A survey on current practices of product development management and needs of the transformation industry in the state of Paraná

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Abstract: The main aim of this work was to carry out a survey on current practices and eventual needs that companies in the state of Paraná have in the area of product development management. Data has been collected via a web-based questionnaire, which was made available to previously selected companies. About 100 companies were contacted successfully, of which more than one-third started to fill out the questionnaire. One of the most relevant results than can be noticed was that, although approximately 75% of the companies confirm that they are concerned about developing new products, only 28% of them actually apply proper management tools in such developments.

Keywords: product, survey, management

1. Introduction

Product Development Management (PDM) has acquired increasing importance in the national picture, since it directly affects the final result of Brazilian companies. Customers and competitors have imposed higher standards of excellency in terms of quality, price and time-to-market, comparable to or even better than best-in-class international practices.

However, it is noticeable that there is still no relevant data concerning current practices of PDM in Brazil. Therefore, it occurs that the reality of national companies is not deeply known, if they are concerned about developing new products and, if so, what the difficulties to conduct PDM are. Due to this lack of information, the present study was conducted in 2004, specifically in the transformation industry sector of the state of Parana. Data has been collected after a sample of companies was determined, questions to be applied were formulated and a web-based data-collection system was conceived. Results have been refined in order to disclose the reality of companies in this state, from which new initiatives can follow in order to assist such companies to reach higher levels of excellency by practicing PDM.

2. Literature review

PDM aims to control and assure quality of one's product development process, connecting all professionals involved, as well as phases for the realization of a product. According to CHENG (2000), "PDM is certainly a large knowledge field that can be seen under many academic perspectives and its body of knowledge can be represented in two dimensions: strategical and operational planning; and product development life-cycle. The latter initiates with the generation of product ideas and is carried out as far as product launch, passing by market research, concept choosing, product and process project detailing, and pre-production. Such activities demand a set of knowledge and require participation, simultaneous or not, from several functional areas within the company."

The main subjects treated within the scope of PDM are: marketing forecast, technology planning, product platforms, intellectual property and portfolio management, among others. The areas of Production Engineering, Marketing and Quality can benefit from those matters. Among the associations in charge of gathering and making the knowledge in this area available to society, some are distinguished, like the world-wide known Product Development Management Association (PDMA) and, locally in Brazil, the Product Development Management Institute (IGDP).

Among the various works concerning PDM in Brazil, some are worth of mentioning. CARNEVALLI et al. (2004) evaluated the usage of QFD in Brazil. IAROZINSKI NETO & CANCICLIERI JÚNIOR (2003) gathered data on the generation of ideas and identification of opportunities for new products and services. MONTANHA JÚNIOR et al. (2003) conducted a survey instrumented by a field research carried out within the metals industry sector of the neighbor state of Santa Catarina, resulting in guidelines for the conception of a technology management model in the product development process. This survey had the technical support of agencies as well as reference companies in the

matter of Technology Management in PDM. Those works have not brought out specific data about the industry in Parana and overall issues regarded in PDM, which has caused the present work to be carried out.

3. Objectives

The main objective of this work was to identify the situation of the transformation industry in the state of Parana regarding the current practices of PDM. From these data it was possible to infer a set of hypothesis about new product development in the state, as well as industry needs.

4. Methodology

The present work was carried out in seven stages, as follows.

4.1. Building a structured questionnaire

The questionnaire was based on the main topics covered in the PDM arena, such as the use of metrics and portfolio management. Those issues have been depicted as components of a "PDM body of knowledge" from two different sources: the Society of Concurrent Product Development (SCPD) and the Product Development Forum. In many cases, explaining notes about the questioned concepts have been added in order to clarify the corresponding topic.

4.2. Development of a data-capturing tool

Because of the questionnaire's non-linearity (there are some answers which lead to other questions, not necessarily subsequent to the first ones), the development of a totally web-based computational tool has been carried out in order to apply questions and tabulate results.

The web-based application was created so that the companies could have access to the questionnaire and answer it without the interference of an interviewer. Moreover, the tool allowed the interviewed to interrupt the process of filling out the questionnaire whenever she wants to. This prevented the interviewed to get bored and allowed her to look for non-readily available information. Figure 1 brings a snapshot of one of the screens produced by the tool.

