

Product development process management practices and problems in companies of Brazilian food industry

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Abstract: This article shows and analyzes the results of a data collecting survey in Brazilian food industry companies, on management practices and problems in the product development process (PDP). The general objective is to characterize and analyze the PDP management within those companies as well as proposing improvement suggestions. The research method adopted is the *survey*, by applying a questionnaire *in loco* when interviewing the person responsible for product development process in those companies. The field research was conducted by the authors of this article by applying a 28 questions semi-structured questionnaire, involving amongst others, subjects like development strategy, PDP organizational structure, activities carried out, tools application, main problems and trends. Those subjects were considered starting from the bibliographic review on PDP managements dimensions. Out of the 32 sample companies, belonging to different segments of the food industry, 23 are large size, and 9 are medium size; 20 are Brazilian and 12 multinationals. The sample showed two observable PDP patterns. One of those patterns is more structured and evidences practices already established and closer to what is prescribed in the specific bibliography; the other pattern is more informal and empiric, where companies start the elaboration and analysis of products physical prototypes more quickly, with scarce use of techniques to support the resulting analyses and decisions.

Keywords: product development process management, food industry, product development, management practices.

1. Introduction

The food industry is a link of the agrifood system which has suffered thorough transformations over the last years, like the companies concentration trend into huge merges, seeking market leadership thru scale economy-based costs reduction. Nevertheless, in the last years, other strategies have being more utilized in the food industry such as: the search, thru market segmentation and product differentiation, as ways to capture consumers with less price elasticity and consumers greater income elasticity, characteristics which allow wider profit gains in products price (NEVES et al., 2000).

The food companies, mainly in the last decade, discovered the importance of adding value thru fitness to use, nutritional factors, variety, economy and quality. In the mean time, consumers exercise a greater discernment capacity as regards quality, value, appearance of the products they purchase (MCLLVEEN, 1994).

Those transformations have caused many consumer segments to be more critical when buying, what in turn has demanded greater companies' qualification to carry out new products development and improvement of existing products.

According to MCLLVEEN (1994), the product development process (PDP) aims at making possible to companies a high financial return rate, besides improving the market share and brand image, thru the production and launch of new and competitive products. An efficient PDP should allow companies to faster perceive trends as set forth by consumers, to attain flexibility in crisis times, which difficult the entrance of competitors in new markets as well as help the company to better take advantages of new products and markets.

However, the development process, mainly in the food industry, tends to show a high level of failures when launching new products, thus reducing the success rates.

RUDDER et al. (2001), remark that a success rate below 12% is expected in annual new products launch, based on USA products data. According to the authors, it is necessary to better understand, analyze and introduce improvements in the PDP in this sector, so as to obtain a higher success rate.

The characteristics described in researches carried out by those authors (RUDDER et al., 2001; MCLLVEEN, 1994) also apply to Brazil, where a dynamic movement involving re-structuration, concentration and maturing of both sector's companies and markets. Thus, a trend exists to develop a greater products number, by companies and sectors within this industry, due to the continuous improvement oriented context, which requires increasing the variety of offered goods as well as its constant innovation. Developing products more quickly, with efficiency and lower costs and adequate to consumers' needs grants companies important competitive advantages.

The objective of this paper is to show and analyze the results of a field research on PDP practices and management problems within a sample of food industry companies. The survey instrument was a specifically prepared questionnaire applied within a 32 company's sample. The authors of this article visited the sample companies and interviewed those responsible for company's PDP.

2. The product development process in the food industry

Various forms exist to classify food and food products. PROENÇA (1995) utilizes the transformation criterion to classify the products transformation degree after the production cycle. Consequently, products are classified from first to fifth generation. The processing degree is associated to the products convenience level. First generation products are considered to be in raw state, as long as the fifth generation ones are considered ready to serve.

CONNOR et al. (1985) present a classification according to the strategic groups characterized by their distribution channels. Thus, products are split into four major groups product: intermediate products (scarcely differentiated); institutional products (traded in large amounts into the institutional market); brand products (retail distributed with strong brand differentiation); and brandless products (retail distributed and price competitive).

Food can also be classified into: processed food and natural food. Processed foods are those whose final characteristics are mainly generated during their industrial transformation process (for example: powdered juice, jelly, etc). Natural foods are those whose final characteristics are generated along the biologic production cycle (for example: milk, natural fruit, etc). To study the food product development process, the classification proposed by this author is more adequate, since food industry products are processed foods.

2.1. Food products development projects

Product development is part of the organizational strategy. The product development strategy is the starting point for both, an existing product continuous improvement and a new product launch. Due to customers requirements, total quality management and economic needs in the food industry, the development process needs to be more focused, quantitative, quick and based on knowledge (EARLE, 1997).

According to the same author, PDP has always been the "heart" of the food industry. Development started 100 years ago, ranging from handcrafted products to those developed with high technology. Fast technological changes, along the improvement of consumers' life standard, resulted in great opportunities for products development.

To better understand the product development process, it is necessary to know the different projects types as developed by companies and industrial sectors. BOOZ et al. (1982), *apud* ILORI et al. (2000), classify new products according to two dimensions: "new to the company" and "new to the market". The authors introduced a variation within that interval and identified six categories: cost reduction; existing products improvement, product repositioning; additions to existing products lines; new product lines to allow the company enter into new market; new products for the market, thus creating new markets.

