1592

UNIVERSIDADE NOVA DE LISBOA

Faculdade de Economia

"EVERYTHING IS IMPORTANT: BUT SOME THINGS ARE MORE IMPORTANT THAN OTHERS"

Vasconcelos e Sá

Working Paper Nº 82

UNIVERSIDADE NOVA DE LISBOA
FACULDADE DE ECONOMIA
Trav. Estevão Pinto
Campolide
1000 LISBOA

Maio, 1988

EVERYTHING IS IMPORTANT; BUT SOME THINGS ARE MORE IMPORTANT THAN OTHERS

I - INTRODUCTION

Did you ever wonder why Nestle is so concerned with its image? And why IBM focuses so much on service (installation, client coaching and after-sales)? Or why Scandinavian Airlines System puts such a strong emphasis on the punctuality of its flights?

In fact, each of these firms focuses on the key success factors (KSF) of their environments, that is, they focus on those tasks which must be performed particularly well for an organization to outperform its competition.[1,2]

In the baby food business, a good image is critical for success since it decreases the risk perceived by mothers when buying the product for their children. In the computer business, the client's information processing depends more on service (installation, teaching , repairs) than on things such as hardware and distribution. Scandinavian Airlines which concentrates on the executive segment, has found that punctuality is one of the critical factors for success in such a market segment.

It so happens that all these organizations, distinguish between what is more and less important in their competitive settings and focus on the former. Paraphrasing George Orwell they discovered that in the market everything is important but some things are more important than others.

In spite of its importance, the empirical evidence of the key success factors has been, up to the present, based upon case-studies and anedoctes. No large survey has ever been conducted.

This article presents the results of a large scale survey taken among USA manufacturers of mature industrial products. The results of the study indicate the following:

1 - Within each Product/Market there are some tasks which are more important (critical) than others for success; success being defined as outperforming the competition in terms of profitability.

2 - Different Product/Market areas have different critical success factors but the more similar they are in their make-up, the more similar their key success factors tend to be.

II - THE STUDY

The survey was carried out in the USA and was based upon the information supplied by one hundred and ninety questionnaires, seventeen attributes, thirty firms and six mature industrial products. For an explanation of the research, see the insert "Where the data come from".

The study was restricted to mature industrial products since on of its objectives was to detect whether or not even within apparently similar product environments one could identify different requirements for success (see exhibit one). The selected mature industrial products were stationary compressors, metal cutting machine tools, standard antifriction bearings, standard valves, iron ore and coal.

Exhibit two presents the list of seventeen attributes (service, process research,image) used in the research. The list of attributes was culled from literature.

Exhibits three and four present the results of the research. These results are based on information supplied by two sets of expert panels, in a total of tuelve panels (two for each product). The members of the panels were mostly managers of companies manufacturing the products. Exhibit three shows the importance (as judged by the first set of expert panels) of the seventeen attributes for the profitability of companies in each mature industrial

product. The attributes are listed according to the average rating which they received. A scale of one (not important) to seven (extremely important) was used.

Exhibit four shows data on the selected thirty firms. The exhibit presents the firms performance rating and how the members of a second set of panels (distinct from the former) rated the firms (compared to competition) on the five attributes which had been selected as the most important (key success factors) by the first set of panels. Again, a scale of one (very poor) to seven (excellent) was used.

The first column of exhibit four lists all thirty firms included in the research. The first four belong to the iron ore industry; the next six to coal; the next five to machine tools; etc. No firm is identified by name for reasons of confidentiality and anonimity which were promised to the experts.

Next to each firm are its performance rating (for a more detailed explanation see the insert "Where the data comes from") and the average ratings it received in the attributes listed at the top of exhibit four. These attributes are the five attributes rated as most important for performance in a given product/market by the first panel of that product/market (see exhibit three). The first five-attributes pertain to the iron ore as well as to the coal industry; the next five, to machine tools and compressors;

and the last five, to bearings and valves.

III - RESULTS

III.1 - Do key success factors exist ? (that is, is performance within each product/market more dependent upon excellence in some tasks and less dependent on others)?

The research results suggest an affirmative answer to the above stated question. As exhibit three shows, in all six different product/markets without exception, the first panels of experts rated some attributes as more important, others as less important. Some attributes were rated near the top of the scale (seven), others near the bottom (one), and still others in between. The former attributes were, in the experts opinion, the key success factors.

The existence of considerable variance among the ratings of the seveenteen attributes within each product/market is confirmed by statistical (T) tests which were performed on the data. In the machine tools, for instance, the difference between the ratings attributed to the working force's technical knowledge and to production management is significant at the 0,52% level (two tail test); the difference between the ratings of working force technical knowledge and purchasing is significant at the 0,02% level; and so on.

Other statistical tests confirm the existence of key success factors within each product/market Area: correlation coefficients were performed between the firms

own scores on the five highest rated attributes in their respective product/market areas and their return on assets (exhibit four). Such an analysis was performed for three groups: the ten manufacturers of equipment goods (compressors and machine tools); the ten manufactures of components (bearings and velves), and the raw material companies (iron ore and coal). All correlation coefficients range between 0.54 and 0.89 and all were significant at the 0.1 level or greater.

