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Market Success of Premium Product Innovation: Empirical Evidence from the German Food Sector[1]

Kevin T. McNamara, Christoph R. Weiss and Antje Wittkopp

Abstract: It is well documented that a large share of new products does not survive their first year in the market. Research reported in this paper examined the relationship between product quality and innovation success. In contrast to existing product innovation literature that focused on industrial goods, this study used food product data from a 2002 German food manufacturing firm survey. Results of Sample Selection Model suggest that premium quality increases product's success rate. Furthermore, firm size has a significant positive impact on success rate. Intensity of competition as well as retailers' market power reduce product's success rate.

Keywords: Product success, innovative behaviour, premium product quality, sample selection, German food industry.

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1. Introduction

New products are of major importance for companies' performance. With them a firm aims at achieving certain sales and performance objectives. However, successful innovation requires considerable financial resources, thus is a risky venture. In year 2000, German food industry spent 1.7 billion EUR in innovations, thereof 1.1 billion EUR have been spent on current innovation expenditure (i.e. staff and material expenses)[1]. In consideration of increases in current innovation expenditure, strong competition by domestic and foreign companies as well as growing retailer's market power, the potential to attain innovation profits is limited. Pressure on attainable profits also emanates from noticeable enhancements in innovation pace[2] which again is due to reduced product life cycle times, fast technological changes and ever-changing customer needs. Thus, high numbers of failures of launched products are not astonishing. According to Fredericks and McLaughlin 50 per cent of launched product innovations are sorted out within their first year in the market as they did not meet performance objectives[3]. In view of this, a question concerning a successful innovation strategy comes up. Within the scope of this paper we will go further into key determinants of product success. Whereas existing literature mainly focused on industrial goods and product as well as firm specific attributes associated with success and failure of products, this papers' aim is to examine the effect of market structure in manufacturing as well as on downstream trade level, and the impact of superior product quality (premium quality) on product innovation success of German food industry in year 2002. It is argued that premium quality can be seen as a means of differentiating products from competitors' products, which allows for the development of imperfect competition, and thereby gives a competitive advantage. Hence, producers of premium products might attain higher (retail and consumer) prices. Consequently, premium quality products are associated with higher profits, will stay longer in assortment, hence have a higher success rates. On the contrary, retailer market power might have a negative impact on product success rate due to exertion of pricing pressure, and thus lower attainable prices and manufacturer's profits.
Particular emphasis is given to the food sector for three reasons. Firstly, as Clarke et al. emphasize, among all areas of retailing, food retailing stands out to have experienced the most significant changes in market structure during the last decades[4]. Secondly, the food sector is particularly interesting because of the large number of innovations per year. According to Madakom 32.478 new products have been introduced into the German food market in year 2000, whereas innovative activity as well as success or failure rates are heterogeneously among food industry sectors[5]. Thirdly, the premium trend in foods is becoming increasingly important. The majority of firms is aware of the role of (superior) product quality in product success.

This paper is arranged in three sections. Section 2 gives a review of empirical literature on determinants of product success. Data and empirical evidence is reported in Section 3. Section 4 offers conclusions.

2. Literature survey

Understanding how product and market attributes influence the success of new product introduction is a key market development issue. Research of factors influencing product success factors are numerous, by country, industry, method, innovation definition, and

performance (success) measures,[2] which tend to be subjective. Following there is a brief description of research milestones understanding factors related to the successful introduction of new products, and an overview of empirical results from studies examining product innovation in the food industry. A concise description of production innovation research is presented in Appendix 1.

Early studies on new product success were tended to be exploratory individual case studies[7]. Research then moved to group of cases[8] and surveys of larger extent[9,10]. A criticism of early research was the measurement of solely product innovation's success or failure. Rothwell et al. addressed this short coming in an analysis on innovations in the chemical industry in the United Kingdom (SAPPHO project)[11]. They used pairwise comparisons of 86 successful product innovations and failures in chemical industry to test for factors associated with market success. Their research suggested the importance of market factors (understanding of consumer needs, marketing) to success in new product introduction, but also suggested that a firm's organization and management structure were also determinants of the firm's ability to launch new products.

Cooper examined the importance of product advantage, quality, and innovativeness as determinants of product success in a Canadian study (NewProd project) [12,13,14,15]. He also examined the relationship between the marketplace (degree of need for products in product class, degree of satisfaction with competitors' products), firm characteristics (such as synergies, R&D, advertising and promotion, market research, management, production resources as well as sales force and distribution resources) and successful product introduction. The study concluded that product innovations launched in markets with large demand, size and growth tended to be more successful than those launched in smaller markets. Further work by Cooper and Kleinschmidt identified the importance of quality of execution of innovation activities, such as marketing and technical support, and the role of product innovativeness, firm image, strong brand name and technical competence of the company in new product introduction[16,17,18,19].

