Rate of success of new dairy products in the UK: how important are health and sustainable claims?

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Abstract:

This paper estimates the rate of success of new dairy products in the UK. They are an important strategy applied by manufacturers and retailers when competing. In the current context of decreasing demand for dairy products, the strategy is seen as a way to recapture lost market. The purpose of this study is to measure the degree of uptake of new dairy products in the UK market and the effect that different attributes (e.g., health and sustainability) may have on their acceptance by consumers. We focus on products introduced in 2011 using Mintel's GNPD and their sales were followed up to 2015 using Kantar World panel data. The impact of attributes on the presence of a product in the market was assessed using the Cox's proportional hazards regression. Results indicated that new packaged products have more probability of being successful compared to other launched types. New developed yogurts is the category introducing more new products but with more risk to fail. The presence of convenience (ease of use) and sustainable (ethical) claims decreases the products rate of failure. However, the hazard rates are very small. The opposite was found for products with demographic or health claims.

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Abstract

This paper estimates the rate of success of new dairy products in the UK. They are an important strategy applied by manufacturers and retailers when competing. Moreover, in the current context of decreasing demand for dairy products, the strategy is seen as a way to recapture lost market. However, as not all the launched products are accepted by consumers, they quickly disappear from the shelves. The purpose of this study is to measure the degree of uptake of new dairy products in the UK market and the effect that different attributes (e.g., health and sustainability) may have on their acceptance by consumers. We focus on products introduced in 2011 using Mintel's GNPD and their sales were followed up to 2015 using Kantar World panel data. The impact of attributes on the presence of a product in the market was assessed using the Cox's proportional hazards regression. Results indicated that new packaged products have more probability of being successful compared to other launched types. New developed yogurts is the category introducing more new products but with more risk to fail in the UK dairy market. The presence of convenience (ease of use) and sustainable (ethical) claims decreases the products rate of failure. However, the hazard rates are very small. The opposite was found for products with demographic or health claims. In addition, new products commercialised under a private label or highlighting the British origin reveal non-significant results, being these attributes not relevant to be considered for the analysis.

1   Introduction

The introduction of new products (through their new product development NPD process) is an important strategy for firms to compete in the market. As stated by Montoya & Workman (2013), the development, adoption, and implementation of creative ideas allows companies to gain competitive advantage, improve their firm growth and performance and as a consequence ensure their long term presence in the marketplace. Today's competitive global food market makes NPD in the food supply chain an essential factor for firms subsistence in national and international markets (Stewart-Knox and Mitchell, 2003, Capitanio et al., 2009).

However, NPD is a complex task that must take into consideration technological development, production capacity, product demand, and global competition. A key objective behind the NPD activity is to be proactive on the identification of potential demand changes of food consumers as well as to develop products with added value capable of growing their market share (Rudder et al., 2001). For the food sector and more specifically for the FMCG (fast-moving consumer goods), NPD is specially challenging due the continuous and quick transformation of retailing. This makes

the process of anticipating consumers' necessities time sensitive and more complex for manufacturers.

Therefore, although thousands of new products are yearly introduced in the food market, many of those are not always embraced by consumers failing to survive even the initial year in the marketplace. As explained by Fuller (2011), the dynamism and interrelationships in the marketplace are complex and not always predictable. Manufacturers, retailers, consumers and customers interact regarding to a specific new introduced product under the context of the encompassing competition with other old and new developed products. Furthermore, stakeholders such as retailers have suffered an important transformation during the las twenty years (Reardon, 2011) adding complexity and uncertainty to the marketplace interrelationships. The result of these interactions lay beyond the control of the research and development or marketing strategies of a manufacturer and therefore, cannot be predicted before the launch of the new product. If new products do not contribute to the company's profits as expected will quickly disappear from the shelves. Rudolph (1995) estimated that about 80-90 per cent of the new products introduced in the retail market fail. Ryynänen and Hakatie (2014) based on previous research appointed the failure of new food products somewhere between 60 and 80 per cent. Similarly, Dijksterhuis (2016) stated that about 50-70 per cent of new products are removed from the market before achieving their financial targets.

Extensive research, mainly case studies, has been done in order to identify the best strategies for the success of NDP and the reasons for failure. Ryynänen and Hakatie (2014) identified based on Lord (1999) that the main factors associated to NPD failure are planning, management, concept and execution. Previously, Fuller (2011) based on Hollingsworth (1994) and Kraushar (1969) among others reported that the reasons for failure can be divided between internal and external to the company and can differ from the power of some retail chains or similarly unique customers to lack of production capacity. Lundahl (2012) stated that an adequately established corporate strategy, enough marketing research and correct differentiation in consumers mind are the factors that define the success or failure of a new product in the marketplace. In the same line, Dijksterhuis (2016) appointed the lack of understanding of consumers' motivations to perform a specific choice as the main reason of NDP failures in the food sector. Therefore, the reasons for failure are divers and numerous. However, what it is agreed by the literature is that the chief factor to avoid failure is to define and deliver a differentiated product with true added value and unique customer benefits together with a good positioning and price. That is, to meet the expected targets (Ryynänen and Hakatie, 2014).

Previous literature appointed that elements such as naturalness (Román et al., 2017), health and well-being (Naqash et al., 2017, Dijksterhuis, 2016) or sustainability (Lazzarini et al., 2017) are more and more important for consumers when evaluating their food choice. Furthermore, sustainability of supply chains has been under public debate during the last years building public concern and interest on to what companies are committed and how this is reported. As a consequence, consumers are becoming more demanding about what they expect manufacturers to achieve. In parallel, firms consider the introduction of new products with sustainability and healthy attributes as one of the ways in which they contribute to improving the sustainability of the food system and also the healthiness of the food offer meeting the needs of the society. However, the impact of such strategy depends on correctly identifying consumers' benefits (added value) and correctly communicating the naturalness, sustainability and healthiness of attributes. Advertising, promotion and labelling regarding to the benefits associated to the functionality of food (sustainable, natural or heathy) can help consumers on setting their purchase decisions (Hawkes 2008).