Several types of multiple regressions were also performed on the data supplied by exhibit four. The dependent variable was profitability. The independent variables were how the firms rated (compared to the competition) on each of the key success factors (service, distribution, etc). The results indicate that, compared to the competition, the higher a firm rates in a few success factors the better its profitability is. In other words, the difference between companies in terms of profitability within each product/market can be considerably explained by how good those firms are in the five most critical tasks (key success factors) of that product/market.

For details see the statistical note at the end.

III. 2. DO DIFFERENT CONTEXTS HAVE DIFFERENT KEY SUCCESS FACTORS ?

The existence of key success factors discussed above does not by itself imply that they differ from context to context. One could hypothetically have a situation where the same set of attributes would be essential for performance in all types of contexts. In such a case, one would have a universal theory (a common set) of key success factors. However, both strategy theory and the available anedoctal evidence, suggest a contingency theory of key success factors. They suggest that what is critical for performance in one context is different from what is critical for performance in another context.[3,4,5]

The results of this research support such a contingency theory of key success factors in several different ways. First of all, the five highest rated attributes in equipment goods were different from the highest rated in components and these were different from those rated highest in raw materials (see exhibit three). That is a first indication that key success factors change from context to context.

The difference among product/markets in terms of critical success factors can also be seen through a correlation matrix.

Exhibit five shows the correlation matrix (both rank order and Pearson correlation coefficients) among the ratings given by the first panels to the seventeen attributes in the six Products.

From exhibit five can be seen that when two products belong to the same type of industrial goods (equipment, components or raw materials), the correlation coefficient (rank order or Pearson correlation) is high. Such is the case of the correlation coefficients between compressors and machine tools (both equipment goods), bearings and valves (components) and iron ore and coal (raw materials). However, the coefficients of correlation between products belonging to different types of industrial goods are low.

Such is the case of the correlation coefficient between compressors and coal, machine tools and iron ore, bearings and compressors, valves and machine tools and so on.

The fact that the (rank order and Pearson) correlation coefficients between different types of industrial products are low indicate that different attributes are important for different products. In other words, the attributes which the first panels rated as most critical for performance in one product are different from the attributes the first panels rated as most important in other products. The correlation coefficients provide, therefore, another indication that different contexts (products) have different key success factors.

Other statistical tests were performed on the data such as T tests on the ratings of each attribute (image, etc.) across the six mature industrial products (iron ore, valves, etc.) and analysis of variance (ANOVA). They all provide additional support for the idea of a contingency theory of key success factors. They suggest that what is critical for performance changes from product to product.

III. 3 - DO SIMILAR CONTEXTS HAVE SIMILAR KEY SUCCESS FACTORS?

Besides defending the idea that different contexts have different key success factors, strategy literature also suggest that the more similar two contexts are, the more similar their key success factors will be.

There follows the implication that an organization, when extending its product line, should preferably enter related areas; If a firm extends its product line to a related area, the key success factors of the new area will be either the same or very similar to the old ones. Therefore, a firm can keep on relying on the same old strengths to match the new key success factors.[6]

On the other hand, if a company enters a different Product/Market area, it will face different key success factors wich require distinct types of strengths that the firm may or may not possess . If it turns out to be the

latter circunstance, then the firm's performance will be hurt.

The present research provides also some evidence on this matter. First of all, it should be noted that the five attributes rated as most critical for compressors and machine tools are identical, although in different order (see exhibit three). Similarly, the five attributes rated as most important in valves and bearings are also the same. Only in raw materials is there a difference between coal and iron ore: technical sophistication of the equipment is one of the five attributes rated as most critical in iron ore, but not in coal, where it is replaced by the marketing knowledge of the sales force. The other four highest rated attributes are the same.

Evidence of the relationship between the similarity of mature industrial products and the similarity of their key success factors can also be seen through exhibit five presented above. The exhibit shows that the correlation coefficients decrease as one moves from the left toward the right. The correlation coefficients are highest between industries belonging to the same type of industrial product, as is the case of compressors and machine tools (both equipment goods), bearings and valves (components) and coal and iron ore (raw materials).

The lowest correlation coefficients are those between products belonging to equipment goods and raw materials, which are indeed very different types of industrial products in terms of unit price, technical complexity, risk, frequency of purchase and extent of buyer-seller interaction when purchasing the product); the pairs constituted by compressors and coal, compressors and iron ore, machine tools and coal, and machine tools and iron are such cases. (see exhibit five).

The correlation coefficients are in between when the products belong to different types of industrial products but which nevertheless have a greater similarity (in terms of price, complexity, frequency of purchase, etc) than the raw materials and equipment goods. There are two such industry pairs: equipment goods and components; and components and raw materials

In other words, in terms of their characteristics (price, technical complexity, frequency of purchase, risk associated with that purchase, extent of buyer-seller interaction in the purchase), the further apart two products are, the lower the correlation coefficients between the ratings of the attributes in the two products will be. The more similar to each other two products are, the higher the correlation coefficients between the two products will be.

It seems, therefore, that there is a relation between how similar two products are and how similar their attributes ratings (key success factors) are.

IV - IMPLICATIONS

From the results of this study, four basic implications can be derived.

