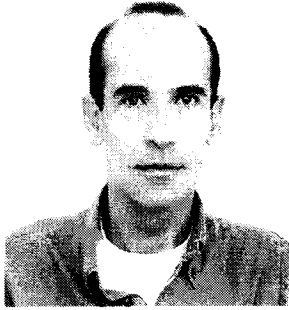


DO WE NEED TO KNOW THE NEED?

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ABSTRACT

This paper will deal with the importance of knowing the exact needs of a future user of a product, when designing a new or redesigning an already existing one. Two tools that can be used to define those needs are presented and illustrated through two case studies.

INTRODUCTION

In his final report [1] of the study "Building competitive advantages for Portugal", Michael Porter calls the attention of entrepreneurs for the need of identifying the market segments to which they want to answer, as each of them presents different users with different needs which implies different capacities.

We think that one of the ways for companies to become competitive will be making an effort so that the products / services they offer will have real quality and minimum costs, defining Quality as the aptitude of products and services to satisfy market needs and expectations [2]. So, and according to Value Analysis definition, it is necessary to optimise the Value of products .

We can no longer design standard products and then sell them to diversified segments in different ways. There must be an adequate use of Marketing and Market Research in order to really know the

different kind of customers and design different products according to the different needs.

Tom Peters and Bob Waterman [4] consider that still today, most of the managers keep on thinking that the first objective of a company is to sell whatever it wants to produce, instead of designing new products and services in order to meet the new needs of the consumers. They forget, or ignore, that what the company wants to produce must be determined by those who buy and no longer by those who sell.

DEFINING THE NEED

Therefore the first step in designing or redesigning a product is the previous and correct definition of needs, no matter what the technical solutions that will contribute to its satisfaction, will be. In VM these needs must then be translated into Functions. We all know that to identify functions of an existing product can be a difficult task. But if we think of identifying the functions of a new product this difficulty will surely increase.

Of course Marketing techniques can be very useful for Value experts, in the identification of the needs. But there are other tools to define and characterise needs, that are complementary to those used by Marketing and can be used together with

Value Analysis. We will now talk about two of them: FPS (Functional Performance Specification) and QFD (Quality Function Deployment).

A Functional Performance Specification [5] is a document by which an enquirer expresses his needs (or those which he is responsible for expressing) in terms of user-related functions (service functions) and constraints. For each of these, evaluation criteria are defined together with their levels, with a certain degree of flexibility being assigned to each one.

An enquirer is a person (or organisation) in search of a product who issues the FPS for it, with a view to its purchase or requisition for use by himself or by others. He can be the direct user of the product or the Marketing service of a company that will sell it. He can be the buyer that has to obtain the product for a user, or a designer who has to integrate the product as a subsystem in the system he is developing.

The expression of the needs in the FPS is made in functional terms, without reference to the technical solutions that may satisfy them, and with a minimum of constraints. This allows the enquirer to obtain from the designer, manufacturer or supplier the design, the realisation or the proposal for the most efficient product that will be the most advantageous for the user. The FPS favours dialogue between a client and a contractor, which implies that the possible flexibilities of what is asked for should be indicated.

In the Japanese approach [6], QFD consists of more than 32 analysing and planning methods to assess long term prospects (more than 5 years) of users' needs, weighted and translated into plans of action for research and development, marketing, product development, engineering, purchasing, production and sales. We have used an adapted approach, which was developed as follows: the requirements of the future user of the product were obtained from market and customer research, sales report, and product complaint analysis and were translated into Functional Analysis, and a "House of quality" was built, in which the requirements to be realised were compared to what was offered by the competition, and were weighted to set priorities.

CASE STUDIES [7]

The two case studies we are now presenting result from two projects supported by SPRINT programme (European Community Programme for

Innovation and Technology Transfer).

In study i) we used FPS to detect the users' needs of a future electrical wheel chair and in study ii) we developed QFD in the design of a new baby carriage.

i) the electrical wheel chair [8], [9]

Considering the importance of the FPS to increase the competitiveness of any company, INETI tried to introduce it in National industry through real applications. Therefore we applied for the support of the SPRINT programme in order to do it, with the project "VA in the designing of new products. Companies contest". The project was conducted in partnership (necessary condition to get SPRINT financial support) with INETI, the receiver institution, and AFAV (Association Française pour l'Analyse de la Valeur) as supplier.

The electrical wheel chair was chosen because there was no national manufacturer for this kind of product, and the chairs available in the market, all imported, were too expensive, did not answer to the users' needs, and had problems in what concerns maintenance and after sales service.