Maidique and Zirger examined new product introduction in the U.S. electronic industry (Stanford Innovation Project)[20]. Their analysis of 276 products suggested that firm variables (management support, R&D process, marketing skills and resources, early market launch) were positively associated with successful product introduction. Production characteristics and marketing strategies (such as high performance-to-cost-ratio, product quality, utilization of synergies, satisfaction of customer needs) were found to be associated with new product success. Results of Link's research on the introduction of industrial goods in Australia[21] supported Maidique and Zirger's findings[20]. Link's study also suggested that factors associated with the success and failure of new product introductions tend to be highly situation specific and differ according to the level of new product's innovativeness, results that supported earlier research[22,23].

Hultink and Robben examined the factors associated with the successful introduction of consumer goods, unlike prior research that focused on industrial goods[24]. They found that successful consumer products were more innovative and associated with a broader assortment. Successful products are characterised by more personal selling and are launched in an early stage of product life cycle. In a later study Hultink et al. attend to analyse specifically the difference between industrial goods and consumer goods[25].

[2] According to the classification of Griffin and Page[6] studies used financial performance measures, product-level measures, measures of customer acceptance, program-level measures and firm based measures. Note that these measure different aspects of product development. Thus, comparison of studies and generalization of results is problematic.

They showed that successful consumer goods (industrial goods) are more often developed in short to moderate (short) cycle times and introduced into moderately (strong) growing markets, have a relatively high degree of newness, launched with higher (similar) promotion expenses and priced similar to the competitors. Furthermore successful industrial goods are introduced in the maturity phase of the product life cycle and into markets with only few competitors.
Whereas in those studies, dealing with industrial goods and consumer goods, the food industry is included to minor extent, Nyström und Edvardsson address exclusively to the food industry for the first time[26]. Study consists of 20 major Swedish food manufacturers with 121 new products marketed in the period 1969-1978, and reveals a positive effect of firm's technology use on product success.
Grunert and Sorensen examined the Danish, German and U.S. yoghurt market[27]. In contrast to previous studies they focussed not on the innovative product itself but on the company, and analysed in what respect successful firms differ from less successful ones. They give empirical evidence for the importance of product quality, market knowledge, marketing and product development activities as success factors.
Likewise Kristensen et al. focussed on the company, which is considered to be successful if the proportion of successful launches of new products over the past three years is high[28]3. Regression analysis of success rate on launch rate and various control variables reveals increasing launch rate, extent to which trade fairs are used to promote new products, consideration of customer needs as well as market research and market analysis as determinants of new product success in Danish food industry.
A very recent and to our knowledge only study dedicated exclusively to German food industry is done by Roggenkamp[29]. In this study index points for 111 products launched in the period 1987-1998 were assigned according to the product success perceived by retailers. Subsequently, these index points were used as endogenous variable in the regression analysis of product success on market structure variables. Analysis revealed a positive impact of market size, an inverted u-shaped impact of concentration as well as a negative influence of product differentiation on product success.

To summarize, in spite of heterogeneity in methods and design of investigation existent empirical literature shows wide accordance in ascertained success factors. It became apparent that by using high quality of execution in product development process, realization of synergetic effects, R&D and technology activities as well as by a strong market orientation superior products can be produced, which can be established successfully on the market by advertising and promotion activities in the following. A superior product itself is highly innovative, gives a benefit to the customer, has a good performance-to-cost-ratio and is a unique product. In particular, a superior product is characterized by high product quality.
This survey also indicates that the majority of literature is engaged in industrial products. The number of studies relating to consumer goods, and to food industry in particular, is comparatively small. Only one study is dealing with German food industry[29] but has noticeable shortcomings in applying a subjective measure of success and aggregated 4-digit data. Thereby study could reveal the impact of market structure, but could not allow for firm characteristics and product attributes. In contrast to this, present study uses survey data and the success rate of new products, i.e. a firm-based measure of products' success.

[3] Kristensen et al. do not specify which proportion has to be exceeded in order to be considered as successful[28].

Furthermore, existing literature has shown that product quality is important to product success. However, it seems to be a basic condition to product success. It is less clear how successful strategies to develop and introduce premium products (superior quality products) can increase product success. This paper's aim is a) to analyse factors determining new product success, b) to focus in particular on the relationship between premium quality and innovation success and c) to control for the influence of competitive intensity and retailers market power.

3. Data and Empirical Evidence

For this purpose we conducted a survey among food industry firms in Germany in spring 2002. Aim was to consider the companies' competitive environment, the determinants of product innovation activities and new product success. Special attention was given to the introduction of superior quality products.