IV. 1 - DO NOT BE SMALL MINDED

Small mindness leads to attribute equal importance to everything, details and fundamentals alike.

Since there is evidence that in each market area some tasks are more important (for performance) than others, small mindness is a mistake management must avoid.

In any competitive setting, it is especially important that management puts into perspective all the tasks that the company has to perform (advertising, quality control, training of the worforce, etc.) and by distinguishing between tasks of greater or lesser importance management must determine what should be its points of FOCUS.

IV. 2 - FOCUS

That is, management must dedicate the best of its time, the best of its people and the bulk of the company's budget to the few critical tasks in which excellence is required.

As Peter Drucker [7] has put it, managers should concentrate their efforts on performing a few tasks exceedingly well, instead of a great number of them only reasonably well. All the non-essential tasks should be merely done in a satisfactory manner (as opposed to excellence required in critical areas). In short, avoid global mediocrity.

IV. 3 - KNOW THYSELF

The greeks had the inscription "Gnothi Seauton" (Know thyself) written on the front of the temple of Delphi in Ancient Greece. That is precisely what managers should do when considering leading their companies into a new Product/Market : They should ask themselves what the key success factors of that new Product/Market are and then whether their firms are better at them than the new competitors they will face.

When considering entering a new Product/Market, a firm should first analyze whether its strengths (those tasks it does best) match the tasks which are critical for success in

that Product/Market.[8]

An affirmative answer to this introspection process is an incentive to go into the new Product/Market area whereas a negative one requires that management carefully reevaluates its options.

Indeed, it may happen that one market area is so attractive (in terms of profits, potential growth, size, etc.) that in spite of not having the required strengths a firm decides to enter it. But in such a case, chances are that the company will perform below average in that new market. As this study shows, above average performance requires strengths which match the key factors for success of each Product/Market.

This point is well illustrated by the dismal performance of some tobacco companies which diversified into high growth/high profit industries such as fastfood, snack products, health products, restaurant chains, and so on.

IV. 4 - STAY CLOSE TO HOME

The results of this research indicate that as environments become increasingly different from one another, so do their key success factors. Since no organization can be expected to possess strengths in all areas, if a company expands its activities into too broad a domain, there is a considerable probability that the company will not possess

the necessary strengths, and its performance may be damaged.

On the other hand, if a company remains in the same context or extends its product line into a related area, the new key success factors it will face, will be at least similar to, the previous one, and therefore, the firm can continue to rely on its previous strengths to match the key success factors. Thus the advantage of specialization in organizational life.

As Mao-Tse-Tung once said: I can have ten men against one hundred but I always attack ten against one. One hundred times; so I win.

CONCLUSION

The implication of this empirical research can be summarized under four basic tenets. They are:

I - AVOID SMALL MINDNESS by distinguishing among more and less important tasks.

II - FOCUS on the most important tasks.

III - KNOW THYSELF, that is analyse your strengths and weaknesses before diversifying; and

IV - STAY CLOSE TO HOME (diversify preferably within related areas).

The concept underlying these four tenets is: SPECIALIZATION.

Specialization INSIDE THE COMPANY by deliberately concentrating money, people and time in order to achieve excellence in the key success factors. Specialization of THE FIRM AS A WHOLE so that its different Product/Markets share at least some key success factors.

As Clausewitz, the nineteenth-century military strategist, noted in his major work -ON WAR-[9], in strategy few things are as important as this: to establish one's army (resources) so that, instead of being weak in many places, it will be strong in a few places.

REFERENCES

1. R. Daniel, Management Information Costs, Harvard Business Review, Sept/Oct, (1961).

2. K.R. Andrews, The Concept of Corporate Strategy, New York, Irwin, Co., (1983).

3. G.F. Rockart, Chief Executive define their Data Needs, Harvard Business Review, March/April, (1979).

4. C.V. Bullen and J.F. Rockart, A Primer on Critical Success Factors, Working Paper, MIT, (1981).

5. Pen V. Jenster, Using Critical Success Factors in Planning, Long Range Planning, vol. 20, nº 4, (1987).

6. M.E. Porter, From Competitive Advantage to Corporate Strategy, Harvard Business Review, May/June, (1987).

7. Peter F. Drucker, Management, Tasks, Principles and Responsabilities, Harpers Row, New York (1973).

8. D. Aaker, Strategic Market Management, New York, John Wiley & Sons, (1984).

9. See R. Parkinson, : Clausewitz, a Biography, New York, Scarborough books, (1979).

TECHNICAL NOTE ON REGRESSION ANALYSIS

Multiple regression is a rigorous test on the relation between a firms performance and the level of its strengths.

However, if for each type of industrial product (equipment goods, components and raw materials), we were to regress the firms performance on their ratings on the five attributes, the regressions would have ten observation points (ten firms per industrial category) and five regressors (five attributes). The degrees of freedom would be too few.

Therefore, in order to increase the degrees of freedom in each regression, the independent variable is an index representing the firms ratings on the five most critical attributes of its industrial category. This index is a weighted sum of the ratings received by the firms on the five attributes; the weights are the ratings given by the first panels to the attributes.

With ten observations for each type of industrial good (equipments, components, raw materials) and a single regressor (the weighted index), all three regressions presented strong results.

