the course of the development process, the Manufacturing function would then be called in at certain critical junctures, such as pilot production and scale up. During intervening periods they would be kept informed of progress but were not overly involved in the day to day detail of the developments.

This balanced approach appeared to work because it kept the lines of communication between Manufacturing and Development open, but at the same time did not allow issues of current Manufacturing capability (or convenience) to veto new product ideas prematurely. Too much influence by the Manufacturing function could result in products that were easily manufactured but not customer-focused. As one company put it:

> "We were beginning to compromise some of the new products so that we could make them easier to manufacture in the factory. This is all well and good, but it is not what the customer requires, with similar products being churned out of the door"

Companies who did not achieve balance between the influence of Development and Manufacturing and who threw ideas 'over the wall' were typically those who experienced the most manufacturing problems during (and after) product launch. One illustration of this came

from a company who manufactured food pastes. When a new recipe was ready, and not before, it was passed over to Manufacturing - with no discussion. In one case this lack of integration resulted in the paste separating during processing, causing huge schedule slippage and wastage:

> "The batches in the tanks are three tons capacity, so you have to make a minimum of about a ton and a half. It gets quite embarrassing when you make a ton and a half and its not right".

Extensive Pilot production. The use of pilot production runs was a key means of smoothing the transfer of products into manufacturing. Pilot runs enabled Development and Manufacturing staff to work together in a relatively unstressed environment in order to establish machine operating parameters, identify potential processing problems, and so on. The majority of the companies who experienced significant manufacturing problems did not undertake pilot production.

The use of product platforms. The majority of successful companies used 'product platforms', by which we mean that they focused on a core product idea, from which it was possible to spin off multiple derivatives. An example of this was found with crisps, where the majority of new products were variations on a common base. By concentrating on a specific area, companies were able to develop a high level of experience with the ingredients and processes, consequently the manufacturing interface was less fraught and subject to problems. In addition to this, even the more innovative new products in the study typically built upon the foundations of tried and tested techniques and ingredients.

The Employment of Development Staff with Manufacturing Experience. Companies who handled the Development/Manufacturing interface effectively typically had a large proportion of ex-Manufacturing personnel in their development teams. This meant that knowledge of Manufacturing's capabilities and constraints could be incorporated into the development process, without the need to spend large amounts of time on direct liaison activity. As one development manager put it:

> "[Producing the product] is a complex process but I think that from experience you have a pretty good idea of what will and won't work. "

Supplier Involvement in Development

The new product development literature often emphasizes the benefits of supplier involvement in the development process. There are a number of reasons for this. Supplier knowledge of technologies and ingredients can be useful in the development of new products; awareness of suppliers' capabilities can help reduce costs, improve quality and so on. Despite these potential benefits, Table 7 demonstrates that supplier involvement in development amongst the food companies was quite limited.

Table 7: Supplier Involvement in Development

	Mean	Minimum	Maximum
Number of suppliers	16	3	104
Percentage of suppliers with significant involvement in the NPD process	24.0%	0%	100%

The companies in this study drew primarily on market information for new product ideas rather than on the knowledge of their suppliers. Supplier input, such as it was, tended to focus more on new ingredients or types of packaging or machinery. Of those companies who did report contributions from suppliers, involvement fell into two types. First, there was some involvement that contributed to the formal development of new product ideas; secondly, supplier involvement was sometimes necessary in order to resolve unforeseen problems. In the first instance, involvement could be either random or managed. In the case of a sauce manufacturer, random ideas from suppliers were regarded as useful inputs into the pool of new product ideas.

> "We always say that we are not too proud to pick other people's ideas up and call them our own. We rely on raw material suppliers, being close to them and talking about innovation."

In the case of a ready-made meals manufacturer a more formalized process existed to harvest potential new product ideas.

> "We have a monthly supply chain meeting. In this we invite those who we believe to be our key suppliers to do presentations and within that they give us an idea of how they are going to help us enhance our business."