We mailed a questionnaire to 539 companies in food manufacturing listed in the „Presse-Taschenbuch Ernährung", a handbook on food industry which is published by the Federation of German Food and Drink Industries (BVE)[30]. From 539 questionnaires, 119 (22 %) were returned. For further analysis only 44 questionnaires could be used due to data restrictions. Dataset consists of companies of all sectors of food industry, federal states and size categories. The majority of respondents belong to bakery, brewery and dairy sector. Least companies are from malthouse, condiments or coffee and tea processing. Most of the respondents are small- and medium-sized companies (59,09%), however firm size ranges from 3 persons employed up to 8500. Thus, sample is a good representation of the German food industry.

As endogenous variable and firm-based measure of new product's success we use the fraction of products launched within the period 1999 to 2001 which are still in firm's assortment today, i.e. $SR = RNP/NNP$ with NNP is the number of new or notedly improved products launched within the period 1999 to 2001, and RNP is the number of those launched products which are still in firm's assortment today. Thus, we measure the average success rate of product innovations.[4] Since $0 \le SR \le 1$, one may be suspicious of the assumption of normality. Further, one may wish an estimator which ensures that predicted values for SR are in the interval (0, 1). A popular transformation to alleviate these problems is the logit transformation[31] where the dependent variable becomes $TSR = \ln[SR/(1-SR)]$. The definition and descriptive statistics of all variables used is reported in Table 1.

[4] A similar measure has also been used in previous empirical studies[28].

Table 1: Definition and descriptive statistics of variables used (n = 44)

	Mean (Std.Dev.)	Minimum Maximum
Percentage of launched products being a success (*TSR*). Logit transformation.	0.485 0.894	-0.325 3.178
Dummy variable for premium quality of products (*TPREM4*). Respondents were asked to evaluate their degree of picking up the premium quality trend with product innovations on a scale from 1 (not important) to 5 (very important). TPREM4 is set equal to 1 for firms reporting premium quality trend to be important and is set equal to zero otherwise.	0.409 0.497	0 1
Consumption trends (*ITREND*). Respondents were asked to rank the importance of consumption trends for the market success of their most successful product innovation on a scale from 1 (least important) to 6 (most important).	4.409 1.245	1 6
Advertising support (*IADV*). Respondents were asked to rank the importance of strong advertising support for the market success of their most successful product innovation on a scale from 1 (least important) to 6 (most important).	2.955 1.238	1 5
Dummy variable for R&D activity (*RD567*). company's share of total sales spent on average on research and development on the following scale: (0) if the share is 0%; (1) if the share is between > 0% and < 0.25%; (2) if the share is between 0.25% and < 0.5%; (3) if the share is between 0.5% and < 0.75%; (4) if the share is between 0.75% and < 1%; (5) if the share is between 1% and < 1.5%; (6) if the share is between 1.5% and < 2%; (7) if the share is ≥ 2%. RD567 is set equal to 1 for firms reporting R&D activity to be in group 5, 6 or 7, and it is set equal to zero otherwise.	0.136 0.347	0 1
Firm size (*FIRMSIZ*). Respondents were asked to classify firm sales on the following scale: (1) if sales are < 1 Mio. EUR/year (2) if sales are between 1 and < 5 Mio. EUR/year; (3) if sales are between 5 and < 25 Mio. EUR/year; (4) if sales are between 25 and < 50 Mio. EUR/year; (5) if sales are between 50 and < 100 Mio. EUR/year; (6) if sales are between 100 and < 250 Mio. EUR/year; (7) if sales are between 250 and < 500 Mio. EUR/year; (8) if sales are ≥ 500 Mio. EUR/year.	4.136 2.007	1 8
Dummy variable for the degree of competition in food manufacturing (*COMP5*). Respondents were asked to rank the degree of competition in their own industry on a scale from 1 (very low) to 5 (very high). The dummy variable is set equal to 1 if the respondent characterizes competition to be very high, and is set equal to zero otherwise.	0.182 0.390	0 1
Dummy variable for retailer market power (*PP45*). Respondents were asked to evaluate retailers' pricing pressure on a scale from 1 (very low) to 5 (very high). The dummy variable is set equal to 1 if the respondent characterizes retailer pricing pressure to be high or very high, and is set equal to zero otherwise.	0.295 0.462	0 1
Number of mergers & acquisitions the company has done between 1995 and 2001 (*FUSION*).	0.795 1.357	0 5