They were:

Equipment goods: $R^2 = 0.62$; $P < 0.1$

Components : $R^2 = 0.62$; $P < 0.01$

Raw Materials : $R^2 = 0.89$; $P < 0.001$

When all thirty observations are pooled together using the index and dummies for the three types of industrial products as the only regressors, the R^2 was 0.87 ($P<0.001$).

Thus, regression analysis indicates that there is a strong relation between how an organization rates on the index (on its context's key success factors) and how it performs. It seems to "pay off" for a firm to have strengths in those areas which are critical in its context.

WHERE THE DATA COME FROM..

The survey was conducted in the USA and was based upon the information supplied by one hundred ninety questionnaires. The survey was divided into three phases:

First Phase: SELECTION OF PRODUCTS

The survey covered a wide range of mature industrial products, from equipment goods, to components to raw materials. The selected products were:

1 - STATIONARY COMPRESSORS OF ONE THOUSAND HORSEPOWER OR MORE used in large manufacturing establishments and in chemical process services such as centrifugal air compressors. The SIC codes are: 3563101-18 and 3563142-56.

2 - METAL CUTTING MACHINE TOOLS (SIC CODE 3541). The emphasis was on (numerically controlled, computer controlled or manually controlled) drilling, grinding and boring machine tools, transfer lines, machine centers, turning and milling machines.

3 - STANDARD ANTIFRICTION BEARINGS (SIC codes 35621/2/3). Here the focus was on standard (commodity type) bearings manufactured in large batches (mass produced). Custom made specialty bearings such as bearings of very large size or with extremely high precision requirements were excluded from consideration.

4 - STANDARD VALVES manufactured in large batches; that is, commodity type valves which are mass produced. Excluded from consideration were custom made specialty valves such as most of the valves used in the nuclear and petroleum industries. Within the standard/commodity type valves, the emphasis was on standard ball, butterfly and gate valves. (SIC codes 3494362-5, 3494367-0, and 3494372-5).

5 - IRON ORE (SIC code 10)

6 - COAL (SIC code 1211)

Four Points ought to be considered:

A - The survey was restricted to mature industrial products since one of its objectives was to detect whether or not, even within apparently similar products, one could identify different requirements for success. (See exhibit one)

B - Special care was taken to define the products in very specific terms. That is why in some products such as compressors or valves up to Five Digit Codes were used. Each product category was therefore homogeneous within itself. In other words, the unit of analysis used in this study was the stategic group (not the industry as a whole). (1)

C - These six products were selected because it was felt that they were representative of their industrial categories (equipment goods, components and raw materials).

D - Each type of industial good is represented by two products (compressors and machine tools for equipment goods; Bearings and valves for components; iron ore and coal for raw materials), because the objective was to test how key success factors differ from product to product depending on whether or not the two products belong to the same or different industrial categories.

Second Phase: SELECTION OF THE FIRMS WITHIN EACH PRODUCT/MARKET

After selecting the mature industrial products, the next step was to select business units and firms within those Product/market. The selection process had to obey several criteria, such as availability of published financial data (annual reports, 10Ks) and high variance in performance among the organizations. A total of thirty firms were selected for the six industrial products.

Third Phase: DATA COLLECTION

The Data collection process consisted of three distinct stages:

A - In the first stage, panels of experts, mostly managers but also some consultants and buyers from the industry in question, were asked to rate the order of importance of seventeen attributes for profitability on each Product/Market. The panels of experts, one for each Product/Market previously indicated, considered attributes

such as service, distribution, and technical sophistication of the equipment (see exhibit two).In other words, the experts were asked: "on a scale of 1 to 7 would you rate the importance of each of the following seventeen attributes for the profitability of an organization in industry x ?"

These seventeen attribute covered a wide range of organization areas (see figure two). The questionnaires also contained an open question to allow those who responded to indicate other attributes they felt critical for success in each product. Care was taken that all industry panels represented similar cross section of experts. Exhibit three presents the results.

B - In the second stage of data collection, information was obtained on how the selected sample of companies, in each of the Product/market areas, rated on the various attributes. Since it is very difficult to evaluate an organization's rating on a given attribute (such as service, image, distribution) through published data, a second set of expert panels (one for each of the six products referred to above), was constructed. These panel members, which were distinct from the members of the first panels included some industry experts from financial institutions, but the bulk were presidents and chief executive officers of the major corporations in the industry. They were asked:

"Compared to the industry average, how would you rate, the following organizations according to the following attributes?" Again a scale of one (very poor) to seven (excellent) was used.

In order to keep the questionnaire short, the questionnaire sent to the second panels of each Product included only the five attributes which had been judged as most critical (key success factors) by the first panel of that Product. No manager was allowed to rate his own organization.

C - In the final phase of data collection, financial data on the selected organizations was collected. The value of each firm's return on assets was computed on a five year average and obtained from annual reports and 10ks.

It should be noted that in order to minimize the possibility that the panelists would be biased towards the best performing firms, several steps were taken: the objective of the research was not communicated to the members of the second set of panels; the order of the firms in the questionnaires was alphabetical, not according to increasing or decreasing levels of performance; bankrupt companies and badly performing organizations of much smaller size, and, therefore, visibility were excluded from the

selected sample of firms; Five year averages were used as measures of organizational performance, thus decreasing the likelihood that the panels members had perfect information regarding the ranking of the companies in terms of performance.