Many of the manufacturers had official agreements with their suppliers regarding intellectual property in order to protect any new product ideas resulting from this liaison. With respect to the second type of involvement, several companies reported how suppliers had helped them solve problems when they had encountered difficulties in processing ingredients. For example, one health food manufacturer who had major problems processing an innovative paste approached the supplier of the paste for assistance:

> "The suppliers of the paste came into the plant and showed us how they thought we could 'layer' their product in this plant."

We also be observed that different types of supplier had different levels of involvement in development. Suppliers of raw ingredients were most commonly involved in the development process, with machinery suppliers only being integrated by a small proportion of the food companies in the study.

Senior Management Involvement in Development

As the preceding sections have shown, product development relies on the interaction of several different functional departments of a company. This cross-functional interaction serves to feed market needs into the development process and to provide technical solutions that match these needs. In this, senior management plays a vital role. First and most directly, senior management has to ensure cross-functional integration in the realisation of new product development goals. More generally however, senior management has to ensure that the cross-functional integration required by the various departments matches with their actual and potential capabilities. Practically, this means that senior management has to monitor the selection of new product development goals to ensure their consistency over time, both in terms of their compatibility with external opportunities and with internal capabilities. In this context, senior management involvement is best characterised by type of product innovation, i.e. whether the innovation only represents a recipe modification or a major concept or process innovation.

Senior management involvement in product modifications

In the case of recipe modifications, the main role of senior management was to ensure that a multitude of individual product modifications was in line with overall strategic goals. This follows from the large numbers of product modifications, typically several dozen, that any single food company had to manage at the same time. If such modifications are not carefully

filtered according to crucial strategic criteria, limited development resources may be dissipated on a large number of incoherent modifications.

Food companies have developed different mechanisms to address this challenge. The first approach is represented by the systematic development of particular business fields. In this case, a company may use product modifications to broaden its range of products in a given field. For example, a manufacturer of vegetarian ready-made products used a rolling cycle of monthly reviews of product development in different product fields. The Development Manager described the process in the following way:

> "The whole thing starts with a top-down process, definition of business strategy, with then a look at sector strategies and development programmes which come from this, and the whole thing is an iterative loop. The development programme is reviewed on a monthly basis by the Product Development Steering Committee, which is the Board plus me, plus one or two marketeers depending on which sector we are looking at that month. ... So there are strategies, sector strategies, development programmes and then specific product development projects, the whole thing being iterative as a loop."

The process thus served to ensure that individual modifications were geared to an overall plan or direction in terms of how a business field was to be developed, and also that resources were allocated to those business fields prioritised by senior management.

The second approach revolves around the definition of one or several core products and the systematic attempt to maintain and improve market position through product development. One manufacturer, for example, was completely dedicated to the production of frozen pasta and pursued the goal of becoming market leader in frozen pasta by offering the best available dish at each price point. Another manufacturer was dedicated to the production of frozen pizza and through product innovation tried to keep abreast of consumer preferences and competitor products. The advantage of this approach is that it allows both Development and the other departments to focus on a clear set of common goals like 'being the market leader in frozen pasta'. The main drawback of course is that this naturally limits the scope of possible activities a company can pursue. The development manager in the frozen pasta company commented:

> "One of the major retailers has asked us to go to RTE [ready-to-eat] status, which means we could produce chilled products, but as a business we do not want to do so. We produce frozen products, that is what we are good at, and that is what we are going to do. In some instances there are immutable rights,

> we say we do this, we are good at this, and this is what we are going to do, we don't care what you want us to do. ... We of course try to combat the competition from chilled products by producing lower cost units."

Senior management involvement in major concept and process innovations

In the case of major concept and process innovations, the findings highlight the role that senior management support for projects plays in their successful completion. In general, major strategic innovations enjoy the enthusiasm and commitment of the core product development team, as well as the support of other departments. Tight deadlines may help foster a common sense of purpose. Examples of such enthusiasm were found in several developments. These included: high-profile chocolate bars by a company which had previously been confined to biscuits; a new type of dough for frozen pizzas to pre-empt market entry by a potential competitor; a completely new manufacturing process for cannelloni: and the development of a retailer own-label version of a snack product.