Study's aim is to analyse the determinants of new products' success rate. Empirical analyses of innovation success typically are based on those enterprises which have launched a new product in the previous time period. These studies are likely to face a sample selection problem. Suppose, that for some reason large firms are characterised by higher rates of innovation success than small firms. If smaller firms are less likely to be successful, the number of new products introduced by these firms will also be smaller. Small firms would only introduce a new product if this product has an exceptionally high probability of being successful. In any given time interval, therefore, success rates estimated on innovative firms only will be biased towards finding relatively higher success rates for smaller firms. This finding would be the result of a selection process – small firms would introduce only those products with the very best

chances for being successful. More formally let the success rate for firm *i* TSR_i be determined by a vector of exogenous variables x_i : $TSR_i = \beta' x_i + \varepsilon_i$

The actual success rate can be observed only for firms that have introduced a new product in the last three years. Let DTI_i be a dummy variable which is set equal to 1 if a firm has launched a new product and is equal to zero otherwise. The willingness to introduce a new product DTI_i^* is determined by a vector of exogenous variables w_i where DTI_i is equal to 1 if $DTI_i^* > 0$: $DTI_i^* = \gamma' w_i + u_i$

Further assume that ε_i and u_i have a bivariate normal distribution with zero means and correlation ρ. The model that applies to the observation in our sample is

$$\begin{aligned} E\left[TSR_i \middle| TSR_i observed\right] &= E\left[TSR_i \middle| DTI_i^* > 0\right] \\ &= E\left[TSR_i \middle| u_i > -\gamma' w_i\right] \\ &= \beta' x_i + \rho\sigma_\varepsilon \lambda_i(\alpha_u) \\ &= \beta' x_i + \beta_\lambda \lambda_i(\alpha_u) \end{aligned}$$

with $\alpha_u = -\gamma' w_i / \sigma_u$ and $\lambda(\alpha_u) = \phi(\gamma' w_i / \sigma_u) / \Phi(\gamma' w_i / \sigma_u)$. So, $E\left[TSR_i \middle| TSR_i observed\right] = \beta' x_i + \beta_\lambda \lambda_i(\alpha_u) + v_i$. [5] Least squares regression using the observed data on success rates only produced inconsistent estimates of β. Regressing TSR_i on x_i and λ_i gives consistent estimates. We use Heckman's estimator for the linear model, which is a two step procedure[32]. First, we estimate the probit equation to obtain estimates of $\lambda_i(\alpha_u)$, the inverse Mill's ratio.[6] In a second step we estimate β and β_λ by least squares regression of *y* on various **x** and λ. The result of the least squares regression model analysing the success rates of 44 enterprises in German food industry in 2002 is reported in Table 2.

Table 2: Results of Sample Selection Model, least squares regression (n=44)

Explanatory Variables	Symbol	Parameter	t-Value
Constant	Constant	1.395	2.583
Premium quality of products	TPREM4	0.439 *	1.958
Consumption trends	ITREND	-0.172 *	-1.888
Advertising support	IADV	-0.128	-1.343
R&D activity	RD567	0.228	0.685
Firm size	FIRMSIZ	0.128 **	2.214
Degree of competition	COMP5	-0.609 **	-1.989
Retailer market power	PP45	-0.403 *	-1.647
Number of mergers & acquisitions	FUSION	-0.1968 **	-2.529
Inverse Mill's ratio	LAMBDA	-0.643 *	-1.817
Adjusted R-squared		0.323	
LL(β)		-37.588	
LL(0)		-57.022	
Likelihood Ratio Index		1.517	

Remarks: *** significance level = 1%; ** significance level = 5%; * significance level = 10%; LL(β) (and LL(0)) are the log of the (restricted) likelihood function.

First of all, Table 2 shows that controlling for a selectivity effect is important. The parameter estimate for the inverse Mills ratio (λ) is negative and significantly different

[5] For further details on Sample Selection Models see Greene[31].

[6] The descriptive statistics of variables used for Probit estimation as well as the result of the Probit Model are presented in Appendix 2.

from zero. This implies that if the probability of launching a new product is higher than predicted on the basis of the observable variables, the succession rate for this firm will decline.

Study's main attention is to investigate if premium quality products are more successful than other products, i.e. have a higher success rate, ceteris paribus. It is argued that premium quality can be seen as a means of differentiating products from competitors' products[7], which allows for the development of imperfect competition, and thereby gives a competitive advantage. Hence, producers of premium products might attain higher (retail and consumer) prices. Consequently, premium quality products are associated with higher profits and success rates. To measure premium product quality interviewed companies were asked to give an evaluation on a scale from 1 ("picking up of premium quality trend is not important") to 5 ("picking up of premium quality trend is very important") for those products that have been launched during the last three years. Nearly 30 per cent of the respondents affirm that picking up premium quality products is very important and 40.9% report it to be important. So, the majority of respondents seems to be aware of the importance of product quality. For the econometric model, we define a dummy variable (TPREM4), which is set equal to 1 for firms reporting premium trend to be important and is set equal to zero otherwise. The empirical literature suggests a positive relationship between product quality and innovation success[12,13,14,15,16,17,18,33,20,27]. Present study supports these findings. Table 2 reveals a weak but positive effect of premium product quality on success rate, the parameter estimate is significantly different from zero at the 10%-level. This result implies that especially products with superior quality have a long life span, i.e. are successful, ceteris paribus.