The vertical dimension of exhibit four lists all thirty companies included in the research. The first four belong to the iron ore industry; the next six, to coal; the next five, to machine tools; five, to compressors; five, to bearings; and the last five, to valves.

Next to each company is its performance rating and then the average ratings it received in the attributes listed at the top of exhibit four. These attributes are the five attributes rated as most important for performance in a given Product/Market by the first panel of that Product/Market.

The first five attributes pertain to the iron ore as well as to the coal industry; the next five, to machine tools and compressors; and the last five, to bearings and valves.

Finally, it was important to take into account that the average profitability for one industry could be higher or lower than that for another. In order words, it was necessary to acknowledge that the industries could differ in attractiveness.

In order to control this industry effect, the difference between its own performance and the industry average was computed for each firm, then divided by the industry average and multiplied by 100 (in order to work with percentage values).

As a formula:

$$\frac{\text{Performance Firm M} - \text{Average Performance in the Industry to which Firm M Belongs}}{\text{Average Performance in the Industry to which Firm M Belongs}} \times 100$$

The resulting value gives an indication (in percentile figures) of how much better or worse a firms performance is as compared to the industry competition. These values are shown under the column labeled performance in exhibit four.

A total of 296 questionnaires were sent to the first and second panels. The total response rate was 64,2% (190 questionnaires were received).

EXHIBIT ONE:

DOMAIN OF THE STUDY

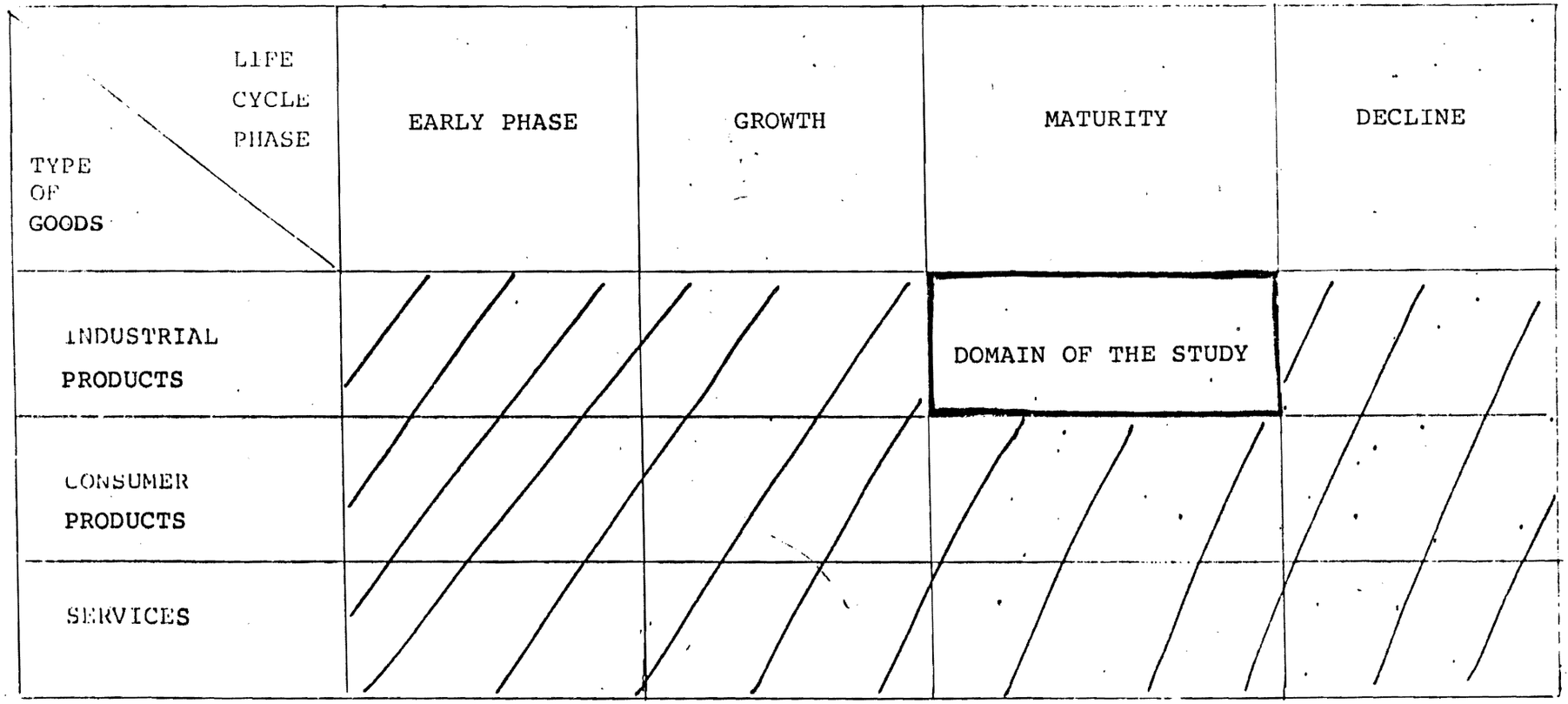

EXHIBIT TWO

THE QUESTIONNAIRES CONTAINED A TOTAL OF SEVENTEEN ATTRIBUTES RELATED TO DIFFERENT ORGANIZATIONAL AREAS. THE SEVENTEEN ATTRIBUTES WERE:

1 - IMAGE (goodwill, prestige, reputation). (the extent to which the name of the organization creates a generally positive attitude in the minds of the customers, not merely whether the organization is market visible or not).