Applicable to the food industry, FULLER (1994) presents other project typology which will be used throughout this paper due to being food specific:

- **Line extension:** a new variation of an already established products line. Extensions are products which call for short time and little development effort, do not require production line changes nor new equipments purchase, and demand minor changes in marketing strategy. Some products extension examples are: new flavor snack crackers and a new dehydrated soup variety;
- **New products repositioning:** the need to reposition may be due to consumers' suggestions or market research. An existing product can be introduced in a totally new market. Generally, some procedures are necessary, like label substitution, a new packing, and the preparation of a new marketing strategy to disseminate the product. As an example, an oat based product, which became "healthy food" because it is fiber rich and helps reduce cholesterol;
- **New form of existing products:** product form change may demand a longer development time, besides production equipments and packings. Some examples of existing products new forms are liquid margarine and soluble coffee;

- **Reformulation of existing products:** product reformulation consists of some improvement, like improving color or taste, increasing fibers content, reducing fat content and increasing stability. Generally this improvement involves low investment and short development time. Some examples of this product are: fiber bread and lactose-free dairy products;
- **New packing for the existing product:** new technologies, like modified or controlled atmosphere, are likely to allow a variety of new products, allowing a shelf life increase, thus satisfying the existing market, besides the opening of new markets. The development time is minimal; however, it may be necessary to purchase new packing equipment. A new packing example is changing mustard or ketchup glass jar into plastic packing;
- **Innovative product:** it is the result of changes in an existing product. Normally, the greater the innovation, the longer development time and the higher research investment. However, some innovative products call for short development time and low investment, like frozen meals; and
- **Entirely new products:** are characterized by long development time, high costs, and large marketing investments to educate consumers, equipments expenses, high risk, and the possibility of having successful products copied by competitors.

2.2. Food products development phases

EARLE (1997) presents a brief history of food PDP throughout the last decades. In the 50s decade, two food product development lines existed: one run by the research and development department and the other, by the marketing department. Nevertheless, the failure rate was high, since both systems neglected the consumer's opinion. One of the great obstacles of products development in the food industry was and still is, in some companies, the distance between R&D researchers and Marketing staff. The integration of the different research techniques, not just association, has been implemented during the last decade and has overcome the negative aspects of product development.

The first attempts to quantify the phases of food product development process, more scientifically grounded, were carried out in 1967 by Buzzell and Nourse and by EARLE et al. in 1968. Buzzell and Nourse identified the technical principles of development and manufacture of food products. Some years later, detailed methods for technological development were described, mainly for formulation and processing.

In 1968, Earle introduced three new aspects into PDP: the coordination of some research techniques; consumer participation in PDP; and go/no project decision making that should be made by the upper administration between phases

of the development process. The authors also highlighted other issues still applicable today: the importance of market assessment for any given product, and the influence of the upper administration behavior on a project success (EARLE, 1997).

In 1971, Desrosier and Desrosier proved the first phase of the development process should be the determination on products and target market by the Upper Administration, so as to plan changes in existing products and new products launch. In 1984, Meyer also emphasized the organizational strategy, although also considered the product concept development and product optimization phases to be equally important in PDP. In 1995, Rudolph, when describing the development system utilized by Arthur D. Little consultancy office, showed the combination of both technological and marketing development in three main phases: product definition, product implementation and product launch phase (EARLE, 1997).

2.3. Restrictions and problems in food products development

The resistance of food companies to innovation is due to the research activities costs, considered as high, and to the possibility of competitors to quickly engulf ("copy") the innovations. The desire to develop an entirely new product, which will increase the company's competitiveness, as well as counterbalances financial targets, which aim at reaching the forecast billing and the need to meet the annual budget restrictions (FULLER, 1994).

Managers, according to FULLER (1994), seldom envision future farther than two years ahead. Major interest lies on short term results, which mismatches long term research. Through that vision, it would not be worth wise to undertake risks involving important investments in innovation research if the return cannot be guaranteed.

Inadequate communication amongst people, departments or different plants of the same company is a problem in any business function. In the products development function, for example, the team should necessarily perform jointly, so as to increase the chances to develop a successful product (FULLER, 1994).

Other difficulty faced by the food industry is market research deficiency. POLIGNANO et al. (2000) consider that, due to the fact that market research is young within the organizational structure of food companies, to operationalize development encounters difficulties in some of its stages in Brazil. Noticeably, deficiency involves "listening the market voice" activities, transforming consumers' needs in project information and their inter relationship. During the product project, failures exist in the responsibilities attribution and execution of activities related to consumers' opinion survey, exchange of marketing information, specifically between marketing and technical areas. MIZUTA (2000) observed,

in the analyzed companies, that consumers' researches are little utilized, while the Upper Administration opinions on products to be developed are more valued.

RUDOLPH (1995) considers that food products development contains serious deficiencies. Amongst the 8077 new food products introduced in the American market in 1993, just 25% were entirely new products and not line extensions. According to the author, despite of no existing accurate information on new product success, an estimate indicates that 80 to 90% fail within one year after launch. There also the products which were not even launched. The failures cost to American food companies at that time spins around \$ 20 billions.

BARCLAY (1992), shows in his paper on PDP (not restricted to the food industry) that most survey researches on PDP is unknown by products development managers. Other failure also cited, would be the lack of references on new products performance. For example, data as regards production and performance of new products seldom would be handed in to the team which developed the product.

2.4. Trends in food product development process

One of the most stringent trends in the food sector is focus on market niches. Stronger competition leads to launch more sophisticated new products or, in other words, containing more added value. Other great characteristic of new launches into the market is the search to offer the customer more practicality, namely, with ready made meals.