It is a common perception in empirical literature that a strong market orientation enhances product success[12,13,14,15,11,8,23,28]. One expression of market orientation is the extent to which a firm is picking up consumer trends. However, present study reveals that the relationship between taking up consumer trends (ITREND) and success rate is negative. Coefficient is statistically significant on 10%-level. This result is plausible as a company taking up new trends very quickly also creates new products or modifies existent ones more frequently. Consequently, the original product does not stay long in assortment, its life span is short, which might explain why the impact of taking up consumer trends on success rate is negative.

Furthermore, the majority of empirical literature reports on a positive relationship between advertising resp. marketing and product success[11,12,13,14,15,20,28,21,27]. This is also due to product differentiation, associated with higher consumer willingness to pay and imperfect competition, which enables the firms to attain higher prices and profits. Hence, higher success rate. In this analysis, however, advertising expenses which are proxied by IADV did not show a statistically significant influence on success rate.

Research and development can be seen as an investment in innovation. Interviewed companies have reported that R&D expenditure is mainly utilized for developing new products (52.51% of expenses) as well as the joint development of products and processes (31.40%). Accordingly, results of the probit model on the probability of launching a new product report a significant and positive impact of the company's share of total sales spent on R&D, represented by variable RD, on the incentive to innovate (Appendix 2b). Moreover, empirical literature show a positive impact of R&D on innovation [34,35,36,37]. As Table 2 shows, R&D not only enhances the probability to innovate, it also increases product success. Strong R&D activities, embodied by dummy

[7] Associated with a high consumer willingness to pay.

variable RD567, have a positive influence on success rate. However, impact is not statistically significant.

Study also looked at the impact of firm size measured as sales per year (FIRMSIZE) on product success. Table 2 reports a significant and positive effect of firm size on product's success rate. This indicates that large companies' new products have a longer life span, thus higher success rates than small firms' products. This might be due to better R&D, advertising and promotion resources as well as sales force of large firms which enable them to market their products more successful. Furthermore large firms are able to spread fix costs over a large sales volume, thus reduce unit costs of production, so that innovations are more profitable in large companies. Interesting is that although having a good accouterment and profit expectation which might be an incentive to innovate, large companies have a low probability to innovate as is reported in Appendix 2b. This result is in contrast to Neo-Schumpeter-Hypothesis I. Apparently smaller firms have a higher innovation incentive which might be due to their advantage of lower complexity in corporate structure. Further more, small and medium-sized firms produce only such know-how they use in short-term[38], thus R&D activity is more efficient than in large companies[39]. Small firms also have a closer contact to the consumer and are stronger exposed to competitive pressure than large companies, which provokes innovate behaviour[42]. Empirical evidence for a negative impact of firm size on innovative behaviour give Acs and Audretsch[40] and Wittkopp[41]. Altogether, large firms' propensity to innovate is low, but if they do, the launched product is more successful than product innovations of smaller firms.

As merger & acquisition activity (FUSION) leads to larger firm size, which is associated positive with product success, a positive impact of FUSION on success rate was expected. However, this is not supported by data. As Table 2 suggests a firm's merger & acquisition activity reduces product's success rate. Influence is statistically significant on 5%-level. Although not expected, this effect is plausible as it is the aim of mergers & acquisitions to bundle firms' strengths. This is mainly done by concentrating on core competencies. As this process includes outsourcing of those company items and products which do not meet firm's objectives or performance expectations, average product's lifespan is low. Consequently, products' success rates of merged companies is lower than those of non-merged companies.

Study's further interest is on the impact of competition and market structure of downstream trade level on manufacturers' product success. Therefore, we included the intensity of competition as well as retailer's market power in regression. Intensity of competition is represented by a dummy variable (COMP5) which is set equal to 1 if the respondent characterizes competition to be very high, and is zero otherwise. We assume that firms in competitive markets undertake innovation to withstand the pressure of competition and "steal consumers" from competitors. Increasing competitive intensity forces to react quickly in order to remain competitive whereas firms with market power, those in markets with imperfect competition, deter from product innovation since the new product would partially "steal consumers" from their own (profitable) old product. So we might argue that innovation propensity is higher in competitive markets[8], but as competitive reactions melt temporary competitive advantages and profits very fast, we assume success rate to be lower in high competitive markets than in low competitive markets. As expected, severe competition provokes innovative behaviour. Coefficient of COMP5 is statistically significant and has a positive sign (Appendix 2b). By developing and launching new products firms try to differentiate from competitors and withstand competitive pressure. Whilst competitive intensity increases the propensity to innovate, it lowers product's life span, thus product success rate (Table 2). The relationship

[8] This assumption is underlined by empirical work[40,45,46,41].

between competitive intensity (COMP5) and success rate is negative and significantly different from zero on the 5%-level. This is due to lower attainable prices and profits in competitive markets, so that a new product might not meet performance objectives and will be sorted out. Consequently, success rate is low. A negative relationship between competitive intensity and product success is also shown by a number of authors[12,13,14,20,21,23].