2 - TECHNICAL KNOWLEDGE OF THE SALES FORCE (technical knowledge of the methods used in producing the products; ability to advise customers what is technically feasible; ability to evaluate the capacity of the organization to meet the technical requirements implied by the customer's needs).

3 - MARKETING KNOWLEDGE OF THE SALES FORCE (ability to persuade customers and to cover the territory well, knowledge of the marketing-credit, delivery, etc.-- in general, policies of the organization and knowledge of the customer's needs and values).

4 - ADVERTISING AND SALES PROMOTION (all types of advertising including TV, radio, outdoors, direct mail newspapers, and specialty magazines; all types of sales promotion, including sampling and trial, shows and exhibitions, price incentives and premiums).

5 - APPLIED PRODUCT RESEARCH AND DEVELOPMENT (activities directed towards modifying, improving, adding new features to, and developing new products)

6 - SERVICE (quality and availability: installation, coaching the customers in using the product, and repairs).

7 - PROCESS RESEARCH (engineering activities directed towards changing, not the products themselves, but the way the products are manufactured).

8 - FIRM SIZE (to exploit economies of scale due to greater mechanization, as well as economies in the materials handling, administrative marketing and financial areas).

9 - CUSTOMER FINANCING (all types of financial arrangements offered by the organization to customers in order to increase their purchasing power or facilitate the terms of sales and, therefore, to increase the capacity utilization of the supplier,e.g., financing expansion of customer installations, guaranteeing of customer bank loans, offering better credit terms for sales).

10 - DISTRIBUTION (transportation, warehousing, and expedition) (ability to maintain low output and input distribution costs and to assure that the deliveries of the outputs are made on the right date and in the right quantity),

11 - LOCATION OF THE MANUFACTURING FACILITIES (proximity to the market; to transportation means, such as lakes, rivers, railroads, and highways; or to sources of raw materials and labor).

EXHIBIT TWO

12 - TECHNICAL SKILLS OF THE WORKFORCE IN THE MANUFACTURING DEPARTMENT (technical skills and level of expertise required from the workforce in the manufacturing plant in order to perform their tasks).

13 - QUALITY CONTROL SYSTEM (a formalized system to inspect, sample, and test the quality of the products, distinct from the production technology and from workers activities directed toward manufacturing those products).

14 - PRODUCTION MANAGEMENT (planning and routinization of the work flow and the tasks to be performed in the manufacturing department, and of the formalized cost control system in that same department).

15 - PURCHASING DEPARTMENT (ability to obtain access to sources of inputs (raw materials, etc) and / or low price for inputs and / or a steady supply of inputs).

16 - LABOUR RELATIONS (1 - few accidents and mistakes by plant workers and few stoppages and interruptions in plant prodution; 2 - low number of strikes, and low level of turnover , lateness, and absenteeism).

17 - TECHNICAL SOPHISTICATION OF THE EQUIPMENT (extent to which the equipment and machinery used in the manufacturing plant of the firm is up to date).

EXHIBIT THREE - FIRST PANELS DATA

Compressors		
Attribute	Ranking	Rating
Service	1 st	6.2
Personal sales technical knowledge	2nd	6.2
Image	3rd	6.2
Working force technical knowledge	4th	6
Product R&D	5th	5.6
Personal sales marketing knowledge	6th	5.3
Quality Control System	7th	5.2
Technical Sophistic Equipment	8th	4.6
Prodution management	9th	4.5
Labour Relations	10th	4.4
Process R&D	11th	4.1
Purchasing	12th	3.8
Size	13th	3.7
Distribu-tion	14th	3.4
Advtg/SP	15th	3.2
Loca-tion	16th	3.1
Customer Financing	17th	2.7

Machine Tools		
Attribute	Ranking	Rating
Service	1st	6.8
Personal sales technical knowl	2nd	6.5
Image	3rd	5.9
Product r&d	4th	5.8
Working force technical knowledge	5th	5.6
Personal sales marketing knowl.	6th	5.5
Quality Control System	7th	5.3
Technical sophistic equipment	8th	4.9
Process R&D	9th	4.8
Product management	10th	4.3
Adverti-sing	11th	3.8
Labour Relations	12th	3.8
Customer Financing	13th	3.7
Purcha-sing	14th	3.1
Size	15th	3.1
Distri-bution	16th	2.9
Location	17th	2.7

Bearings		
Attribute	Ranking	Rating
Quality control system	1st	.6
Distribu-tion	2nd	5.9
Process R&D	3rd	5.9
Product management	4th	5.6
Personal sales Marketing knowl	5th	5.5
Technical Sophistic Equipment	6th	5.4
Image	7th	5.3
Personal sales technical knowledge	8th	5.3
Product R&D	9th	5.1
Labour Relations	10th	5
Size	11th	4.9
Work force technical knowledge	12th	4.7
Purcha-sing	13th	4.5
Service	14th	4.3
Advt/SP	15th	3.6
Location	16th	3.1
Customer Financing	17th	2.4