Beyond practicality and convenience, other observed trend is the production of enriched foods, to increase their nutritional value. The European market for healthy foods is visibly growing. In other parts of the world, that sector is growing as well. In Japan, almost each launched product has one or more ingredients allegedly health beneficial (BYRNE, 1998).

Consumers are being flooded with nutritional information and begin to understand the enormous influence diet and feeding habits exert on health and well-being. The food industry is interested to use the consumer's concern about nutrition as a starting point and incentive to develop food products which are health beneficial and have medicinal properties.

All those characteristics also apply to Brazil, because a movement is taking place towards the maturation of both consumer and sector companies.

Other trend in new food products development, according to EARLE (1997), is the growing importance of companies supplying ingredients and equipments. Large ingredients companies are specialized in process engineering, carry out researches to ground technological innovation, and are prepared to invest and undertake risks. The equipments suppliers also play an important role in

process development. Packing equipment may yield a product differential. Not only does packing have the function to protect the food during processing and distribution, but also to compose the product, thus adding value to differentiate it from its competitors.

3. Data presentation and analysis

A five-question blocks questionnaire was prepared to serve as field research instrument, involving: company's general data; PDP structure; PDP management; PDP results; and problems and trends/perspectives, having the bibliographic review on PDP management dimensions as a reference and the PDP specificities of the food industry. The questionnaire was initially tested in 4 companies (2 large sizes and 2 small and medium sizes). Starting from the reviewed questionnaire, companies were visited and people responsible for product development were interviewed. The sampling was neither aleatory nor stratified, and was a function of both convenience and access possibility.

3.1. Sample characterization

Data were collected from a 32 companies sample within the Brazilian foods industry. By adopting SEBRAE's criterion of employees number, the sample companies can be divided into two groups: 23 large size companies with more than 500 employees (72% of the sample); and 9 with less than 500 employees, considered small and medium size (28%). Regarding the external market: 20 (62.5%) export their products, and 12 (37.5%) are not engaged in exports. As regards capital 24 companies (75%) are Brazilian and 8 (25%) are multinationals (Table 1).

Table 2 shows the sample companies distribution, classified according to ABIA - Brazilian Association of the Food Companies (2002), per operation segment.

Table 1. Sample characterization.

	Size		Exports		Capital	
	Large	Small/medium	Yes	No	Brazilian	Multi
Number of companies	23	9	20	12	24	8
(%)	72	28	62.5	37.5	75	25

Table 2. Number of companies per food segment.

Segment	Number of companies	Sample (%)
Wheat chain	9	28
Chocolate/cocoa/candies	9	28
Beverages	5	16
Various (seasonings and ingredients)	4	12.5
Animal protein chain	3	9.5
Sweets and confectionary	1	3
Oils and fats	1	3
Total	32	100

Table 3 presents the geographic distribution of the sample companies.

Thus, the sample profile is large size companies predominant, located in the state of São Paulo, Brazilian, which export part of their production.

3.2. Market strategies and products innovation dynamics

Figure 1 shows the market strategies adopted by all 32 companies. The interviewee could choose more than one option. Results show: 74% companies adopt market strategies addressing the popular segment; 61% utilize non popular market strategies, and 29% employ market specific strategies.

According to Figure 2, 50% of companies with less than 500 employees adopt the popular market strategy; 62.5% utilize non popular market strategy, and 12.5% segment specific strategies. For companies with more

Table 3. Geographic distribution of the sample companies.

Location	Number of companies	Sample (%)
Interior of São Paulo State	15	48.40
Great São Paulo	8	25.80
State of Espírito Santo	3	9.68
State of Santa Catarina	3	9.68
State of Paraná	2	6.45
State of Rio Grande do Sul	1	3.23
Total	32	100.00

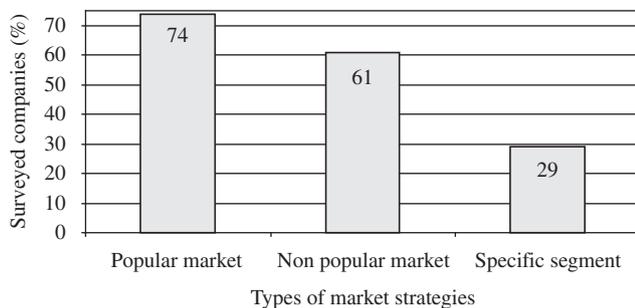


Figure 1. Adopted market/product strategies, considering all companies.

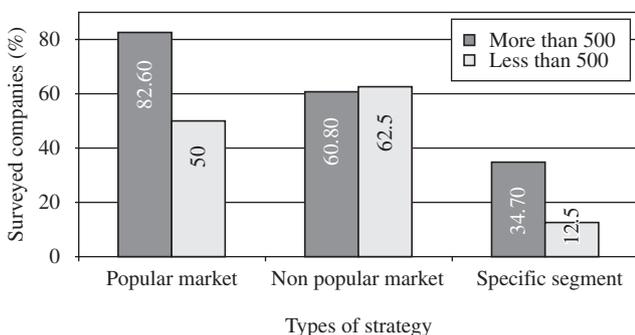


Figure 2. Adopted market/product strategies, considering the companies' size (number of employees).

than 500 employees, 82.6% operate in the popular market; 60.8% in the non popular market; and 34.7% in specific market segments. Thus, the large companies operate more intensively in the three markets.