The tool was also useful for progress monitoring. It made it possible to find out which companies had already started to answer the questionnaire, how many questions they had answered until then and which companies had not finished filling out the questionnaire yet.

4.3. Determination of population, calculation, data collection and registration of sampled companies

In order to determine the population for this survey, the 2004 directory of the Federation of Industries of the State of Paraná – FIEP has been used. More specifically, the transformation industry sector was used as a population, which has produced a total of 3,647 companies. After the population was determined, a preliminary sample was calculated. This was based on recommendations for market research suggested by SEBRAE (2004). The minimum number of companies in the sample was 61. Then, the sample was sectored by size and type of company, as presented in Table 1.

After the preliminary sample was sectored, some representation of all sectors was needed, which led to a total of 97 companies. In the end, a final sample of 100 companies was determined to be used in the field work. Once the sample was calculated, all companies to be interviewed were registered on the web-based questionnaire system. That meant registering name, address, contact name,
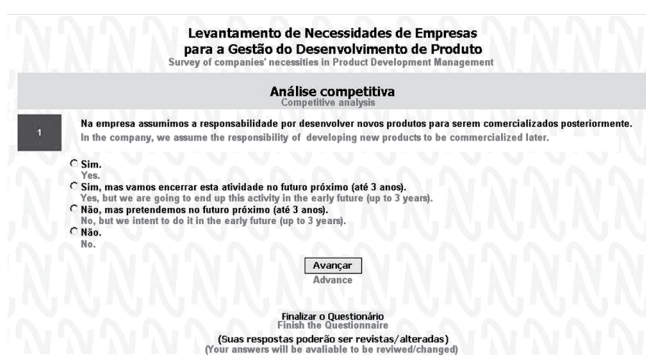

Figure 1. Snapshot of one of the screens in the system.

Table 1. Sample structure by company size and industry sector.

Industry sector	Company size				Total
	Micro	Small	Medium	Large	
Rubber and plastics	2	2	1	1	6
Non-metallic ores	3	2	1	1	7
Metals	3	2	1	1	7
Machinery & equipment	2	2	1	1	6
Office automation & computers	1	1	1	0	3
Electrical	1	1	1	1	4
Electronic & communications	1	1	1	1	4
Health care & instrumentation	1	1	1	1	4
Automotive	1	1	1	1	4
Furniture	4	3	1	1	9
Food & beverages	4	3	2	1	10
Tobacco	0	1	1	0	2
Timber	2	2	1	1	6
Chemicals	2	2	1	1	6
Software	2	4	0	0	6

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phone, e-mail, web page, type and size for all sampled companies.

4.4. Contact establishment with sampled companies

After the sampled companied were registered, personal contacts with them were initiated. Those were mainly carried out by telephone. At that moment the main objective was to identify the individuals who were in charge of managing product development activities within those companies, or at least identify existing functions mostly involved with those issues, such as design or production. This was one of most laborious stages, because in small businesses there are only a few employees in the product development arena, specifically. In many cases, the business owner is the one in charge of several functions, which made it more difficult to gather seeked information in a timely manner. On the other hand, in medium and large companies, identifying the individual in charge of product development management was easier.

There was a 15% success rate for first contact attempts. That is to say, only 15 out of 100 contacted companies started to fill out the questionnaire promptly. However, they did not conclude the task. The adopted strategy was to establish a new contact with the sampled companies again and ask them to continue answering the questions in the system until the last question. One of the main difficulties at that point was that most people were not sure about the information they were presenting. Also, although the purpose of the research and its importance had been previously introduced, many of the interviewed individuals were suspicious about industrial spying and, therefore, were not willing to disclose classified information, apparently.

4.5. Questionnaire monitoring

This was carried out in parallel with phase (d). Therefore, after the right individual had been identified and the research had been explained, the system administrator registered a login (company or personal e-mail) so that the user could start filling out the questionnaire. The web-based questionnaire allowed complete monitoring of the research development. It was possible to verify which companies had not been contacted yet, which ones had not started to answer the questions, the ones that had not finished filling it out and the ones that had already finished it. And, according to the situation of each company, counter measures were taken.