This paper aims to understand if there is a connexion between labelling information (positional claims) and the success of NDP. To do that it draws upon unique data that links NPD in the UK

market to sales data in order to evaluate their level of success. The focus is on the dairy sector. It is an interesting case because with the exception of cheese, milk consumption per capita has suffered a reduction of about 38 per cent since the 1970s (EU, 2015). Moreover, milk and its products have been subjected to a negative press campaign as regards its health and environmental effects (The Grocer, 2016). In addition, the dairy sector is especially relevant when considering the introduction of NDP. A large number of new ingredients have been developed from milk as a result of big investments made by food manufacturers. We aimed to find out first the degree of uptake of new dairy products in the UK market and second to identify if health, sustainable and other product attributes have an effect on its market success.

The paper is organized as follows; it starts with a description of the NPD mechanism in the food sector followed by a description of the NDP for the UK dairy market. The fourth section focuses on the empirical work and the last section covers the results and discussion.

2   New product development in the food sector

NPD results from a situation in the one a firm consider that it has less number of products in the market than the ones desired (Raubitschek, 1988). Besides the high rate of failure, NPD ranks among the riskiest and most confusing tasks for most companies, firms continue to launch new products in the market assuming the risk as necessary for success. There are three main elements that guide firms on their NPD strategies. First, new available additives and ingredients that can be used to enhance or generate added value on food. Second, the implementation of technological advances that change the production process or packaging of products. Finally, changes on food legislation that allows or force reformulation or development of new products.

A new developed product has been defined by Fuller (2011) pg. 2-4 as follows:

"1. A new product not previously manufactured by a company and introduced by that company into its marketplace or into a new marketplace, or

2. The presentation or rebranding by a company of an established product in a new form, a new package or into a new label into a market not previously explored by that company"

The level of innovation when developing these new products can vary from factual innovations to imitative products depending on the magnitude of the novelty. As stated by Connor (1981), the level of uniqueness depends on which agent in the food system is guiding the development and how this actor understands newness and undertakes risk of failure. The different profiles or ranges of new foods are: me-too products or new product lines, cost reduction products, line extensions, repositioned products, new forms of and reformulation of existing products, repackaging of existing products, innovative products and creative or "never seen before" products. (Rudder et al. 2001; Fuller, 2011; Ryynänen and Hakatie, 2014).

During the las 20 years the innovation process in the food sector has changed. Traditionally the process of innovation in the food industry was guided by primary producers and manufacturers which imply downstream flow of changes and information. That is, producers and manufacturers perform NPD based on their know-how to adjust their production to new available technologies, alterations in the distribution channels or new legislation among other elements (Costa and Jongen, 2006), with the outcome of products that are distributed by the different shops and retailers and accepted or not by the market. During this first period me-to products and cost reduction products were less common and retailers use to have a direct communication with consumers at the point of purchase.

Innovation evolved towards a second stage called consumer-led product development, which was focused on consumer's current and future needs being the market the determinant of the NPD. This second approach, a proactive one, supports that food markets have evolved from sellers markets to buyers markets and therefore, companies have to do a big effort to understand consumers' needs in order to develop products following upstream changes (Costa and Jongen, 2006). Capitanio et al. (2009) argued that firms NPD process is built on a mix of product-driven and buyer-driven strategies, considering both R&D (know-how) and market-oriented activities essential for a successful NPD process. The same was argued by Sarkar and Costa (2008) and Gatignon et al. (2009) who state that the big amount of actors which participate in the food supply chain pressures firms to follow an open innovation strategy to succeed in their NPD process, highlighting the importance of customers as key actors but not exclusive in the NPD process.

The third and current stage in NPD structure is directed by retailers. After the supermarket revolution and the concentration of consumers in big urban areas, food consumption is concentrated around big retailers named super and hypermarkets. As result retailers nowadays are situated in a powerful position, deciding how food products are presented to consumers and asking manufactures for specific product standards corresponding to their store image. Within this market structure seller and buyer do not communicate in a one to one way anymore but using in site adverts and food labels. This makes positional claims extremely important for consumers to be aware of the products befits and as a consequence for the new developed product to achieve success.

3   The UK dairy supply chain and its NPD

The purpose of this section is to provide a short description of the structure and evolution of the dairy industry in the UK, and in particular about the introduction of new products. The dairy supply chain is divided in four stages named milk farming, milk cooperatives, milk processing and finally milk retailing and consumption.

During the last twenty years important events occurred at all levels of the UK dairy supply chain pressuring companies to develop extend added value products in order to keep its competitiveness in the national and international market. As figure 1 shows the UK milk farming system have suffered important changes with an important decease of the total number of dairy cows and dairy farms. At the same time the dairy farming became more efficient with an increase of the milk yield per cow. It can be observed that the milk production suffered an important decrease from a high of 14.3 billion litres in 1995 to a low of 13.1 billion litres in 2009, before beginning to rise again up to 15billion litres in 2015. A new fall occurred in 2016 after the elimination of the milk quota in March 2015 contrary to what expected.