The innovation dynamics of all the sample companies can be observed in Figure 3: 58% of the companies modify their products periodically; 52% launch products which are new to the company (although they are already offered) and 52% launch new products as pioneers. Consequently, a significant part of the companies can be said to need development efforts to meet their strategies.

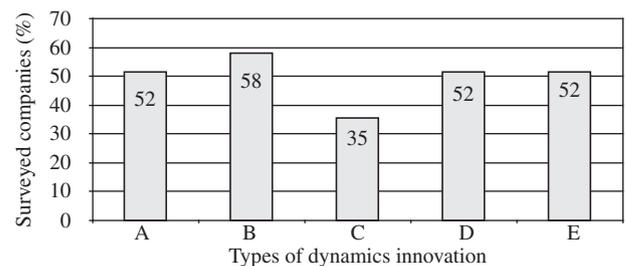
Companies with less than 500 employees: 12.50% launch products new to the company and are also market launch pioneers. In large size companies, the innovation dynamics can be considered as stronger: for 65.22% existing products are periodically modified; and 56.52% launch products which are new to them and to the market.

That dynamics is also relatively stronger in exporter companies: 63.64% modify products periodically; 50% launch products new to the company; and 35.45% launch new products as pioneers.

The highest percentage of products developed by companies (independently of their size or export activities) is represented by line extensions (Figures 4, 5 and 6):

- for all the sample companies: averages 39.07% of developed projects, with a 5 to 90% amplitude variation;
- for the large size companies: 34.55% (with 5 to 70% variation); for companies with less than 500 employees, 59% (varying from 25 to 90%); and
- for exporter companies: 46.18%, (with 5 to 90% variation).

Developing a new packing for an existing product, is the second project type most carried out by companies: for all the sample companies 26.41% (varying from 5 to 66%); for the large size companies 24.44% e, for those with less than



- A Existing products - maintained in the market for a long time
- B Existing products - periodically modified
- C Periodically launches - new products following market leader
- D Launches products - new to the company
- E Launches pioneer products

Figure 3. Sample companies' innovation dynamics.

500 employees 35.25% (varying from 5 to 66%); and for exporter companies 26.54% (varying from 5 to 60%).

In view of the data plotted above, in small and medium companies projects are mainly the line extension and new packing types.

As regards projects with more innovative characteristics (Figure 7), evidence is that 26.18% of the companies develop products new to the company, and 15.14% develop products

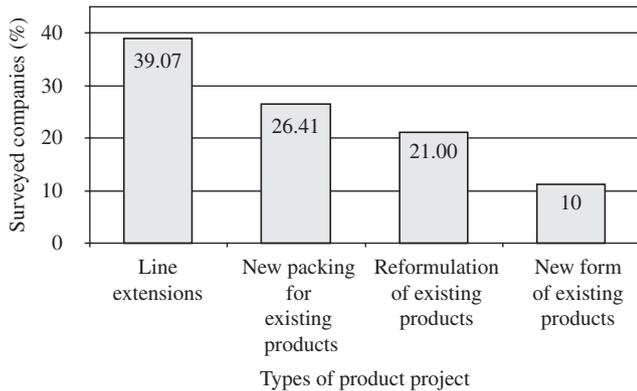


Figure 4. Types of product project developed by all companies studied.

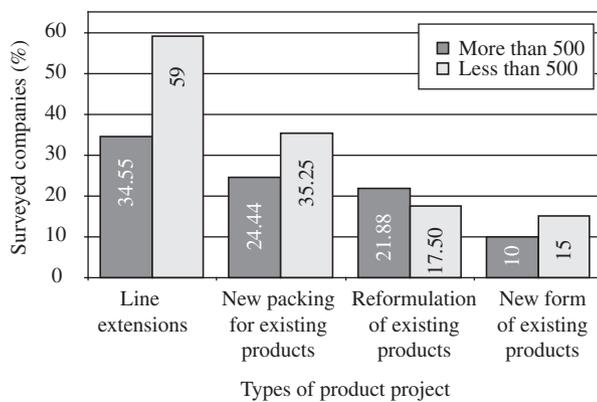


Figure 5. Types of product project considering companies' size (number of employees).

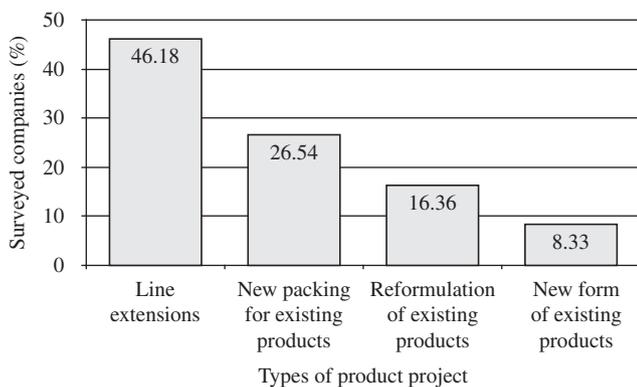


Figure 6. Types of product, project type developed by exporter companies.

new to the market. Medium and small companies have been developed innovative products as shown in Figure 8.

Figure 9 exhibits the average billing percentage of products launched in the last years (up to three, three to five, and more than five years ago). As an average, products launched more than five years ago yielded the highest billing percentage (53.42%); 32.43% with recently launched products (in the last three years) and products launched between three to five years ago average 25.32%. Thus, billing thru new products considered as new has a billing share below one third of the total billing.