In line with this is the assumption that oligopsonistic pressure exerted of powerful retailers leads to a strategic reduction in purchases with the aim of reducing prices. Katz stresses that larger buyers can more credibly threaten to integrate backwards thereby exerting more pressure on a supplier[43]. Scherer and Ross argue that a large buyer's purchasing order is more likely to break up potential collusion between suppliers[44]. This lowers manufacturers attainable innovation profits.[9] As the new product might not meet firm's performance objectives, it will be taken out of assortment. Thus, success rate might be low. In the econometric model, we use a dummy variable for retailer market power (PP45), which is set equal to 1 if the respondent characterizes retailer pricing pressure to be high or very high, and is zero otherwise. Present study gives empirical support for the underlying assumption on a negative relationship between buyer power and product success. Coefficient of retailer market power shows a statistically significant negative effect on success rate. This implies that retailers' market power reduces attainable profits, thus, products' success rate is low. Further on, buyer power also impedes firms incentive to innovate as it is documented in Appendix 2b. Coefficient of RMP5 is negative and statistically significant different from zero on the 5%-level. As buyer power reduces manufacturers attainable profits, and thus incentive to innovate, companies' probability to innovate decreases with increasing retailer market power. This effect is corresponding to Weiss and Wittkopp[36,37].

4. Summary

Thousands of new food products are launched every year, however a large share does not survive their first year in the market. In the view of increasing innovation expenditure, high competitive pressure, growing concentration ratios in food retailing and enhancements in innovation pace, success of new products becomes a critical issue. This paper analyses product, firm and industry specific attributes associated with success of German food products. Special attention is given to the impact of product quality as well as market structure in manufacturing and downstream trade level.

Analysis is based on firm level data from a survey of food manufacturing firms carried out in 2002 in Germany. The results of a Sample Selection Model give support to the proposition of negative effects of both retailers' market power and competitive intensity on product success. However, these negative impacts might be mitigated if manufacturing firms launch products with superior quality (premium products). Premium product quality shows a statistically significant positive impact on success rate. This implies that premium quality can be seen as a means of differentiation, which gives the manufacturer a competitive advantage, thus is associated with higher prices, profits and success rates. Results imply that in a competitive environment with increasing retailer's market power premium product quality might be a suitable strategy to increase product success. Further, we find firm size to be significantly and positively related to product's success rate. Whereas, firms with strong mergers & acquisitions activity and firms frequently taking up consumer trends show low product's lifespan resp. success rate.

[9] For a recent summary of the empirical literature linking market concentration to buyer and supplier profitability see Ellison and Snyder[47].

Finally, we have to allude to some critical points in present study. The used logit transformed average product success rate implies that, regardless achieved sales volume or profits, a new product is successful if it stays a long time in assortment, thus has a long lifespan. However, this is only true under ceteris paribus condition and causes difficulties if we think of the large number of seasonal food products which are designed to stay only short time in firm's assortment, independent of their actual performance. Consequently, it would be preferable to use monetary measures of product success (such as profit, sales) which have not been available for present study, and in addition are critical to collect. Moreover, future research should turn to individual products, survey their lifespan, record product, firm as well as market characteristics, and aim at using different measuring instruments to compile the diverse dimensions of product success. This could give an in-depth understanding of factors influencing new product's success which is essential to make implications to manufacturing as well as food retailing.