Figure 1. Evolution of UK milk farming system
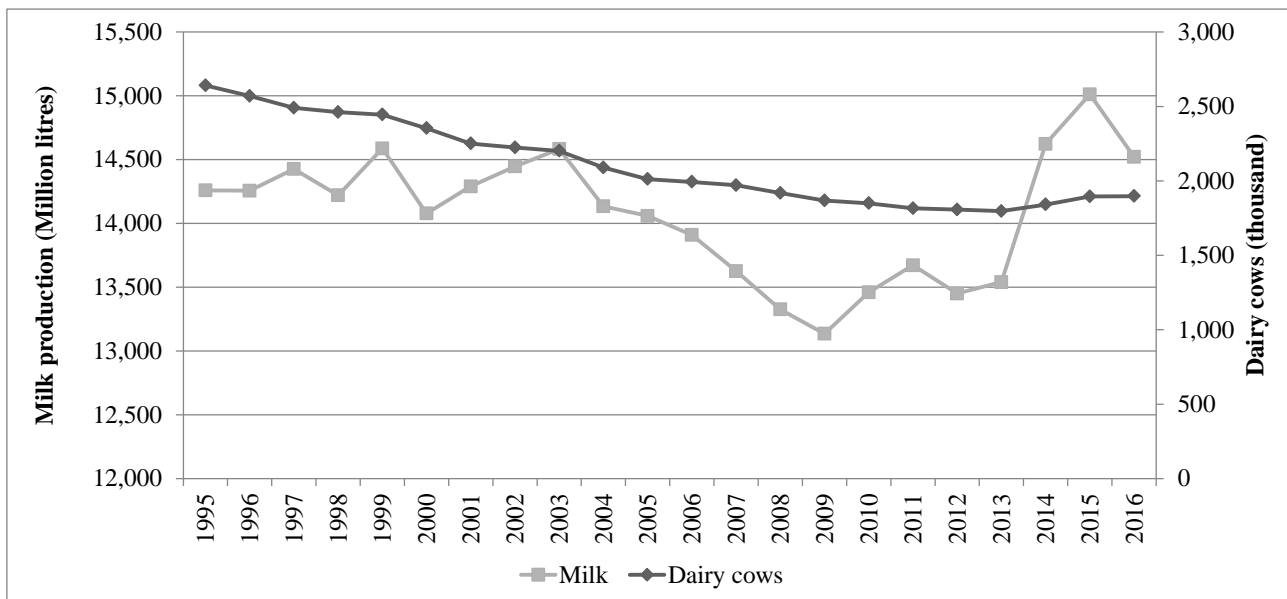
Source: DEFRA (Agriculture in the United Kingdom data sets)

About 50 per cent of the milk produced in the UK is sold liquid, 24 per cent is used to produce cheese and the remaining part is used to produce a number of products such as powder milk and yoghurt.

It is well known that milk and dairy products including cheese and yoghurt, are good sources of protein and calcium. However, dairy products have also been reported to be harmful to health with negative consequences for those consumers with lactose intolerance, osteoarthritis, rheumatoid arthritis, or trying to avoid potential cardiovascular disease (Rozenberg et al., 2011) naming milk as 'white poison' (The grocer, 2016). As a result consumers are confused and therefore milk and some dairy products have suffered an important reduction in its per capita consumption since the 1980s. The biggest reduction in the late years (2014, 2015 and 2016) could be found in the "butter and spreadable" category. Fresh milk has also suffered an important decrease on sales especially on the own label category; in contrast, branded fresh milk show some modest increase. An opposite situation could be found in cheese where it is the branded category that has shown the greatest decrease (about 4 per cent).As reported in The Grocer (2016) the improvement for branded milk seems to be associated to the increasing focus to add value to the product. Yoghurt sales suffered a reduction in the period 2015 and 2016 compared to previous years; however this has been less significant than in other categories.

In order to overcome the trend observed in the market, dairy manufacturers and retailers have invested in new product development (NPD) strategies in order to reach consumer's necessities and shift the current situation. Table 1 presents the evolution of new dairy products from 2000 to 2014. The growth in the number of products per year has been 9.6 per cent. Although manufacturers have introduced more products than retailers, the latter have been growing much faster (23 versus 7 percent per year, respectively). In terms of the claims, it is clear that new products have been introduced considering all the claims categories namely: convenience, demographic (i.e., destined to a particular group), health and nutrition, safety and sustainable. The data shows that in the later years there have been a significant development of products with claims associated to demographic and health and nutrition.

As regards the top companies introducing dairy products the top five are retailers, namely: Tesco, Sainsbury's, Marks & Spencer, Asda and Morrisons. Manufacturers can only found in the 6th position (Müller Dairy). However, the total proportion of branded products is much higher than the one for private labelled products.

4 Empirical work

4.1 Data

The analysis was based on an assembled database combining data extracted from Mintel Global New Products Database for United Kingdom (GNPD) and Kantar World Panel Dataset for Great Britain (KWDS). On the one hand, GNDP provides information about new products launched in selected countries around the world. For products launched in the UK market during 2011, the dataset contains information for 7,058 new products launched in different types of store retails by 1,507 manufacturing or retailing companies and considering 2,941 different brands. The products were classified into 26 categories. Dairy products represent 8.4 per cent of total launched products in UK for 2011 (588 dairy products).

In addition, the GNDP dataset also provides information about sub-categories, private label and origin among others. Of particular importance for this study was the fact that the dataset also provides information about the positioning claims in each product. This is important because they convey information to consumers about the product. A total of 74 different claims were found in the dataset. For the analysis these were classified into 5 groups namely: convenience (e.g., microwaveable), demographic (e.g., if destined to a particular demographic group), health and nutrition (e.g., low in calories), safety (e.g., no additives/preservatives) and sustainable (e.g. organic).

On the other hand, KWDS includes weekly records of all foods and beverages that were taken home from supermarkets and similar stores by GB households during the period 2013 to 2015. For each product, the dataset contains rich information on a number of attributes such as brand, manufacturer, origin of the product and whether the product is a private label, organic, gluten free, fair trade or animal-friendly product. The dataset also contains information on purchases.

The dairy products from GNDP were identified in KWDS.

Table 2 presents the degree of success by product category of new dairy products. It indicates a rate of success of 36.1 per cent. The table also shows an index of success where the average rate of success is 100. New products associated with evaporated milk, sweetened condensed milk, Margarine and other blends, rice/nut/grain and seed based drinks and non-flavoured milk (white milk) were the top successful categories. Table 3 present the statistics for the variables that were considered for the econometric analysis.

4.2 Methods

In order to assess the impact of particular attributes on the presence of a product in the market a Cox's proportional hazards model was estimated where the dependent variable was the number of periods (in years) a products remained in the market (see figure2).