In companies with less than 500 employees the highest billing percentage is due to products launched within the 3 last years (55% of billing), as long as in the large companies the highest billing percentage originates in

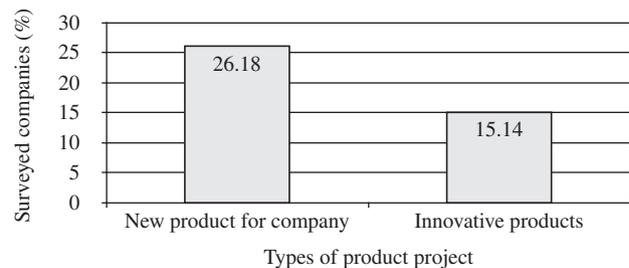


Figure 7. Development of projects more innovative considering all companies studied.

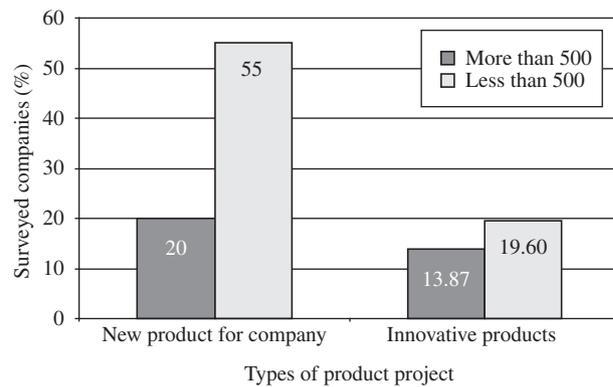


Figure 8. Development of projects more innovative, considering companies' size.

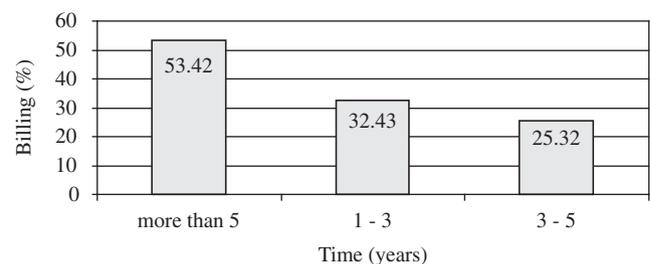


Figure 9. Companies' average billing due to products launched in the last years.

products launched more than 5 years ago (average 55.44% of billing). In exporter companies, average 49.53% of billing originates in products which were launched more than 5 years ago.

3.3. PDP structure

It was observed that 69% of the sample companies have a formal Product Development (PD) responsible sector.

The existence of that sector is more frequent in large companies: 86% of the large companies have formal PD responsible sectors in their units, as compared to 30% in companies with less than 500 employees (Figure 10). Most of the exporter companies have a sector exclusively devoted to PD.

Out of the companies which have a PD sector, 69% have a department exclusively devoted to product development. For the remaining companies, 39% the PD department is attached either to the quality management or to technology Department or reports to the administrative direction.

As regards the PD employees, most of the companies have a food engineer. Depending on the size and sector the company operates in, other professionals are also hired, such as biologist, chemical engineers and chemists. Normally, technicians help those professionals. The number of professionals exclusively devoted to PD is fairly low, ranging from 1 to 20 people.

During the pre-development macro-phase, corresponding to a set of activities previous to elaboration and prototype testing, all companies carry out formal activities of ideas generation and selection involving new products. Both project financial analysis and product conceptualization activities carried out by 96% of the companies. Marketing research studies, to help and guide projects, are utilized by 78% of the companies. The development of a company's new products strategy is carried out by 75% of the companies (Figure 11).

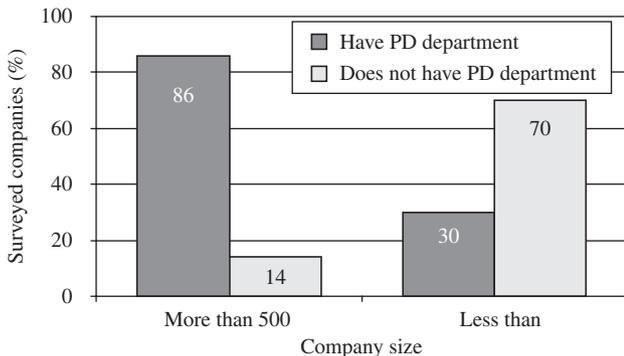


Figure 10. Percentage of companies that have a PD department, considering companies' size.

By observing the activities of the pre-development macro-phase, independently of the companies' size, 100% of the companies carry out new product ideas generation and selection. All large companies' PD models use project financial analysis, as long as of 87.5% companies with less than 500 employees perform that activity. In 87.5% of the large companies marketing research studies are carried out. Out of the small and medium companies, 50% perform that activity. Out of the large companies, 83.3% develop a business strategy addressing PD, and only half of the companies with less than 500 employees perform that activity.

As regards the next macro-phase, new product development, 100% of the companies carry out "product project/process" and "packing tests", while 96% carry out activities dealing with products testing and shelf life determination. Sensory analyses are carried out by 94%, and 59% perform studies on hazard analysis and critical points control during the development stage (Figure 12).