Note: The seventeen attributes were rated on a scale of importance from one (lowest), to seven (maximum)

Exhibit three. – First Panels Data (continued)

Valves		
Attribute	Ranking	Rating
Distribu-tion	1st	6.1
Process R&D	2nd	6.1
Personal sales; marketing knowledge	3rd	6
Prodution management	4th	5.8
Image	5th	5.8
Quality control system	6th	5.4
Technical Sophistic. equipment	7th	5.3
Product R&D	8th	5.3
Size	9th	5
Purchasing	10th	4.9
Personal sales technical knowledge	11th	4.7
Labour Relations	12th	4.7
Service	13th	4.4
Working force; Technical knowledge	14th	4.4
Advtg/SP	15th	4.1
Location	16th	3.9
Customer financing	17th	2.6

Iron ore		
Attribute	Ranking	Rating
Location of reserves	Ist	6.7
Quality of reserves	2nd	5.8
Distribu-tion	3rd	5.8
Tecnhical sophisti.	4th	5.4
Labour Relations	5th	5.
Prodution management	6th	5
Quality control system	7th	5
Process R&D	8th	4.8
Working force technical knowledge	9th	4.8
Personal sales; technical knowledge	10th	4.8
Size	11th	4.6
Product R&D	12th	4.5
Personal sales; marketing knowledge	13th	4.3
Image	14th	4.2
Customer financing	15th	3.2
Service	16th	3
Advtg/SP	17th	2

Coal		
Attribute	Ranking	Rating
Location of reserves	Ist	6.7
Quality of reserves	2nd	6.6
Labour Relations	3rd	6.5
Distri-bution	4th	5.7
Personal sales; marketing knowledge	5th	5.6
Tecnhical Sophistica-tion equip-ment	6th	5.4
Prodution management	7th	5.4
Working force technical knowledge	8th	5.2
Size	9th	5.1
Quality Control system	10th	5.1
Image	11th	4.9
Personal sales; Technical knowledge	12th	4.5
Process R&D	13th	4.4
Customer financing	14th	3
Service	15th	2.7
Product R&D	16th	2.6
Advtg/SP	17th	2.4

Exhibit Four- Results of the Second Panels Data

	Firm	Performance	Locat. Reserv	Qlty Reserv	Dist	Labor Rela	TSE	Service	PS Tech	[illegible]	PS R&D	W.F. Tech	Process R&D	Distr	Qlty CC	PM	PS Mkt
IRON ORE	(1)	- 5.65	6.25	4.13	4.66	4.71	5.29										
	(2)	- 59.28	4.86	4	4.11	5	4.5										
	(3)	- 22.93	5	4.43	4.75	5.33	4.71										
	(4)	• 88.15	5.5	4.43	5.63	5.33	5.71										
COAL	(5)	- 877.18	2.75	3	4	3	2.5										
	(6)	• 387.15	5.58	4.36	5	3.8	5.27										
	(7)	• 383.35	5.5	5.58	5.1	4.45	5.33										
	(8)	- 267.08	3.25	3.36	4	5.17	3.28										
	(9)	• 573.32	5.08	5.18	4.77	6	5.73										
	(10)	• 1.09	4.92	5.08	3.8	3.73	4.17										
MACHINE TOOLS	(11)	- 43.35						4.13	4.25	3.8	3.22	4.29					
	(12)	- 12.57						5.6	5.44	6.15	6.09	5.5					
	(13)	- 46.38						5.6	4.44	4.55	4.36	4.5					
	(14)	• 74.99						5.3	4.89	5.35	5.15	5.25					
	(15)	• 27.32						4.71	4.71	5.25	4.63	4.83					
COMPRESSORS	(16)	- 112.29						3.38	3.38	3.36	3.5	4					
	(17)	• 137.13						5.5	6	5.86	5.43	5.42					
	(18)	• 32.68						4.5	5.08	5.29	5.43	5.42					
	(19)	- 10.55						5.23	4.75	5.45	4.42	4.91					
	(20)	- 46.97						3.77	3.69	3.71	2.93	3.75					
BEARINGS	(21)	• 62.88											5.1	5.7	4.4	4.56	5.09
	(22)	- 152											2.2	2.7	2.6	3.13	2.45
	(23)	• 42.15											4.3	4.4	4.6	4.67	4.09
	(24)	- 4.88											3.22	4.86	4.13	4.17	4.1
	(25)	• 42.14											5.27	5.27	4.91	5.33	5.25
VALVES	(26)	- 86.99											3	4.11	4	3.43	3.56
	(27)	• 51											3.58	4.33	4.36	4.33	4.25
	(28)	• 73.92											5.25	6.33	5.91	5.78	6.33
	(29)	- 106.93											3	3.42	5	5	4
	(30)	• 68.99											3.83	3.42	4.67	4.1	4.69

NOTES:

Locat. Reserv - location of reserves; Qlty Reserv - Quality of Reserves; Distr - Distribution; Labor Rela — Labor Relations; TSE - Technical Sophistication of the Equipment; Service - Service; PS Tech - Personal Sales Technical Knowledge; IMG - Image; PR&D - Product R&D; W.F. Tech - Working force technical knowledge; Process R&D - Process R&D; Distr - Distribution; QCS - Quality Control System; PM - Production Management; PS Mkt - Personal Sales marketing knowledge.