In these cases, strong senior management support appeared important for two main reasons. First, senior support creates a sense of eagerness and importance around a project, fostering a sense of 'mission'. More tangibly, the perception that superiors are interested in the success of a project encourages all participants to commit their own work and resources towards its success. This aspect is particularly important as major projects often depend on the co-operation and support of junior staff in other functional departments, over which development managers tend to have only limited control.

The importance of senior management support for strategic projects was shown by those projects where such support was absent. For example, in one large confectionery company strategically important projects were repeatedly delayed and held back by senior management in order to make room for short-term projects that could generate extra short-term revenues. This led to very long lead-times of three to four years for major projects; other companies managed this in about half this time. These long lead-times existed against a background of strategic planning which on average reached only three years into the future. For development lead-times to be longer than the strategic planning horizon is clearly problematic.

Another example was found in a large bread manufacturer, in which the development of strategic concepts was left to devolved multi-functional teams without strong senior management support. The resulting projects failed to rally strong interest across the company,

and lacked support from other functions. This in turn led to delays and disruptions in development schedules and to unsatisfactory product quality.

The delegation of NPD responsibility

Even though it is appealing to devolve the initiation and development of concepts to Development Departments, the results of this study suggest that this has two main drawbacks. First, concepts and ideas develop in a rather haphazard fashion, and can be 'all over the place'. Secondly, if senior management do not identify strongly with the projects, Development will find it difficult to enlist, let alone control, other departments whose co-operation they require. This in turn results in long lead times as planned deadlines are not met, and other side effects such as increased defect rates and potentially costly mistakes.

Project management

Successful product development requires the effective matching of market opportunities to product attributes in an efficient manner. The various organisational issues in achieving this match were discussed previously. However, companies must not only be able to achieve such a match, but to achieve it in ways that minimise cost and maximise speed of development. The 'best' new product will fail if it is excessively expensive or arrives too late on the market. Both these factors are reflected in planning accuracy, i.e. companies' ability to achieve their new product development goals in terms of time and cost.

In this respect, the food companies provide a mixed picture. On average, companies spent approximately 20 per cent longer on their projects than planned. Actual costs exceeded forecast costs by an average of eight or nine per cent. Part of the reason why food companies are able to adhere to their forecast costs lies in their ability to change ingredients in order to meet cost targets. A good example of this was given by one company, which suddenly had to lower production costs to meet demands for an increased profit margin.

> "We did not meet the schedule due to a margin change. So it was not strictly to do with development, but it meant that the recipe remained in my area for longer. We had a new chief executive in September. So even though the product had been approved and launched on its costings, we then had a margin change brought in. Previously, the margins have been seen as acceptable. It was a major issue in that the time span was tight, very tight, and it was quite a major change in recipe in that we were moving completely from one process to another. So in order to use this process, we had to change the recipe and formulation completely to try to achieve this margin. Nutrition was unaffected,

but taste parameters were. So we did have a struggle, in fact we did indeed meet taste parameters in what would be seen as a better performing [product]."

Table 8: Planning Accuracy – Cost and schedule adherence

	Average
Actual costs vs forecast costs	+8.5%
Actual project duration vs planned duration	+21.1%

Increasing formalisation

As a response to some of the above challenges, we found a clear trend towards greater formalisation of the development process. In particular, relatively young, computer-literate project managers showed a strong inclination towards IT-based formalisations of the project management process. This trend seemed to be motivated by a desire to increase the influence of Development by achieving more control over the activities of other functional departments and senior management, and thus greater control over the schedule. In the words of the Development Manager of a large confectionery manufacturer:

> "The process forces one into making decisions. You know exactly, at this point 'I need a decision'. Even a member of the board cannot get around this. Even he cannot say, I will decide a little bit later. Yes, if you decide later, then that is the end of it, full stop. This means, we are not only forcing the people which work here in product innovation to stick to a process, but through the process decisions can be brought about ... and if I cannot stick to the deadline, then I will have to give very good reasons for the delay."

The implementation phase of development projects was highly formalised in most companies, with all but a few companies using detailed schedules of all the relevant activities from packaging to production trials. However, more proactive companies are increasingly trying to formalise the 'fuzzy front-end' of concept generation and concept development. This stage of the process may involve scheduled brainstorming sessions and formalised follow-up and elaboration of the ideas thus generated. It may also involve formalised procedures to scan the market for new ideas and technologies.