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Appendix

Appendix 1: Selected empirical studies on products success factors

Study	country/ industry	Sample	Performance measure	Success factor
Project SAPPHO: Rothwell et al. (1974)	GB/ Chemistry	86 products (43 successes, 43 failures) launched in period 1950-1970	subjective rating evaluation of market share and profit	Management strength and characteristics of managers, marketing performance, understanding of user needs, R&D efficiency, communications
Rubenstein et al. (1976)	US/ industrial and consumer goods	103 products (successes and failures) launched in period 1969-1973, 6 firms	subjective rating evaluation of technical success, overall project (economic) success, both technical and project success	Recognition of needs (relative advantage of the innovation, degree of urgency, price), contact with customers, communication within firm, meeting time schedule, level of profitability, rate of adoption of an innovation, information about sales potential, top management support, technical sophistication of the project, financial risk, market information, degree of congruence with corporation goals
Booz et al. (1982)	US/ industrial and consumer goods	13000 products launched in period 1976-1981, 850 firms	performance criterion reached. performance criterion is left to interviewed managers (e.g. profit contribution, profitability, sales)	Product fit with market needs, product fit with internal functional strengths, technological superiority of product, top management support, use of new product process, favourable competitive environment
Project NewProd I: Cooper (1979a,1979b,1980, 1982)	CDN/ industrial goods	103 firms, 195 products (102 successes, 93 failures) launched in period 1977-1982	profitability objectives reached or exceeded	Product characteristics (product advantage, quality, innovativeness to the market, synergies), market factors (clear orientation on customer needs/ level of market need, market growth), company factors (R&D, advertising, marketing/market research, management, sales force-distribution effort, knowledge of customer price sensitivity, understanding of buyer behaviour, knowledge of customer needs)

Appendix 1 continued

Project NewProd II und III: Cooper and Kleinschmidt (1987,1990)	CDN/ manufacturing	125 firms, 203 products (123 successes, 80 failures) launched in 1985	subjective rating evaluation of profitability, compliance with sales or profitability objectives, payback period, domestic and foreign market share, sales (profit) of new product relative to other recent new product introductions, extent to which the new product's sales (profit) reached sales (profit) objectives, Window of Opportunity	Superior product (uniqueness, high product quality, superiority in the eyes of the customer, solution to a customer's problem, high performance-to-cost-ratio, innovativeness), clearly defined product and project, technological and marketing synergies, market attractiveness, quality of execution (of technical activities, predevelopment activities, marketing activities)
Stanford Innovation Project: Maidique and Zirger (1984)	US/ electronics	276 products	Reached breakeven point	Firm factors (top management support, R&D process well planned and organized, adequate marketing expenditure, market knowledge, introduced early into the market) as well as product characteristics and strategies (performance-to-cost-ratio, product quality, utilization of synergies, satisfaction of customer needs)
Link (1987)	AUS/ industrial goods	135 firms; products launched in the period 1981-1985	Perceived performance, not specified	Firm factors (synergies in marketing, technology and production; management of development phase, sales force, marketing (promotion, advertising, market research), firm image), product factors (high product quality, product advantage, novelty of product, strong brand name, appropriate pricing and targeting) as well as market factors (market growth, market size, distribution channel support)
Projekt NewProd: Cooper and Kleinschmidt (1995)	GB, D, US, CDN/ chemistry	103 products (68 successes, 35 failures) products launched in the period 1977-1982 and 1985, 21 firms	Market share as well as rating evaluation of profitability, technical success, impact on the firm, time efficiency, launched in time	Product superiority (product quality, good value for money, superior price/performance characteristics, meets consumer needs, high customer benefit, uniqueness, highly visible benefits, innovativeness), non-product advantage (salesforce, firm image, brand name, firm's technical competence), quality of execution (marketing activities such as market research, market tests, launch; technical activities such as product development), synergies, market attractiveness (strong growth, high demand)

Appendix 1 continued

Hultink and Robben (1994)	NL/ industrial and consumer goods	123 firms, 193 products (116 successes, 77 failures) launched in the period 1989-1993	rating evaluation of market acceptance, financial performance, product-level performance	Broad assortment, relatively more innovative, personal selling, launched in early stage of product life cycle, brand strategy
Hultink et al. (1995)	GB/ industrial goods	138 firms, 221 products (138 successes, 83 failures) launched in the period 1990-1994	subjective rating evaluation of 15 customer-determined success, financial performance and product-level performance indicators	High degree of novelty, technology, market need, few competitors, distributed exclusively, broad assortment
Hultink et al. (2000)	GB, NL, US/ industrial and consumer goods	617 firms, 1018 products (595 successes, 423 failures) launched in the period 1995-1999	Not known	Consumer goods: short to moderate product cycle times, moderate market growth, degree of newness, brand extensions, high marketing expenditure, Pricing similar to competitors
Cooper and Kleinschmidt (2000)	AUS/ industrial goods	110 products (67 successes, 43 failures), 55 firms	Rating evaluation of profitability, RoI, sales, time efficiency, launched in time, manufactured within budget, technical success, Window of Opportunity	Product superiority (product quality, price/performance-ratio, meets customer needs, benefit to customers, uniqueness, strong visible benefit), quality of execution (marketing activities such as market research, market tests, launch; technical activities such as product development), marketing synergies, high technological activity, top management support
Nyström and Edvardsson (1982)	S/ food industry	20 firms, 121 products launched in the period 1969-1978	Subjective rating evaluation of technical success, market success and commercial success	Technology use
Grunert and Sörensen (1996)	DK, D, GB / food industry	60 firms	Rating evaluation of consumer acceptance, relative costs	Product quality, market knowledge, marketing activities, product development activities
Kristensen et al. (1997)	DK/ food industry	55 firms	proportion of successful launches of new products over the past three years	Launch rate, use of trade fairs, meeting of customer needs, market research, market analysis
Roggenkamp (2002)	D/ food industry	111 products launched in the period 1987-1998	product success perceived by retailers	market size, concentration, product differentiation