Figure2. Description of the degree of success

Survival time = time the product is observed to be sold in the market
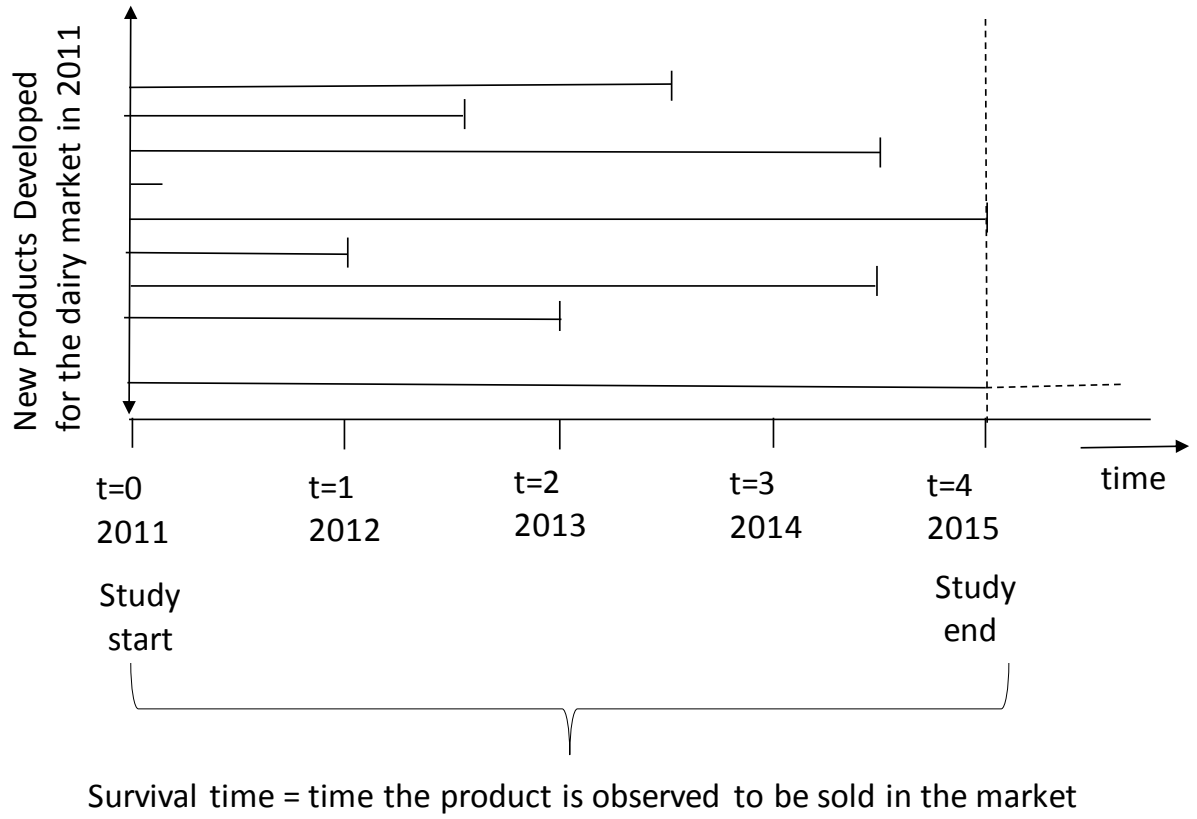
The Cox's proportional hazards model is specified as follows:

$$H(t) = H_0(t) \times \exp(\beta_1 x_1 + \beta_2 x_2 + ... + \beta_k x_k)$$

where $x_1, ..., x_k$ are a collection of predictor variables and $H_0(t)$ is the baseline hazard at time t, representing the hazard for a product with the value 0 for all the predictor variables. By dividing both sides of the above equation by $H_0(t)$ and taking logarithms, we obtain:

$$\ln\left(\frac{H(t)}{H_0(t)}\right) = \beta_1 x_1 + \beta_2 x_2 + ... + \beta_k x_k$$

$H(t)/H_0(t)$ is the hazard ratio. The coefficients $\beta_1, ..., \beta_k$ are estimated by Cox regression, and can be interpreted in a similar manner to that of multiple logistic regressions.

Results and discussion

The first step of the analysis was to look at the Klapan-Meire curves for all categorical predictors. Figure 3 and 4 shows the Klapan-Meire failure curve (cumulative probability of failure) considering all the products together. We can observe that the probability of failure is less than 0.5 percent.

Figure 3. Klapan-Meire failure curve

Kaplan-Meier failure estimate
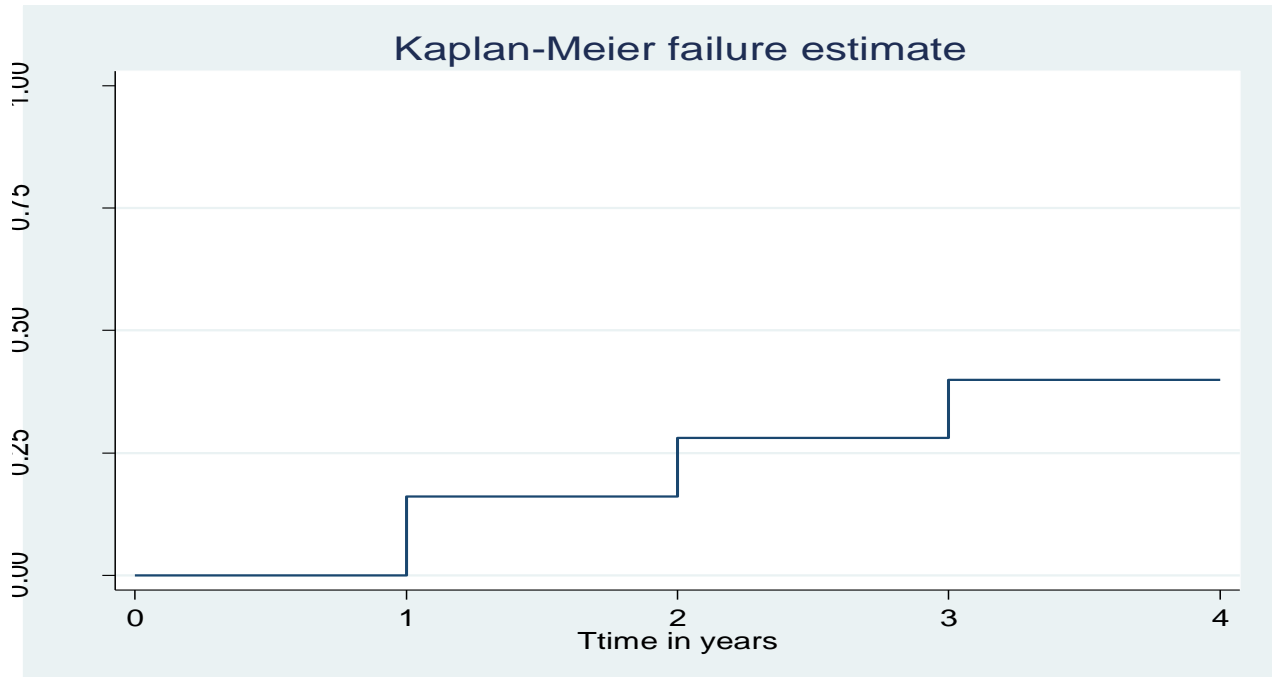
When considering the different dairy group categories we can observe that yogurt, cheese and non-milk products are the ones with higher probability of failure.