To produce a FPS we need a Functional Analysis team, which, in this case, included doctors, therapists, ergonomists, medical technicians, experts in the VM methodology and users. It is essential that the FPS expresses the needs in functional terms, with no reference to solutions that may satisfy them. The FPS was defined by the team, according to the French standard NF X 50-151 (December 1991), and was constituted by the following elements:

a) General presentation of the problem:

There is a significant population of disabled people (defined as being not able of autonomous walking and auto-propulsion) in Portugal. Therefore they are potential users of this product. For each 100,000 disabled people, 5,000 are potential users of an electrical wheel chair but they do not own one owing to its high price and the low compensation provided by the social security service. In the preliminary phases of the project it was considered that the potential market would be larger, because it made no sense to think only about Portuguese clients. To these we should add, at least, those from all the countries of the European Union, and maybe elsewhere. Therefore the existing international standards had to be taken into account.

We made a research and a comparative study, of several models and brands existing in the market, and it confirmed that no single one was completely

satisfactory in what concerns performance.

The price at which the product should be sold was also settled.

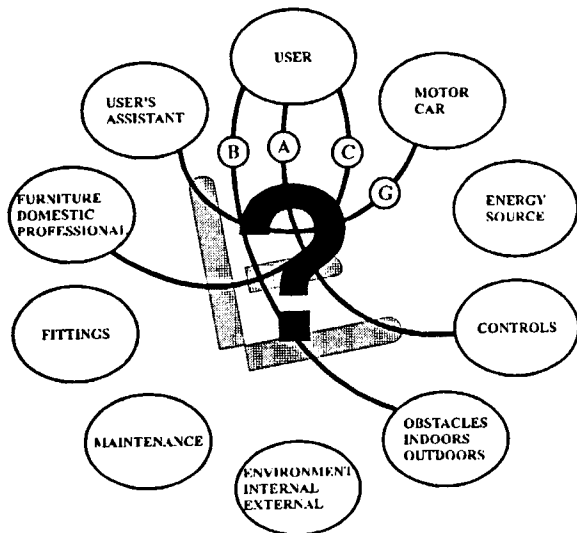
b) Functional expression of need

This is the result of a thorough functional analysis and constitutes the main part of the FPS. The team used the approach of "interaction with the external environment" in order to identify the users' needs and then the functions that the future product would have to perform so that it would answer to those needs.

In a first step those elements of the external environment, which the product will interact with, during its life, were listed: User, motor car, energy source, controls, obstacles (indoors and outdoors), environment (internal and external), maintenance, fittings, furniture (domestic and professional), user's assistant. Each of these elements was then characterised. For example, *the user* :

- is incapable of autonomous walking
- is incapable of auto-propulsion
- is incapable to stabilise when he is sat down
- is incapable to transfer, himself to / from the wheel chair
- is sensitive to long pressures in support areas
- is sensitive to the characteristics of the support surfaces
- has difficulty in the access and manipulation of the controls
- ...

this characterisation was quantified whenever possible.



Considering the way in which each element interacts with the product, or with other elements having the product as a link (as depicted in the figure above), the team listed the following functional needs:

- A - to allow the user to operate the chair on his own
- B - to allow the user to move about in his home
- C - to allow the user to work in an office
- D - transfer by the assistant of the user to and from a motor car
- E - to allow the user to move about outdoors
- F - transfer by the assistant of the user to a and from another piece of furniture
- G - the assistant takes the chair into or out of the car
- H - in case of breakdown the assistant can move the chair and the user
- I - the assistant can carry out routine maintenance
- J - to make after sales service possible on the spot
- K - to look good
- L - to comply with standards and regulations.

For each function and constraint evaluation criteria were defined together with their levels, with a certain degree of flexibility being assigned to each one. Then all the needs were quantified and put into a hierarchical order. This was done by the team together with users coming from different institutions.

Now we had collected the elements that would allow the exhaustive characterisation of the users' needs and therefore the elaboration of the FPS.

An example of a sheet of the FPS for this product in what concerns function G - the assistant takes the chair into or out of the car, is as follows:

CRITERIA	DESIRED LEVEL (NOMINAL)	DEGREE OF FLEX.
- duration of the operation	max. 5 min.	1
- assistant		
- number	1	0
- age	25 - 60 years	1
- tolerance to the effort	medium/low	1
- weight of the heaviest part	max. 30 kg	2
-

This being done for all the functional needs, the team had finished the Functional Analysis and could go to the next step of the VA job plan - Creativity.

ii) the baby carriage [7], [10]

As the previous one, this project had the financial support of SPRINT programme, and involved five countries: Portugal, Ireland, Spain, Germany and the United Kingdom. The first three acted as know-how receivers and the other two as suppliers. The main objective of the project was to promote VA/VM in SME (Small and Medium Enterprises) in general, and to use the method to improve quality systems in particular. This double objective aimed on one hand to contribute to the improvement of European competitiveness in the quality field, and on the other hand to profit from the "quality boom" to show the part that VA can play to get the desired competitiveness. The idea was to combine experience in more advanced countries as far as VA and Quality are concerned, with the application of VA in a quality context in less advanced countries.