However, while 80 per cent of companies in our study had documented product development processes, only 24 per cent had their development process accredited under ISO 9001 and only one third of companies required development staff to record the time they spend on

different projects. Moreover, a number of companies suffered from insufficient formalisation of process. This was a particular concern to the smaller companies with strong owner-manger control, but surprisingly, there were also a number of very large companies who lacked any type of consistent, formalised process. The Head of the Development of a large bread manufacturer, for example, described how the lack of any clear formal process regularly led to a chronic work overload near the end of the schedule:

> "We actually sent products out with the wrong label. We sent pancakes out where egg was not mentioned as an ingredient. Can you imagine? Pancakes without eggs! And we had the association for egg-allergies ringing in asking whether these pancakes did not contain any eggs."

For retailer own-label manufacturers, another factor driving formalisation of product development processes was pressure by the large retailers. These often make their orders dependent on proof of formal procedures. In certain cases, retailer own label food companies thus have started to replicate the planning cycle of their main customer in their own organisational processes.

UK-Germany Comparisons

Although the main aim of this study was to benchmark new product development performance and practice in UK food companies, international comparisons can yield considerable insight into national patterns. For this reason, a number of German companies were also included in the study in order to highlight some of the specific characteristics of the UK model of product development. This also enables us to distinguish between country-specific and industry-specific patterns.

The German companies included in our study were significantly larger than the UK companies, with an average annual turnover of £546 million compared to £136 million for the UK companies. The average number of employees was 5,291 compared to 1,017 for the UK. While this does not mean that all German food companies are larger than their UK counterparts, it is indicative of the ownership structure of German companies. Most smaller German companies are family-owned and family-managed companies and tend to be very secretive about financial data. Nearly all of the smaller German food companies who we approached to participate in the study declined the invitation. The companies who participated tended to be the larger, public companies. Still, even amongst these large companies, two were owned and directed by members of their founding families. Publicly

listed joint-stock companies were rare in the German food sector.

Different market environments

Two other characteristics distinguished the environment in which the German food companies operated from that of their UK counterparts. First, the integration of the German food market with those of other European countries was much higher than for the UK food market. This is reflected in the higher percentage of output exported by German companies, which at 22 per cent is nearly four times higher than the 6 per cent for the UK. Even those German companies who were not part of international concerns had extensive operations in other European countries, especially the Benelux countries and France, but also some Eastern European countries such as Poland and Hungary.

Secondly, competition amongst German food companies appeared to be more fierce than amongst UK firms, for two main reasons. First, as Germany is by far the largest European market, none of the large international manufacturers can afford to ignore it. The German manager of a large multinational remarked:

> ”Because all the large multinationals have a strong presence in Germany, competition is extremely fierce. It is where they all battle it out. ... And even though our market share is lower than in many other European markets due to the sheer size of our market, we always have an important voice in all the decisions of the international group”.

Moreover, price discounters play a much more important role amongst German retailers than in the UK. Competition is therefore strongly driven by price (Ironically, Wal-Mart recently entered the British market to compete on price and at the same time entered the German market to compete on quality of service). Both factors, strong competition amongst multinational manufacturers of branded products and strong pressure on prices, reduce the potential gains from retailer own-brand labels, and accordingly such labels play no role in the German market. In this context, one interviewee remarked that there was no positive margin between the manufacturing costs for retailer own-label products and the retail price of branded products, so that there was simply no business to be made with retailer own-labels. In our study, none of the German projects involved a product that was developed together with a major retailer, whereas this applied to 40 per cent of the projects in the UK. Whether the German market indicates any negative prospects for the long-term viability of UK retailer own label manufacturers in a harsher competitive climate remains to be seen. If the retailers themselves develop a strong brand identity based on their own-label products this may not

have to be the case.

Another open question is whether the harsher economic climate in Germany is to be blamed for the significantly lower profit rate of German companies which at 0.8 per cent compares poorly with the 7.1 per cent found in the UK. The difference may be partly explained by the weak economic growth in Germany over the last few years, in particular in domestic consumer markets, and by the absence of smaller companies in the more innovative sectors in our sample of German companies (for the reasons mentioned above). This explanation would is consistent with the negative average growth rate of the German companies of –1.5 per cent, compared to an average growth rate of +17.1 per cent for the UK food companies.