Figure 3. Klapan-Meire failure curve by category

Kaplan-Meier failure estimates
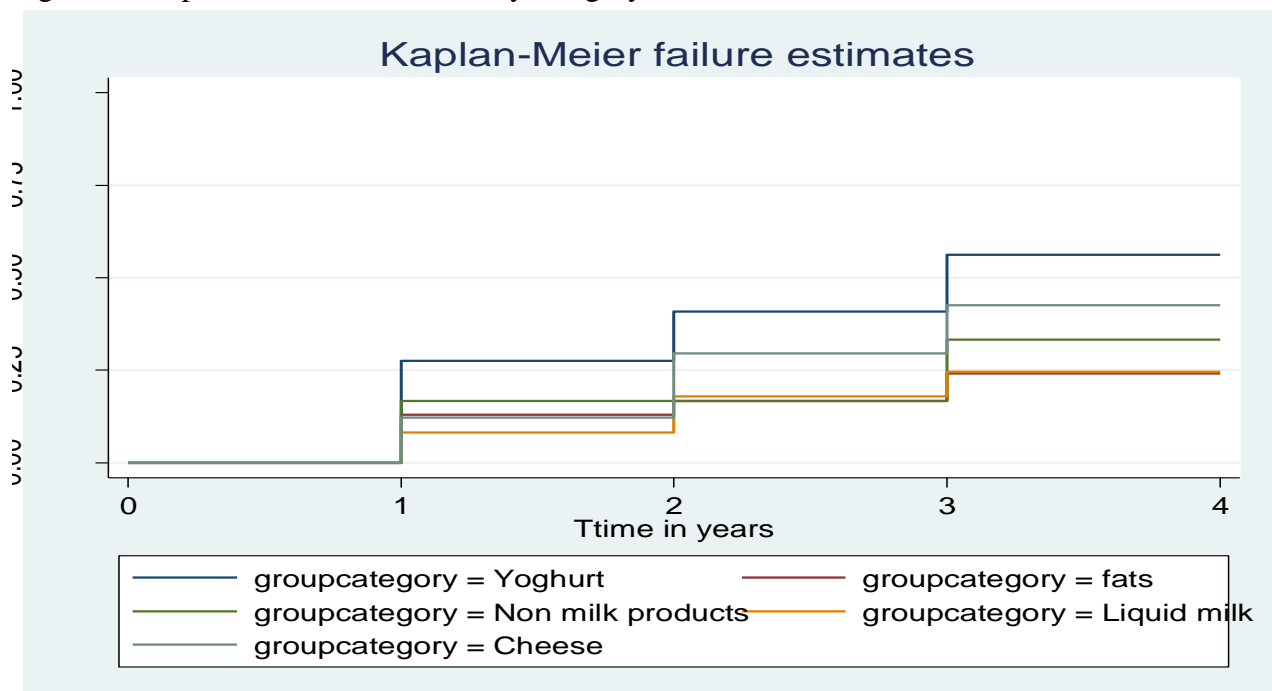
The purpose of this section is to understand the factors that influence on the success of the new developed product introduced in UK dairy market in 2011. This was addressed using the Cox's proportional hazards model explained above. Table 4 presents the estimated results for the Cox model. Goodness of fit results shows that the model fits the data appropriately. The test of proportional hazards assumption was implemented with non-significant output that indicates an absence of evidence to contradict the proportionality assumption.

When considering the relevant factors that have an effect on the success of the new developed product, it is possible to observe that with regards to the type of launching, products with new packaging have more probabilities of success than other type of launching. The rate of failure of products relaunched with new packaging compared to other launching types (i.e. new formulation, new packaging, and new variety or relaunch) (ceteris paribus) decreases by 44.5%. Whereas, less significant is the higher probability of failure for new products. This can be explained because new products are factual innovations and need to go through a process of acceptance or adoption by consumers whereas new packaging, imply a lower level of novelty and can be easily accepted. After purchasing consumers balance the utility perceived from observed, credence and also experience attributes (such as taste, smell or other sensorial qualities). If the perceived utility lacks to fulfil consumers' expectations the new developed product will not be purchased in the long term. The more dramatic is the innovation more difficult can be the comparison between products by consumers.

Regarding to the different dairy categories we can observe that yoghurts and cheese do have less probability of success than other dairy products, being new yogurts the ones with more probabilities to fail in the UK market. Yoghurts and cheese have an estimated hazard of failure of more than two times the hazard for other dairy products (ceteris paribus). New developed yogurts are the ones with more risk to fail in the UK market. Regarding to the introduction price, we can observe that the higher the introduction price the higher the hazard of failure. If the price increases by a unit (ceteris paribus), the rate of failure increases by 13.6%.

When considering the claims associated to the new introduced products we can note that convenience and sustainable claims have more possibilities of success than those products without those claims. It can be observed that the presence of convenience (ease of use) and sustainable (ethical) claims decreases the products rate of failure. However, the hazard rates are very small. When considering health claims. The opposite can be observed for products with demographic or health claims, which increase the products rate of failure. An exception is the claim reporting low glycaemic associated to a decrease on the products rate of failure.