One of the companies in which the project was developed, is a metal work company, whose main products are: baby carriages, metal baby items, wood baby items, toys, etc., being manufactured either through mass and / or batch production, of which about 50% is for internal market and the remainder to export mainly to Belgium, Spain, France and the United Kingdom.

The VA subject chosen for this project was a new baby carriage for a medium-grade market. One of the objectives defined for the study was to implement a methodology to detect the user's needs and develop new products in the company. The company also wanted to create a new market tendency through products recognised as really innovative ones.

The project was classified as a Quality - Marketing one because if the user's needs were not deeply characterised, there would not be quality. So an important part of the resources was allocated to the wishes search and definition.

The first step in the work development (VA job plan) was to collect information: technical; marketing; competitors from several countries; weak points resulting from: standards, government, users; problems with costs; marketing; users; market wishes; competitors selling arguments; list of disadvantages of existing products, facing similar competitive products; list of complaints; the most important aspects in sales; reports and comparative tests; target market - economic and geographic

aspects; etc.

To organise all this information we used QFD, particularly the House of Quality, and the first task, performed by the team, was to identify the user's wishes and needs. Not only the members of the team had a word to say about this matter, based on collected information and also on their own experience, but it was also necessary to hear the customers, being them users or not. For this purpose we analysed what they think about this subject, through questionnaires and direct observation, according to a plan previously prepared and discussed within the team. We had to be careful not to mix the user's language (wishes and needs) with the technicians' one (quality elements - dimensions, weight,...) and not to change their own words.

We got the following list of the user's wishes:

- the baby comfort
- strength
- versatility
- easiness of use
- aesthetics
- fittings availability
- compactness

Normally the wishes expressed by the users are very embracing and so they must be detailed in order to be worked. For example one of the wishes expressed was *easiness of use* and it had to be divided into: easy driving, easy closing of the chair, easy braking, easy washing, easy handling,...

After having listed the wishes, they were characterised as exhaustively as possible, so that we could find the quantifiable parameters that constitute the quality elements of the House of Quality - translation of the market voice into the enterprise one: which characteristics will insure that the needs will be satisfied.

We also had to set the functions in a hierarchical order, ensuring that it reflected the expectations of the market and the users, and not the mere feelings of the team.

The next aspect to be analysed during this phase was the competitors behaviour in order to keep on building the House of Quality. To do so, it was necessary to know how the competitors answered to users' wishes, whether they had solved or not the existing weak points of company's products, and if so which were the technical solutions found. So we had to do a competition's analysis in which the user's opinion about the competitors' products was

expressed as a result of the level of satisfaction towards the wishes we had previously detected. The analysis of the quality elements of the competitors was also done.

When the House of Quality was fully filled in (see part of it in the figure below), we had gathered enough elements to consider that the Functional Analysis had been carried out and could then enter the next step of the VA job plan - Creativity.

House of Quality

Customer requirements	Ø	Length of backrest	Length of backrest	Weight of the carriage		A	B
the baby comfort	23	9	207	9	207	1	23
strength	16	0	0	0	0	3	48
versatility	15	1	15	1	15	3	45
ease of use	15	0	0	0	0	9	135
aesthetics	13	1	13	3	39	1	13
Characteristics goals		min. 100"	min. 400mm				
Competitive analysis		A	440				
		B	480	9,5			
Parameters rating							

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CONCLUSIONS

Analysing the two case studies presented we can verify the need, felt by both companies, of knowing the wishes and / or needs of the future users, when they decided to design new competitive products. One may say, of course, that this is a Marketing task. But we can see from these two examples that there are other tools, namely the FPS and the QFD, that can be useful to identify and characterise those needs as deeply as possible. When applied together with Value Analysis methodology they can lead to good results.

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* Value is the relationship between the contribution of the function (or VA subject) to the satisfaction of need and the cost of the function (or VA subject). The term "value" is also used when factors other than cost, such as reliability, weight, availability of resources and time, etc. are considered [3].