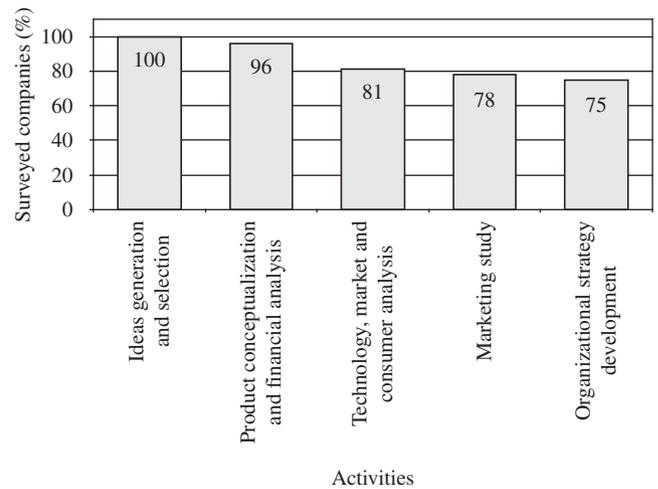


Figure 11. PDP activities during the pre-development macro-phase, considering all companies studied.

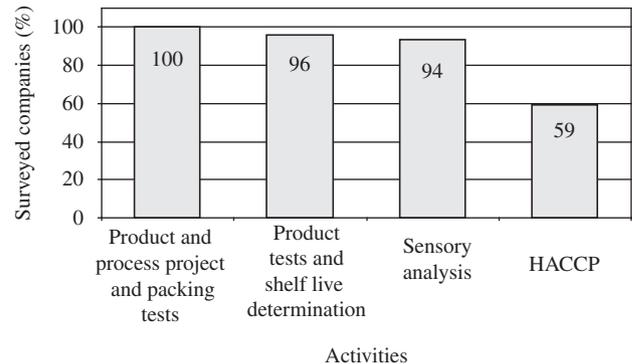


Figure 12. PDP activities in the development macro-phase, considering all companies studied.

Considering the size of the companies, a difference can be observed on HACCP use during the development: 66.7% of the large sized ones employ HACCP as compared to 37.5% of the companies with less than 500 employees.

Once the prototype is ready, the production line starts the pilot lot, after its validation a set of activities start focused on market launch. In that very moment the post-development macro-phase starts (product launch; product quality studies, production efficiency, purchase behavior, consumers' attitudes, marketing methods; assessment of the market success forecast; as well as forecast and planning of the product future).

All the companies showed to perform the planning of the new product launch into the market. Studies on product quality and production efficiency occur in 88% of the companies, while 66% perform activities involving forecast and planning of the product future in the consumer market (Figure 13). Both large companies as well as small and medium ones carry out planning to launch the product into the market. Out of the large companies, 91.6% study product quality and production efficiency, as well as 75% of the companies with less than 500 employees.

Just half of the small and medium size companies forecast and plan product future in the market, as compared to 71% of the large size.

The main ideas source utilized by the companies, independently of their size or exporting activities, lies in the benchmarking of products existing in the market. Percentage values corresponding to those activities are: 69% for all the companies; 71% for the large companies and 62.5% for the small and medium ones; and 69.5% for the exporters. The second source would be the market research results (resorted to by 59% of all the sample companies; 67% of the large companies and by 38% of the small and medium ones).

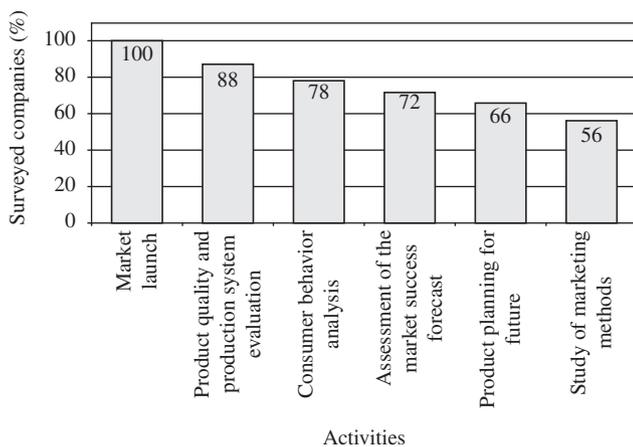


Figure 13. PDP activities in the post-development macro-phase, considering all companies studied.

The three main technical resources companies have available for PD are: Pilot laboratory and some pilot equipment (for example: mixers and stirrers). Out of all the companies, 84% own product development laboratory, and 50% own isolated pilot equipments; 92% of the large companies own pilot laboratory as compared to 62.5% of the small and medium ones. As a rule, outside resources such as services of ITAL – Instituto de Tecnologia de Alimentos or suppliers' development infrastructure are barely used.

3.4. PDP management

Most of the companies resort to multifunctional teams while developing their projects. Results indicate that 92% of the large companies employ PDP teams, as compared to 62.5% of the small and medium companies. Independently of the company's size, when a project is conducted by a team, the member departments normally are: Marketing, R&D, Logistics, Process, Sales and Upper Administration. A leader is generally appointed to conduct the activities during the project phases and reports to the upper administration or to any management (often Marketing Management). People involved in projects normally communicate amongst themselves thru periodic meetings or e-mail.

Figure 14 exhibits tools and methods which are already implanted in the companies. Sensory analysis, without statistical data analysis, is implemented in 75% of the companies; market research in 50% of the large size companies and in 63% of the small and medium ones; portfolio management in 67% of the large size companies and in 38% of the small and medium ones.