When associating the claims to the different dairy sub-categories we can observe that several interactive terms were found significant revealing that there are claims that only work for particular categories. For the case of basic products such as milk and butter results show a decrease in the rate of failure when information related to reduction of price "economy" appears on the label. Regarding to health claims we can observe that some interaction reveal a reduction on the rate of failure whereas other health claims increase the rate of failure. Improve bone health for milk products, low fat and saturated fat for cheese and margarines respectively and finally low sugar and low allergens for yogurt are the interactions negatively related to products failure. On the contrary, low in fat for soy based drinks, fresh chees and margarines seem to increase the rate of failure.

Regarding to sustainability, environmentally friendly packaged products seem to have more success in the UK market for different dairy processed products such as evaporate milk, condensed milk and margarine. Sustainable claims that bring a reduction on failure rates are environmentally friendly product for the case of non-dairy drinks and ethical charity claims for white milk. It is interesting to highlight that organic and ethical animal are not positively related to product failure.

In addition to the variables presented in table 4 other attributes were also considered for the analysis but removed due to lack of significance. These variables were products with private label

(introduced by supermarkets), products identified as British (i.e., whether the product has a claim that identifies it a British) and finally products without any claim in the label.

6 Conclusions

The purpose of this paper has been twofold: first to examine the rates of success of new developed dairy products for the UK market and second to identify some of the factors leading that success with special attention to the sustainable and health attributes.

We focused on products introduced in 2011 using Mintel's GNPD and their sales were identified up to 2015 using Kantar Worldpanel data. Descriptive results revealed that the categories that provide more new developed products within the dairy sector are spoonable yogurts, cheese (different types) and drinking yogurt. Regarding to the type of claims associated to the new products convenience and health claims are the more common for the dairy sector. Finally the descriptive tables also highlighted the importance of the private labels for the NPD in the UK dairy industry being Tesco and Sainsbury's the leading companies.

The results also indicate an average rate of success of 36.1 per cent. The top successful categories were evaporated milk, sweetened condensed milk, margarine and other blends, rice/nut/grain and seed based drinks and non-flavoured milk (white milk).

The cox model results identify that launched new products have less probability of being successful compared to other launched types whereas new packaged products have more probability of success. The rate of failure of products relaunched with new packaging compared to other launching types (ceteris paribus) decreases by 44.5%.

When considering the different dairy categories it has been found that introducing yoghurt products or cheese decrease the probability of success. That is, yoghurts and cheese have an estimated hazard of failure of more than two times the hazard for other dairy products (ceteris paribus). New developed yogurts are the ones with more risk to fail in the UK market. When considering the introduction price we observe that if the price increases by a unit (ceteris paribus), the rate of failure increases by 13.6%.

In addition, new products commercialised under a private label or highlighting the British origin reveal non-significant results, being these attributes not relevant to be considered for the analysis.

The model results also identify that all categories of claims named health, safety, environmental, demographic or convenient can be associated to the level of success of dairy products. The presence of convenience (ease of use) and sustainable (ethical) claims decreases the products rate of failure. However, the hazard rates are very small. The opposite was found for products with demographic or health claims.

To better understand these relations the analysis must be category specific. Several interactive terms were found significant (i.e., attributes that work only for some dairy products). A decrease in the rate of failure was observed for: Milk and butter using an "economy" claim; health claims such as 'improve bone health' for milk products, 'low fat' and 'low trans fat' for cheese and margarines respectively and 'low sugar' for yoghurt; sustainable claims such as 'environmentally friendly package' for different dairy products, 'environmentally friendly products' for cereal drinks and 'ethical charity' for white milk.

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Table 1 – UK Dairy sector – Introduction of new products figures 2000-2014

Categories	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Dairy	174	221	257	207	302	320	171	216	200	267	390	592	649	710	690
Branded	163	192	190	158	194	219	117	159	144	155	259	318	338	398	446
Private Label	11	29	67	49	108	101	54	57	56	112	131	274	311	312	244
Dairy products with at least one claim 1/															
Convenience	3	10	13	9	8	18	12	16	27	72	79	117	160	166	171
Demographic	51	101	127	96	158	145	64	75	101	173	293	433	501	568	538
Health and nutrition	47	100	114	78	112	130	70	75	85	118	202	309	318	330	332
Safety	25	22	32	21	22	45	18	33	42	57	109	159	178	198	195
Sustainable	31	40	26	13	22	18	17	30	29	45	131	205	213	260	274
Top 10 companies introducing dairy products															
Tesco	1	4	13	13	40	27	9	7	14	28	40	48	99	62	34
Sainsbury's	3	12	23	12	5	21	3	1	7	15	18	31	32	32	24
Marks & Spencer	1	3	13	12	17	22	15	17	10	9	17	12	32	24	24
Asda	4	1	3	2	5	7	3	1	2	11	22	40	38	36	36
Morrisons	0	0	0	0	1	7	1	1	0	5	11	36	46	68	35
Müller Dairy	4	7	10	11	19	13	7	6	6	6	10	15	13	23	38
Arla Foods	7	13	12	5	7	6	11	7	10	5	10	20	14	15	29
Dairy Crest	4	10	5	9	12	7	10	2	3	5	14	15	13	15	16
Waitrose	1	3	0	5	3	6	5	7	6	22	10	22	18	19	22
Nestlé	3	5	7	13	9	15	5	3	6	5	6	12	9	7	14
Others	146	163	171	125	184	189	102	164	136	156	232	341	335	409	418

Source: Own elaboration based on Mintel's GNPD
Note: 1/ Products may have more than one claim and they could be from different claim categories.