Differences of organisational processes

In terms of the organisational processes, three main differences can be observed between the German and UK companies. These concern the strategic orientation, the organisation of the development function and the formalisation of the product development process.

Table 9: Different time horizons

	UK companies	**German companies**
Time horizon of strategic plans	3 years	5 years
Period that products are expected to be in the market	12 months	70 months
Percentage of sales from products launched in previous two years	32%	12%

Long-term orientation. With regard to strategic orientation, German companies were much more long-term oriented than their UK counterparts. Thus, in the German companies in our study, strategic plans reached on average five years into the future compared to only three years for the UK companies. Similarly, German companies expected their products to be in the market for 70 months whereas for UK companies anticipated product life was only 12 months. One German development manager commented:

> ”Of course, I want to produce this as long as Coca-Cola has Coke, that is indefinitely, no fixed end date. One of our products is for example 110 years old. It would be nice if such a product also runs for a hundred years.”

There is a generally faster renewal cycle in UK food companies. The percentage of sales

attributable to products launched during the previous two years, was 32 per cent in the case of the UK, but only 12 per cent in the case of Germany.

Organisation of development departments. German product development departments tend to have much more explicit structures than their UK counterparts. In German companies, new product development is typically labeled 'Research and Development' and is considered an independent, autonomous function. Within the R&D department there is an independently defined set of tasks that are filled with appropriately qualified staff. In UK companies, new product development seems to be more the responsibility of an 'NPD-team' with tasks being defined in a loose and fluid manner. The more fluid nature of the organisation of NPD in the UK may also be a reflection of the much higher turnover of staff. The NPD managers in the UK companies were often with their companies for only a couple of years. In the German companies, all the managers who were interviewed had worked with 'their' company more or less all their working lives, typically around 20 years.

The labeling of NPD departments as 'R&D' seems to indicate a stronger research orientation of German companies. This may be reflected in the number of patents registered by German companies - an average of eight patents for Germany compared with only one for the UK. This higher incidence of patents is not simply a result of the larger size of German companies, as even the largest UK companies registered fewer patents than their German counterparts. Thus, while the highest number of patents registered by any UK company was only six (below the German average), the highest number of patents registered by a German company was twelve, i.e. twice the UK highest value. The research orientation of German NPD also seems to be reflected in the high number of Ph.D. graduates who head German NPD departments. Thus, the majority of heads of NPD who were contacted in Germany held a Ph.D, even if they were working in quite small companies, while this was only the case with two companies in the UK.

The Structuring of the NPD process. Similar to the much more pronounced organisational structure of their NPD departments, NPD processes in German companies also have much more explicit, often formalised structures. Thus, a much higher proportion of German companies have their development process accredited under ISO 9001, while all of them possess documented processes and require their staff to record the time they spend on different projects. One manager in a large German manufacturer of confectionery described

their NPD process as follows:

> "We have one main process with five different phases and for each phase we have sub-processes. Altogether there are around 300 processes which are all interconnected. And running through these processes is like driving on an *Autobahn*."

The German preference for clear structure is also indicated in the number of projects led by one person. While this figure was as high as eight in the case of the UK, German project managers only had to lead one project at a time.

The emphasis on formalised structure in German organisations may be one reason for the better schedule compliance in German companies compared to the UK. While the average schedule deviation in UK companies was 23 per cent, all the German companies managed to achieve their planned schedules. Similarly, in the case of the German companies only seven per cent of all the changes made to the product had implications in terms of schedule adherence or cost whereas in the case of UK companies this percentage was as high as 52 per cent.

On the other hand, in terms of cost deviation, German companies were worse than their UK counterparts with actual costs exceeding target costs by 12 per cent compared to eight per cent in the UK. This supports the earlier observation that cost compliance can often be achieved at the expense of schedule compliance by exchanging more expensive ingredients and processes for less expensive ones during the later stages of the process.