EXHIBIT FIVE

MATRIX OF THE COEFFICIENTS OF CORRELATION BETWEEN THE RATINGS OF EACH PRODUCT/MARKET (each Product/market is characterized by the ratings given by the First Set of Panels to its 17 attributes)

PEARSON CORRELATION COEFFICIENTS / PROB > |R| UNDER HO:RHO=0 / N=17

	COMP	MTOOLS	BEARING	VALVES	COAL	IORE
COMP	1.00000 0.0000	0.91 0.0001	0.48 0.05	0.33 0.2	-0.14 0.60	-0.09 0.73
MTOOLS	0.91 0.0001	1.00000 0.0000	0.34 0.18	0.19 0.46	-0.44 0.08	-0.35 0.16
BEARINGS	0.48 0.06	0.34 0.18	1.00000 0.0000	0.93 0.0001	0.26 0.31	0.31 0.22
VALVES	0.33 0.2	0.19 0.46	0.93 0.0001	1.00000 0.0000	0.3 0.24	0.35 0.17
COAL	-0.14 0.60	-0.44 0.08	0.26 0.31	0.30 0.24	1.00000 0.0000	0.84 0.0001
IRON ORE	-0.09 0.73	-0.35 0.16	0.31 0.22	0.35 0.17	0.84 0.0001	1.00000 0.0000

SPEARMAN CORRELATION COEFFICIENTS / PROB > |R| UNDER HO:RHO=0/N=17

	COMP	MTOOLS	BEARING	VALVES	COAL	IORE
COMP	1.00000 0.0000	0.93 0.0001	0.3 0.2410	0.2 0.42	-0.2 0.35	0.27 0.2967
MTOOLS	0.93 0.0001	1.00000 0.0000	0.20 0.4302	0.10 0.69	-0.53 0.03	-0.53 0.03
BEARINGS	0.3 0.2410	0.2 0.43	1.00000 0.0000	0.92 0.0001	0.14 0.59	0.27 0.30
VALVES	0.21 0.42	0.1 0.69	0.92 0.0001	1.00000 0.0000	0.17 0.5231	0.20 0.43
COAL	-0.24 0.34	-0.53 0.03	0.14 0.59	0.17 0.52	1.00000 0.0000	0.53 0.0001
IRONORE	-0.27 0.30	-0.53 0.03	-0.27 0.30	0.20 0.43	0.83 0.0001	1.00000 0.0000

NOTES:

- Comp = Compressors Industry
- M Tools = Machine Tools Industry
- N = Number of Attributes in each industry (17)
- Below each correlation coefficient is the level of statistical significance, that is Prob|> |R| under the null hypothesis R=0
- Prob.> = Probability of greater than

ÚLTIMOS WORKING PAPERS PUBLICADOS

nº 70 - LUCENA, Diogo : "Environment Monitoring and Organization Structure I". (Setembro, 1987).

nº 71 - LUCENA, Diogo: "A Note on the Representation of Information Structure". (Setembro, 1987).

nº 72 - LUCENA, Diogo : "Environment Monitoring and Organization Structure II". (Setembro, 1987).

nº 73 - ANTUNES, António Pais e GASPAR , Vitor : " Tributação , Incentivos e Investimentos: Análise Qualitativa". (Novembro, 1987).

nº 74 - BAROSA, José Pedro: "Optimal Wage Rigidity: A Suggested Methodology to Test the Theory and an Application". (Outubro, 1987).

nº 75 - CABRAL, L. M. B.: "Three Notes on Symmetric Games with Asymmetric Equilibris". (Novembro, 1987).

nº 76 - LUCENA, Diogo:"To Search or Not to Search".(Fevereiro,1987)

nº 77 - SÁ, Jorge Vasconcelos e: "A Theory of Synergy". (Fevereiro, 1987).

nº 78 - VILARES, Manuel José: "Os Bens Intermédios Importados Como Factor de Produção". (Julho, 1987).

nº 79 - SÁ, Jorge Vasconcelos e: "How To Compete And Communicate in Mature Industrial Products". (Maio, 1988).

nº 80 - ROB, Rafael: "Learning and Capacity Expansion IN A New Market Under Uncertainty". (Fevereiro, 1988).

nº 81 - PEREIRA, Alfredo Marvão: "Survey of Dynamic Computational General Equilibrium Models For Tax Policy Evaluation". (Outubro, 1987).

nº 82 - SÁ, Jorge Vasconcelos e: "Everything IS Important: But Some Things Are More Important Than Others". (Maio, 1988).

Qualquer informação sobre os Working Papers já publicados será prestada pelo Secretariado de Apoio aos Docentes, podendo os mesmos ser adquiridos na Secção de Vendas da Faculdade de Economia, UNL, na Travessa Estevão Pinto, Campolide - 1000 LISBOA.