Table 2 - Degree of success by dairy product category

Categories	Fully failed	Partial success	Success	Total	Percentages				Success index
					Failed	Partial	Success	Total	
Evaporated Milk	0	1	4	5	0.0	20.0	80.0	100.0	2.22
Sweetened Condensed Milk	1	0	3	4	25.0	0.0	75.0	100.0	2.08
Margarine & Other Blends	6	2	17	25	24.0	8.0	68.0	100.0	1.89
Rice/Nut/Grain & Seed Based Drinks	1	0	2	3	33.3	0.0	66.7	100.0	1.85
White Milk	15	3	29	47	31.9	6.4	61.7	100.0	1.71
Soy Based Drinks	5	2	8	15	33.3	13.3	53.3	100.0	1.48
Cream	15	3	14	32	46.9	9.4	43.8	100.0	1.21
Butter	11	0	8	19	57.9	0.0	42.1	100.0	1.17
Fresh Cheese & Cream Cheese	8	3	7	18	44.4	16.7	38.9	100.0	1.08
Processed Cheese	9	4	7	20	45.0	20.0	35.0	100.0	0.97
Flavoured Milk	13	6	10	29	44.8	20.7	34.5	100.0	0.96
Shortening & Lard	3	1	2	6	50.0	16.7	33.3	100.0	0.92
Soft Cheese & Semi-Soft Cheese	29	7	17	53	54.7	13.2	32.1	100.0	0.89
Hard Cheese & Semi-Hard Cheese	61	19	35	115	53.0	16.5	30.4	100.0	0.84
Soy Yogurt	4	1	2	7	57.1	14.3	28.6	100.0	0.79
Curd & Quark	9	2	4	15	60.0	13.3	26.7	100.0	0.74
Soft Cheese Desserts	7	4	4	15	46.7	26.7	26.7	100.0	0.74
Drinking Yogurt & Liquid Cultured Milk	16	7	8	31	51.6	22.6	25.8	100.0	0.72
Spoonable Yogurt	76	19	31	126	60.3	15.1	24.6	100.0	0.68
Creamers	2	0	0	2	100.0	0.0	0.0	100.0	0.00
Liquid Dairy Other	1	0	0	1	100.0	0.0	0.0	100.0	0.00
Total	292	84	212	588	49.7	14.3	36.1	100.0	1.00

Source: Based on Mintel's GNPD and Kantar Worldpanel data.

Table 3 – Descriptive statistics

Variable	Obs	Mean	St. dev.	Min	Max
Number of years a product has been sold	588	1.90	1.79	0.00	4.00
New Packaging	588	0.22	0.42	0.00	1.00
New Product	588	0.41	0.49	0.00	1.00
Product category (dummies)					
Evaporated Milk	588	0.01	0.09	0.00	1.00
Sweetened Condensed Milk	588	0.01	0.08	0.00	1.00
Margarine & Other Blends	588	0.04	0.20	0.00	1.00
Rice/Nut/Grain & Seed Based Drinks	588	0.01	0.07	0.00	1.00
White Milk	588	0.08	0.27	0.00	1.00
Soy Based Drinks	588	0.03	0.16	0.00	1.00
Cream	588	0.05	0.23	0.00	1.00
Butter	588	0.03	0.18	0.00	1.00
Fresh Cheese & Cream Cheese	588	0.03	0.17	0.00	1.00
Processed Cheese	588	0.03	0.18	0.00	1.00
Shortening & Lard	588	0.01	0.10	0.00	1.00
Flavoured Milk	588	0.05	0.22	0.00	1.00
Hard Cheese & Semi-Hard Cheese	588	0.20	0.40	0.00	1.00
Soy Yogurt	588	0.01	0.11	0.00	1.00
Curd & Quark	588	0.03	0.16	0.00	1.00
Soft Cheese Desserts	588	0.12	0.32	0.00	1.00
Drinking Yogurt & Liquid Cultured Milk	588	0.05	0.22	0.00	1.00
Spoonable Yogurt	588	0.21	0.41	0.00	1.00
Creamers	588	0.00	0.06	0.00	1.00
Liquid Dairy Other	588	0.00	0.04	0.00	1.00
Alternative product category					
Dairy non-milk products	588	0.16	0.37	0.00	1.00
Liquid milk	588	0.14	0.35	0.00	1.00
Cheese	588	0.26	0.44	0.00	1.00
Yoghurt (made of milk)	588	0.29	0.46	0.00	1.00
Fats	588	0.14	0.35	0.00	1.00
Dummy branded (0) and private label (1)	588	0.44	0.50	0.00	1.00
Dummy 1 if the product mentions that is a British product	588	0.10	0.29	0.00	1.00
Type of claim (dummies)					
Added Calcium	588	0.04	0.20	0.00	1.00
All Natural Product	588	0.02	0.14	0.00	1.00
Antioxidant	588	0.00	0.04	0.00	1.00
Babies & Toddlers (0-4)	588	0.00	0.06	0.00	1.00
Beauty Benefits	588	0.00	0.04	0.00	1.00
Bone Health	588	0.04	0.19	0.00	1.00
Carbon Neutral	588	0.01	0.10	0.00	1.00
Cardiovascular (Functional)	588	0.04	0.19	0.00	1.00
Children (5-12)	588	0.05	0.23	0.00	1.00
Cobranded	588	0.01	0.12	0.00	1.00
Convenient Packaging	588	0.07	0.25	0.00	1.00