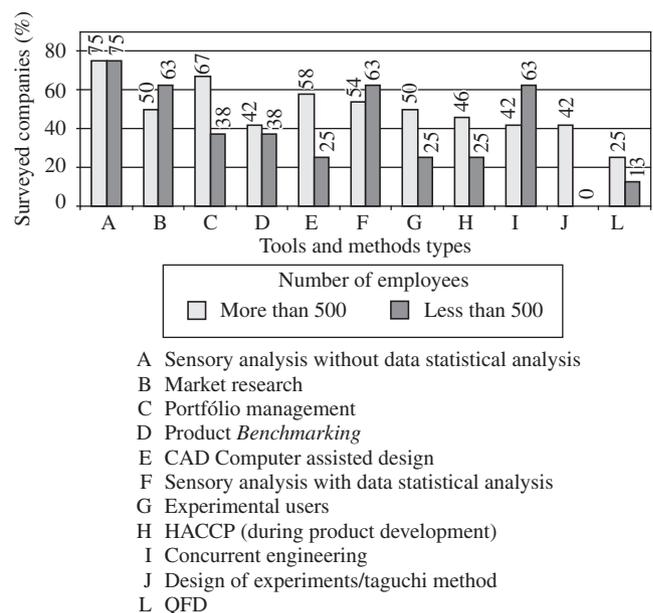


Figure 14. Already implemented tools/methods, considering the companies' size.

In 70% of the large size companies customers participate in PD, as compared to 75% of the small and medium size companies. The participation of suppliers in product development is relatively higher than the clients'. Suppliers participate in PD in 93.75% of all the companies, being 100% in the large size companies and 75% in the small and medium ones.

3.5. Performance assessment and PDP results

As a rule, companies carry out assessment of the product technical performance, as regards meeting requirements and specifications, market and regulations wise, as well as product production efficiency, what happens during the development and post-development phases.

Not all the companies carry out performance assessment involving clients and consumer's satisfaction, and economic performance as regards target cost, sales expectations and market share. Those assessments are normally carried out in the post-development phase.

In the sample companies the use of PDP performance assessment indicators is still at an early stage. Some companies try to measure the elapsed time to conclude each project and also whether products achieve their objectives (as proposed at the beginning of the development). To do so, they measure economic performances related to the target cost, sales perspectives and market share, linked to customers' satisfaction.

Figure 15 shows the average duration time (expressed in months) of the various project types developed by the sample companies. Innovative projects show longer duration time, independently of the company's size and exporting activities. The longest second project type to be developed is a product new to the company and which is already offered to the market. Companies take an average 14.7 months to develop an innovative product (with large amplitude

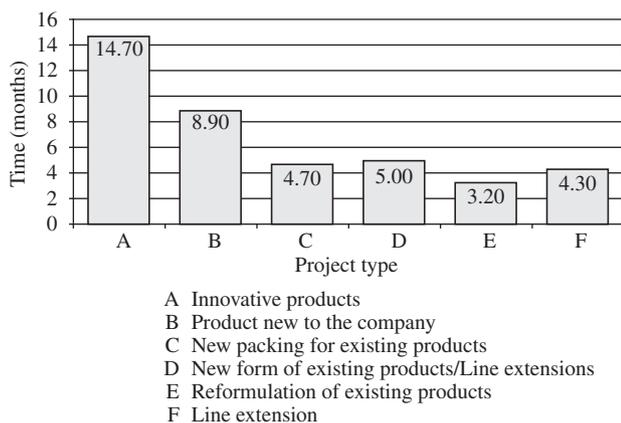


Figure 15. Projects average time, considering all companies studied.

variation, from 3 to 36 months) and 8,9 months to develop a product new to the company (from 2 to 36 months). Projects reformulating existing products showed an average shorter development period (3.2 months), as well as projects involving product form change (5.0 months).

The success rate of developed and launched projects is 72.2%, for all the sample companies, what is much above what is shown in other research studies. That rate corresponds to the number of successful projects (in the market) relative to all the projects developed by the company. However, just 39.6% of the initial proposals (ideas) turn into a new product, effectively launched into the market.

When observing the results of the product type companies most develop (line extensions) and the source of those ideas (competitor products) figures related to the parameters above should not surprise.

3.6. Problems and trends

Folowing the main PDP problems faced by the sample companies are listed:

- the number of development projects has increased, but the few people teams to conduct the projects remains the same, resulting in delays and project control difficulties;
- failures to meet dead lines would also be related to a frequent delay in making decisions during the PDP phases as well decisions depending on the upper administration;
- work structure deficiencies (procedures and methods) and discipline to control projects;
- difficulties with suppliers, generally involving meeting dead lines and, in some cases, quality assurance of the supplied products to be applied to the developed product;
- difficulties and delays to register products in government agencies (ministries);
- difficulties to follow-up and meet regulations of product target export countries;
- excess of similar products in the market ("market trivialization") troubling the perception of the company's new product by the market;
- difficulties to introduce new products, mainly in large supermarkets chains, and in negotiations of room available to the product;
- some companies face difficulties due to the lack of internal infra-structure and access to services of laboratory tests and analyses;
- difficulties to match eventual new-products-associated new technologies to the technologies existing in the company; and
- low flexibility of the process technologies existing in the company to meet new products requirements, during the test and production phases.

Some trends are more frequently cited by companies as long as others are more isolated by them. Amongst the most frequently cited trends are intentions to increase the new products development capacity, purchase of equipment and even pilot plants included; and the search of new markets, whether domestic or abroad, which calls for products and packing changes. Examples of more isolated trends are intentions to create a specific development department, separating it from the quality department; and investments in new product and process technologies (automation), which will allow the launch of new products. Some companies declare the intention to widen the products portfolio and increase the rate of new products launch, as long as others intend to maintain the number of existing products and even reduce the new products launch, in view of the difficulty to obtain room in the shelves of large retailers. Thus, a clear trend, as regards the widening of new products launch, does not exist.