4.6. Tabulating results

The tool developed for the present research made it possible to generate graphics that correspond to the results obtained, which were organized as follows: general mode (all the companies included), by company size, by industry sector and result crossing (between company size

and industry sector (e.g. small companies in the furniture sector). The criterion which has been adopted for the classification of companies by their size was the same that is currently used by FIEP, that is: micro companies, from 0 to 19 employees; small companies, from 20 to 99 employees; medium companies, from 100 to 499 employees and; large companies, more than 500 employees. Figure 2 shows an example of a graph generated by the web-based tool.

4.7. Analysing results

As the figures were tabulated, a spreadsheet was used to help make comparisons between results by industry sector or company size and, finally, to identify noticeable results. The presentation of results in this manner allowed the identification of trends and anomalies, as well as interesting results by company type and size.

5. Results

Because of its scope, it was decided that the results obtained in the general mode (with no filtering by company type or size) would serve as reference for further comparisons. Each answered question was then analyzed with regard to the mostly chosen answers. Some of the main results are pointed out as follows.

5.1. Significant results regarding company size

The percentage of micro companies which actually regard product development as an important business process is significantly less than the ones of small, medium
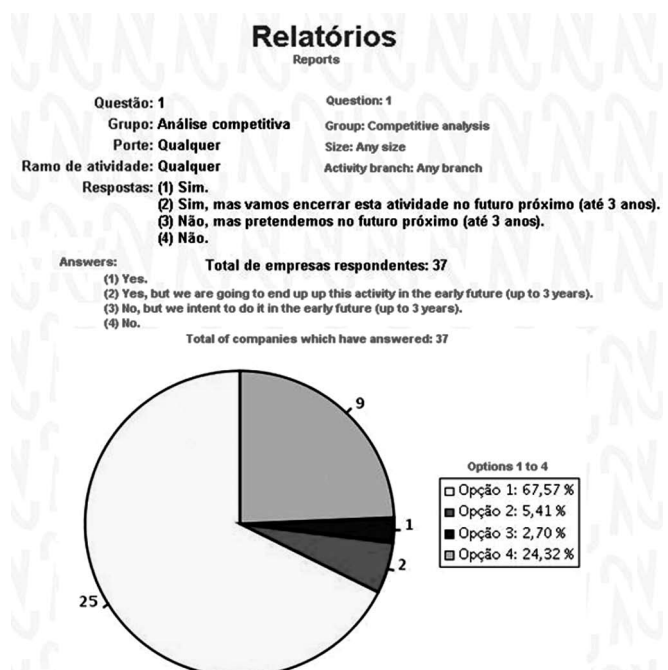

Figure 2. Tool-generated graphical result.

and large companies, which consider it a very important initiative. In micro companies, significant unfamiliarity has been detected on how R&D management is internally treated. Only one third of the micro companies, a half of the small and medium companies and finally up to 80% of the large companies are concerned about technology planning. In other words, they pursue investment in pure research, applied research and technology development.

In large companies a remarkable dissociation occured between the companies' business strategy and products strategy (used for definition, development and launching of new products). However, market forecasting was more intensively treated in those companies.

Knowledge management was more intensively treated by small companies (75%). But only about 40% of large companies, 30% of medium companies and 30% of micro companies were concerned about this issue.

5.2. Significant results related to industry sector (or company type)

The sectors that revealed minor concern about new products development were: timber, chemicals and health care & instrumentation products. Non-metallic ores, office automation & computers and machinery & equipment sectors demonstrated some concern. On the other hand, all other sectors reported higher concern about developing new products.

The rubber & plastics sector indicated that the bargaining power of their costumers was the dominating force that drives competitiveness. On the other hand, the metals sector demonstrated not to deeply know which the dominating forces that drive competitiveness are. In the furniture sector, the pressure made by alternative products seemed to be the dominating force. In the sectors of electronic & communications and automotive the threat caused by the entrance of new competitors was reported to be the dominating force.

Machinery & equipment, office automation & computers, as well as the metals sector, reported not to clearly know what their business strategies are. In other sectors a perfect knowledge of this issue occured. None of the companies in the automotive sector clearly knew what their new product strategy was. In companies of the electrical, furniture, food & beverage and tobacco sectors there was no evident alignment between new product strategy and business strategy.