Table 10: Planning accuracy in UK and German Food Companies

	UK companies	**German companies**
Schedule deviation	+23%	0%
Percentage of changes to product with implications for schedule or cost adherence	52%	7%
Cost deviation	+ 8%	+12%

Finally, consistent with their general preference for more formalised, structured processes German companies also placed more emphasis on formal methods of knowledge transfer such as end-of-project reviews, archives of project records and shared databases. Similarly, all the NPD departments of the German companies regularly received information about sales

whereas this was only the case in 59 per cent of the UK companies.

The main organisational differences between UK and German food companies are summarised in table 11 below.

Table 11: Organisational Differences between UK and German Food Companies

Aspect	UK companies	German companies
Time orientation of NPD	short-term	long-term
Organisation of NPD	Loose	tight, task centred
Orientation of NPD	development orientation	research orientation
Project organisation	Flexible	structured and strongly formalised

Summary and Implications

The aim of this study was to provide benchmarks of new product development practice and performance in the UK food industry, and in so doing contribute to our understanding of the drivers of successful product innovation. This is particularly important in domestically oriented and mature industries, which have often been neglected in research on new product development.

The study employed a comprehensive set of quantitative indicators of organisational processes and NPD performance as well as qualitative data about the NPD process. We identified a set of generic drivers of successful product development and examined these in the context of the organisational 'interfaces' between development and other actors, namely marketing, the customer, manufacturing, suppliers and senior management.

Based on this analysis, a number of key observations can be made about the NPD process in the food industry. First, in contrast to other industrial sectors, NPD in the food industry mainly involves constant modifications and adaptations of a multitude of products, rather than the introduction of major concept and process innovations. The emphasis is strongly on *product development* rather than *product or process research*. This implies relatively low

spending on NPD, small NPD departments and small project teams. At the same time, developers are typically involved in several projects at the same time. Each project on its own is not very complex in organisational terms; the complexity arises from managing a multitude of projects simultaneously.

Secondly, a correct reading of the market and integration of this information into the development process represents a major challenge in the food industry. Co-ordination between Development, Manufacturing and suppliers, on the other hand, presents much less of a challenge than in industries such as the automotive industry. While effective and early involvement of, for example, Manufacturing, in the development process is important, it is not too difficult to achieve. 'Reading the market' was the activity into which the most effort and expenditure was typically focused. This was also the area where companies attained quantifiable results; those companies who invested heavily in reading the market were, in the majority of cases, those who saw greatest sales of their products.

Thirdly, senior management plays a crucial role in the NPD process in terms of guiding multiple projects towards a limited set of strategic goals and in providing support for more fundamental innovations. Finally, appropriate formalisation of the development process is important, both to manage the complexity of a large number of individual projects, and also to achieve sufficient control over the contributions of all the departments involved in the process.

The comparison between UK and German companies reveals that, in many respects, UK and German companies face similar organisational challenges and respond to these in similar ways. The German market environment is more competitive than that of the UK, and less influenced by retailer own-label products. In both countries the basic structure of food companies, the elements of their NPD processes and their organisational priorities are similar. The main differences are that the German companies show a more long-term orientation, a stronger research focus, tighter, task-centered organisational structures and more formalised and structured development process. It is not possible to conclude that either of the two national models is 'better' on the basis of our limited data. However, the stronger export orientation of German companies suggests that this model is better able to withstand the pressure of foreign competition. The extent to which UK companies live in a fairly protected environment will become clearer in the future as the EU becomes more of a single market.

Overall, the companies with the most effective NPD in the food industry were those

companies who:

(1) gained an intimate understanding of the market

(2) were concerned with, but not overly obsessed by, close co-ordination with manufacturing and their suppliers

(3) showed a strong focus on strategic goals and

(4) had appropriately formalised development processes.

Our results on the role of senior management involvement and process formalisation largely correspond with those found in other industries. However, the organisational significance of managing the development/market interface as compared to the development/ manufacturing/supplier interfaces distinguishes the food industry from other manufacturing industries, in particular those which involve complex engineering. This highlights the importance of industry-specific models of 'best practice' in new product development, and the limitations of generic, universal models.

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