4. Final remarks

Independently of the size of the companies or their exporting activities, most launched new products focus popular markets, where competition occurs thru low prices competition. As regards the role played in the market and quantity of launched new products, large size companies exhibit a more aggressive behavior; they make new products available to popular markets as well as to specific segments. However, small and medium size companies trend to launch more products into the non popular market.

Most companies periodically modify their products and launch products which are new to them, thus indicating the need to apply PDP concentrated efforts, aiming at meeting their strategies. This information makes clear why the companies of this sector develop line extension products more intensively or just modify their packing. Nevertheless, the small size companies launch more innovative products than the large ones, the same happens with products which are new to the companies.

The small and medium size companies appear to launch new products faster than de large ones, which are generally more PDP stiffened. One of the reasons would be the permanent status reports on product development tasks submitted to the upper administration, usual in large companies, which is more complicated when the headquarters are abroad.

Regarding the PDP structure, large companies have a PD specific sector or department, employing a higher number of employees and equipments. In small companies just some pilot equipment and one or two PDP responsible persons were observed, generally those people are also responsible for Quality Management.

During the pre-development macro-phase, activities on ideas generation and selection are carried out thru market

research as well as project financial analysis, independently of the companies' size. The source of ideas is normally associated to competitor products, already existing in the market. In the development macro-phase, it is observed that products testing thru sensory analysis and packing are activities intensively performed by all the companies. After development, product launch planning is the most intensively performed activity.

In the search for a higher rate of product success in the market, sector's companies ground the development on the competitors' products already existing in the market, that being the main ideas source. Generally, that company type reveals insecure when launching innovative products or products new to the company. They aim at maximizing the production of line extension products, less investing to acquire new technologies and equipments. The low investment rate is probably due to the low added value, as compared to other sectors and because of the strong internal and external competition.

PDP is still very empirical in most of the companies, the lack of a formal procedure for new products development is observable. Generally, for each developed product, a different path or procedure is followed. The lack of a formal procedure is likely to lead companies to face serious difficulties, ranging from the development of a non manufacturable product including launch delay and market failure. However, it was observed that some large size companies show a formalized PDP, regularly utilizing several PD supporting tools in their activities. Those large companies are implementing a reference model known as "funnel model" to structure that process.

The interviewees described the ever growing influence of the supermarkets chains during the PD. That influence may be direct or indirect. The direct influence would be the joint development of a new product, thru the participation of representatives in prototypes testing or by the submission of patterns or samples to show how the product should be. The second influence is due to the economic pressure the retail chains exert on food producers. To place more products in the supermarket shelves those netchain request from companies investments and discounts, spinning around 5 to 100 thousand dollars, depending on the product. In view of this scenario, some companies' trend would to perform small variations in already launched products, not characterizing a truly new product, yet looking new to the consumer.

That industry is traditionally considered as low in technological dynamism, although, as a side effect induces innovations in related sectors, since a new food normally calls for new ingredients, packing and changes in process and production equipment.

The strengthening of retailers influence on the production chain dynamics, and the competition for space in the supermarkets shelves, have also led food companies

to pursue technological opportunities for cost reductions and new products, affecting the diversity of offered products and reduction of the product permanence time in the market.

That context demanded of companies to emphasize on training for product development process. On the other hand, the uncertainty of the new products acceptance, the low extraordinary gain appropriation (as a function of the relative easiness of similar products to enter the market) and rise of the development costs makes companies share those activities with suppliers and clients or establish alliances with development services companies. Thus, companies have tried to outsource part of the development activities, focusing minor changes (line extension or packing changes projects) and often having as a starting point the idea of a new product existing in the market.

In the sample companies, two PDP patterns are observable: I) one which is more structured as regards products strategy and market and development, phases and activities definition, tools usage, project assessment points (stage gates) and actions meant to increase development training; II) other, more informal, reactive to competitors product launch, with few defined procedures, weaker in terms of technical and managerial skills and with final decisions on project management strongly centralized in the company's owner or in the upper administration. Classifying companies within these patterns is often independent of the company's size and sector.

In the companies, PDP follows a phases and activities sequence, even informally. That sequence, although specific to each company, is similar to their comparison or to what is prescribed in the pertaining literature.

In general, companies envision PDP positively, regarding this activity expansion, infrastructure investments and improvement in technical and managerial skills.

The sampling of surveyed companies, probably, is more structured in PDP, as compared to the average food industry companies, considering their size. This statement is grounded on the sample's profile, most of the companies being large size (75%) and 25% multinationals, and due to the fact that the questionnaire structure (containing PDP management details) demanded from the companies and interviewees a certain structuration degree and knowledge of this process.

Some best practices of PDP management can serve as recommendations for this industry. Among these practices, the following could be emphasized:

- strengthening of integration, whether with customers and suppliers (*co-development*) or amongst the internal areas involved, mainly Marketing, Product Development, Quality and Production;
- strengthening of the use of Information Technologies, which facilitates communication and interaction of the PDP involved areas;

- higher PDP systematization, thru reference models, reviews (stage gates) and project management and follow up mechanisms; and
- use of performance indicators and *portfólio management*, aligning development projects with companies' product and market strategies.

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