Variable		Obs	Mean	St. dev.	Min	Max
Digestive (Functional)		588	0.04	0.19	0.00	1.00
Ease of Use		588	0.01	0.09	0.00	1.00
Economy		588	0.08	0.27	0.00	1.00
Ethical - Animal		588	0.02	0.12	0.00	1.00
Ethical - Charity		588	0.03	0.17	0.00	1.00
Ethical - Environmentally Friendly Package		588	0.28	0.45	0.00	1.00
Ethical - Environmentally Friendly Product		588	0.04	0.19	0.00	1.00
Ethical - Human		588	0.01	0.10	0.00	1.00
Gluten-Free		588	0.11	0.31	0.00	1.00
GMO-Free		588	0.04	0.20	0.00	1.00
High Protein		588	0.02	0.12	0.00	1.00
High/Added Fiber		588	0.00	0.06	0.00	1.00
Limited Edition		588	0.04	0.19	0.00	1.00
Low/No/Reduced Allergen		588	0.12	0.32	0.00	1.00
Low/No/Reduced Calorie		588	0.02	0.12	0.00	1.00
Low/No/Reduced Cholesterol		588	0.01	0.10	0.00	1.00
Low/No/Reduced Fat		588	0.35	0.48	0.00	1.00
Low/No/Reduced Glycemic		588	0.01	0.07	0.00	1.00
Low/No/Reduced Lactose		588	0.03	0.18	0.00	1.00
Low/No/Reduced Saturated Fat		588	0.05	0.22	0.00	1.00
Low/No/Reduced Sodium		588	0.02	0.12	0.00	1.00
Low/No/Reduced Sugar		588	0.03	0.17	0.00	1.00
Low/No/Reduced Transfat		588	0.04	0.20	0.00	1.00
Microwaveable		588	0.01	0.09	0.00	1.00
No Additives/Preservatives		588	0.24	0.43	0.00	1.00
No Animal Ingredients		588	0.04	0.20	0.00	1.00
On-the-Go		588	0.02	0.12	0.00	1.00
Organic		588	0.08	0.27	0.00	1.00
Other (Functional)		588	0.02	0.15	0.00	1.00
Prebiotic		588	0.00	0.06	0.00	1.00
Premium		588	0.05	0.21	0.00	1.00
Seasonal		588	0.03	0.17	0.00	1.00
Slimming		588	0.03	0.16	0.00	1.00
Stanols/Sterols		588	0.02	0.14	0.00	1.00
Time/Speed		588	0.01	0.07	0.00	1.00
Vegan		588	0.04	0.19	0.00	1.00
Vegetarian		588	0.69	0.46	0.00	1.00
Vitamin/Mineral Fortified		588	0.07	0.25	0.00	1.00
Wholegrain		588	0.01	0.08	0.00	1.00

Source: Own elaboration based on Mintel's GNPD

Table 4 – Cox regression time-constant variables and introduction price

	Coeff.	St. err.	Hazard rate Value	Hazard rate St. err.	t ratio	Sig.
New product	0.295	0.181	1.344	0.244	1.630	*
New packaging	-0.588	0.213	0.555	0.118	-2.760	***
Product is yoghurt (made of milk)	1.082	0.274	2.950	0.808	3.950	***
Product is cheese	0.856	0.279	2.354	0.657	3.070	***
Introduction price	0.128	0.051	1.136	0.058	2.480	**
Convenience						
It's easy of use	-37.559	1.026	0.480 a	0.500 a	-36.610	***
Demographic						
For babies	1.512	0.477	4.535	2.162	3.170	***
For vegetarians	0.523	0.197	1.688	0.332	2.660	***
Health and nutrition						
Has low calories	1.738	0.224	5.686	1.273	7.760	***
Has low glycemic	-2.661	1.432	0.070	0.100	-1.860	*
Low in sodium	0.954	0.372	2.596	0.966	2.570	***
Is prebiotic	2.044	0.255	7.719	1.972	8.000	***
Is wholemeal	0.873	0.241	2.394	0.578	3.620	***
Sustainable						
Is ethical animal	-37.596	0.729	0.470 a	0.340 a	-51.550	***
Is ethical human	-38.414	0.733	0.210 a	0.015 a	-52.400	***
Interactions						
Convenience						
White milk x Is economic	-34.909	1.044	6.910 a	7.210 a	-33.430	***
Butter x Is economic	-40.365	0.766	0.030 a	0.020 a	-52.710	**
Demographic						
Evaporated Milk x Is vegetarian	1.075	0.255	2.930	0.746	4.220	***
Hard and Semi-hard Cheese x Is premium	-37.823	0.524	0.380 a	0.200 a	-72.240	***
Spoonable Yogurt x Is limited edition	1.318	0.356	3.736	1.331	3.700	***
Margarine x No animal ingredients	-38.798	1.029	0.140 a	0.140 a	-37.700	***
Health and nutrition						
Margarine x Has low saturated fat	-36.831	0.522	1.010 a	0.520 a	-70.540	***
Margarine x Has low trans fat	2.400	0.283	11.022	3.116	8.490	***
White milk x Bone health	-34.909	1.044	6.910 a	7.210 a	-33.430	***
White milk x Is vitamin/Mineral fortified	33.210	1.702	265.000 a	451.000 a	19.520	***
Soy based drinks x Low in fat	0.928	0.252	2.531	0.638	3.680	***
Fresh cheese x Low in fat	0.989	0.407	2.689	1.094	2.430	**
Processed cheese x Low in fat	-37.819	0.748	0.380 a	0.280 a	-50.530	***
Flavoured milk x Provides bone health	-38.011	0.730	0.310 a	0.300 a	-52.040	***
Spoonable Yogurt x Has low allergens	-1.420	0.538	0.242	0.130	-2.640	***
Spoonable Yogurt x Low in sugar	-38.142	1.015	0.270 a	0.280 a	37.590	***
Safety						
Margarine x No additives preservatives	-2.155	0.725	0.116	0.084	-2.970	***
Cream x No additives preservatives	2.358	0.320	10.575	3.383	7.370	***
Spoonable Yogurt x No additives preservatives	0.707	0.298	2.027	0.603	2.370	**
Sustainable						
Evaporated Milk x Is environmentally friendly package	-37.572	0.599	0.480 a	0.280 a	-62.780	***
Sweetened condensed milk x Is environmentally friendly package	-36.866	0.819	0.980 a	0.800 a	-45.030	***
Margarine x Is environmentally friendly package	-36.607	1.246	1.260 a	1.580 a	-29.370	***
Butter x Is environmentally friendly package	3.295	0.363	26.976	9.805	9.060	***
Flavoured milk x Is environmentally friendly package	1.419	0.379	4.133	1.566	3.750	**
White milk x Is environmentally friendly product	2.173	0.271	8.784	2.384	8.000	***
Rice, nut, grain and seed based drinks x Is environmentally friendly product	-36.997	0.760	0.860 a	0.650 a	-48.690	***
White milk x Is ethical animal	2.460	1.280	11.709	14.982	1.920	***
White milk x Is ethical charity	-36.471	0.700	1.450 a	1.010 a	-52.080	***
Margarine x Is Organic	37.433	1.806	1.810 a	3.260 a	20.730	***
Log pseudolikelohood ratio test	-747.275					
Wald chi²(20)	60298.050 ***					

Notes: '*', '**', '***' stands for P<0.10, P<0.05, P<0.01, respectively.

[a] The value is multiplied by e-16.