Appendix 2a: Definition and descriptive statistics of variables used in Probit Estimation

	Mean (Std.Dev.)	**Minimum Maximum**
Dummy variable for innovation activity (DTI). if the interviewed companies have launched one or more innovative products between 1999 and 2001 the dummy variable is set equal to 1, and is zero otherwise.	0.815 0.390	0 1
Market share (MAS). company's market share in its main pillar on the following scale: (1) if market share is <1%; (2) if market share is between 1and < 5%; (3) if market share is between 5 and < 10%; (4) if market share is between 10 and < 20%; (5) if market share is ≥ 20%.	3.022 1.422	1 5
Research and development (*RD*). company's share of total sales spent on average on research and development on the following scale: (0) if the share is 0%; (1) if the share is between > 0% and < 0.25%; (2) if the share is between 0.25% and < 0.5%; (3) if the share is between 0.5% and < 0.75%; (4) if the share is between 0.75% and < 1%; (5) if the share is between 1% and < 1.5%; (6) if the share is between 1.5% and < 2%; (7) if the share is ≥ 2%.	2.087 1.867	0 7
Dummy variable for retailer market power (*RMP5*). Respondents were asked to rank retailer market power on a scale from 1 (very low) to 5 (very high). The dummy variable is set equal to 1 if the respondent characterizes retailer market power to be very high, and is zero otherwise.	0.478 0.502	0 1
Dummy variable for the degree of competition in food manufacturing (*COMP45*). Respondents were asked to rank the degree of competition in their own industry on a scale from 1 (very low) to 5 (very high). The dummy variable is set equal to 1 if the respondent characterizes competition to be high or very high, and is zero otherwise.	0.174 0.381	0 1
Firm size (*FIRMSIZ*). Respondents were asked to classify firm sales on the following scale: (1) if sales are < 1 Mio. EUR/year; (2) if sales are between 1 and < 5 Mio. EUR/year; (3) if sales are between 5 and < 25 Mio. EUR/year; (4) if sales are between 25 and < 50 Mio. EUR/year; (5) if sales are between 50 and < 100 Mio. EUR/year; (6) if sales are between 100 and < 250 Mio. EUR/year; (7) if sales are between 250 and < 500 Mio. EUR/year; (8) if sales are ≥ 500 Mio. EUR/year.	4.293 1.884	1 8
Investment rate (*INVEST*). % share of total sales spent in year 2001 on investment.	5.981 6.946	0 50
Adaptation flexibility (*FLEX*). evaluation of the company's adaptation flexibility on a scale from 1 (very low) to 5 (very high).	3.489 0.932	2 5
Market size (*MSIZEA*). industry sales in real terms in billion EUR in year 1999.*	13.876 10.951	0.947 38.277
Market growth (*AGR*). Average growth rate of industry real sales between 1995 and 1999.*	1.284 6.355	-11.798 28.313

* data source: aggregated 4-digit data of production survey provided and published by German Federal Statistical Office, data for years 1995-1999.

Appendix 2b: Results of Probit analysis (n=92 firms)

Variable	**Coefficient**	**t-Value**
Constant	0.792	0.714
Market share MAS	0.513 **	2.242
Research and development RD	0.537 ***	3.045
Retailer market power RMP5	-1.199 **	-2.254
Degree of competition COMP45	1.408 *	1.685
Firm size FIRMSIZ	-0.305 **	-1.999
Investment rate INVEST	-0.078 **	-2.449
Adaptation flexibility FLEX	0.395	1.387
Market size MSIZEA	-0.060 ***	-2.735
Market growth AGR	-0.017	-0.256
LL(β)	-24.529	
LL(0)	-44.028	
Likelihood Ratio Index	1.795	
Chi-squared (DF)	38.998 (9)	
R^2 McFadden (Veall/Zimmermann)	0.443 (0.60873)	
% Correct Predictions	85.87	
% Correct predictions of "ones" ("zeros")	93.33 (52.94)	

Remarks: *** significance level = 1%; ** significance level = 5%; * significance level = 10%; LL(β) (and LL(0)) are the log of the (restricted) likelihood function. DF refers to the degrees of freedom.