Companies in the metals, machinery & equipment, electrical, automotive, food & beverages and tobacco sectors did not apply business-level innovation. On the other hand, the furniture sector applied such strategy. The automotive sector reported to be dealing with innovation through a "continuous improvement" approach. The search for innovative products is an approach used only by the office automation & computers sector. Sectors such as machinery & equipment, automotive, furniture, food & beverages and tobacco reported not to be seeking innovative products.

Companies in the office automation & computers, automotive, furniture and tobacco sectors were the ones that mostly use market forecasting as a tool to support product development. The rubber & plastics, metals and electrical sectors reported to use such a tool much less frequently. The sector that manage to invest in basic research, applied research and technology development were: office automation & computers, automotive, furniture, food & beverages and tobacco. The electrical sector reported no concern with technology planning. Only a few companies on the metals sector reported to be dealing with product platform development in any way.

5.3. Overall significant results

The dominating forces that drive competitiveness in a performance perspective of the consulted companies were, in decreasing order: the intensity of rivalry among existing competitors, the bargaining power of purchasing clients and the bargaining power of suppliers.

Most companies were concerned about new product development and two thirds of the them value the subjects treated within the PDM body of knowledge. However, less than one third of the searched population reported to have applied project management techniques and tools based on a phase-gate product development process, as recommended in the PMBOK (Project Management Body of Knowledge).

On the other hand, half of the consulted companies reported to have dealt in any way with the issues of selection and analysis of new products feasability. A little more than one third of the companies stated to have worked on portfolio management issues. Only half of the consulted companies reported to have dealt with marketing forecast issues (forecast methods based in facts).

Most consulted companies said they have worked on product platform development. However, only one third of the companies of the metals sector considered such issues to some extent.

6. Discussion

From the results obtained, it is possible to infer a set of hypothesis yet to be proven through specific studies, as follows:

Hypothesis 1: micro companies do not consider the continuous flow of new products as a survival factor. They bet in the product that they have in hands until they perceive a need for innovation;

Hypothesis 2: the rubber and plastics sector is very much influenced by the large automakers, in such a way that

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they closely follow their customers' new product launching rhythm;

Hypothesis 3: the history of small companies and their leaders favor how much knowledge management is valued;

Hypothesis 4: the machinery & equipment and office automation & computers sectors survive more as a result of opportunism in the market than as a result of a clear vision of their business;

Hypothesis 5: automakers do not clearly know what their new product development strategies are, because they are global companies where such strategies are determined overseas;

Hypothesis 6: it is possible to improve the results of companies in electrical, furniture, food & beverages and tobacco sectors, as long as their business strategy and new product development are better aligned;

Hypothesis 7: companies in the machinery & equipment, automotive, furniture, food & beverage and tobacco sectors do not seek innovative products because their customers show a conservative profile; and

Hypothesis 8: in general, new product development in Parana is carried out in a non-structured way, by people who are usually unaware of PDM fundamentals, and therefore result in loss of competitiveness by cost increase and quality reduction.

In general, it can be stated that companies in Parana are getting interested in subjects treated by product development management. It is remarkable that even those firms that reported to have concerns about such issues still do not possess much PDM related knowledge.

One of the most important results of the present work is that only 28% of the companies apply PDM tools and methods. Therefore, it can then be depicted that there is room for consulting services in this area. However, a long way is to be walked through until a significant change in the companies' vision is perceived. It has been observed that most of them are prioritizing other initiatives other than PDM that aim at competitiveness increase, like productivity improvement and manufacturing process optimization.

7. Final remarks

The present work has produced some interesting insights by carrying out a field research using a directly approach to product developers. It aimed at gathering data on current PDM pratices and existing needs in this area. The results serve to build an overall industry profile in the state of Parana, regarding PDM.

From this study, it has been noticed that most of the researched companies still do not deal with the issues in product development management as deeply and clearly as it is necessary in order to become more competitive in a globalized market. Therefore, there is an urgent need for organizations to promote PDM related knowledge throughout the various industry sectors of the state of Parana.

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