Business and Competitiveness: Two mModels Compared and Microeconomic/Management Foundations of National or International Comparisons

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Abstract
Competition amongst national firms and as extension amongst international firms is determined via a complex interaction of forces. Porter (1985, 1990) has proposed a concrete way to measure competitiveness through its well-known model. Sanidas (2005, 2006) has introduced a more detailed management and organization-based model with microeconomic elements that present a new and more comprehensive way to measure competitiveness performance. A survey of marine industry firms in Australia has provided with the primary data to examine these two models.
In more detail Porter's model is based on five (5) forces: customers' power, suppliers' power, substitutes, threat to entry, and degree of rival competition in the industry. In addition, the firm's strategy is also taken into account. On the other hand Sanidas's PROBB (process of the black box) model is a detailed 200-variable model that takes into account all key organizational, managerial, and economic variables according to a comprehensive background theory. Thus, the PROBB paradigm includes the processes of strategies, contracts, wisdom, and movements.
The primary data of the marine industry survey in Australia are used to calculate 4 independent factors (from SPSS factor analysis) called F1, F2, F3, and F4 which represent the four PROBB. Then regression analysis is used to estimate sales and other Porterian variables as a function of these factors. The results are very good: for example sales can be almost 90% explained either by F3 or a combination of 5 Porterian variables. This is a pioneering study with many positive extensions.
The foregoing analysis can be the basis for a competitiveness comparison between national firms or international firms. Currently similar studies are undertaken in other countries in Asia in order to be able to compare the competitiveness level of national firms across international borders. However, it is emphasized that proper international comparisons can only be made once we understand how comparisons inside national borders are made. The present paper offers such an understanding.

Keywords: competitiveness, organizational, quantitative analysis, sales, exports.

Introduction

Competition between firms is a broad topic and is subject to many qualifications. It can be examined from various points of view, e.g. from economics, marketing, management, and so on. For example economists have devised at least four distinct markets, such as monopolies and perfect competition. Grant (1998) mentions several

factors affecting a given industry's performance: Porter's five forces (and its sub-factors), Schumpeter's competition as related to industry structure, game theory elements, resources and capabilities, strategies, cost advantages, product differentiation, innovations, integrations and diversification, and so on. All these factors (and others) would make a quantitative analysis difficult if not impossible. On the other hand a partial analysis such as that of Porter's is easier to manage and put into practice. Effectively, Porter's five forces (Porter; 1980, 1990) have received a considerable attention so far and despite 20-30 years of reference to them they can still be valid in explaining competition between firms.

Recently Sanidas (2005, 2006) has introduced a comprehensive model of describing and explaining a firm's dynamic path in the economy. This model includes –in a succinct way- all major factors that shape the firm's evolution in growth. The theory of the firm is extended to encompass all types of opportunity costs and not just transaction costs. As a further extension to the transaction costs and capabilities development and as a synthesis of several related issues, Sanidas (2006) has introduced a complete system of 4 mutually exclusive and interdependent and negentropic processes that fully describe the contents of the black box of production (PROBB)(see Table 1 in Appendix). This model as Table 1 shows is a comprehensive summary of all elements that uniquely describe and explain the way firms are organized, managed and grow. These four PROBB are interdependent, although each PROBB contains unique elements that cannot belong to another PROBB[1].

The purpose of this paper is primarily to test the validity of the PROBB model by considering two of the main variables of measuring competitiveness performance: sales and exports. Then for comparison purposes, sales and exports will also be tested against Porter's five forces. A survey on the marine industry in Australia during the last two years will serve as the source of primary data for testing these two models. Section two will briefly describe data and methodology. Section 3 will discuss the determination of the 4 latent variables through factor analysis and produce a map (through multidimensional scaling) that contains all PROBB variables, the latent factors (indirectly) and the 2 performance variables (sales and exports). Section 4 will attempt to do some testing of the proposed models (the PROBB model versus Porter's model). Finally section 5 will discuss conclusions.

Data and methodology

In Australia the marine industry is relatively important as a large proportion of inhabitants own a boat; thus this industry has firms in all stages of the value chain: production of boats, their service and maintenance, production of boat parts, marine insurance, and so on. At this stage of research 120 firms have been surveyed so far on a face to face basis through interviews[2] with top managers or owners of these firms. The questionnaire used has approximately 200 questions and is entirely based on the findings of Sanidas (2005, 2006). There are 5 major parts of this questionnaire: the first 4 parts are based on the 4 processes of the black box (PROBB) as shown in Table 1. The

[1] There is a list of acronyms in Appendix.
[2] An initial set of 10 firms were used to pre-test the level of understanding of each question. The research assistant who conducted the interviews was able to further explain aspects of various questions when asked by the top manager/owner of the surveyed firm during interviews.

fifth part is a mixture of various types of questions ranging from economic variables to strategic variables and so on. In the next section some of these variables will be examined whenever necessary.

From the sampling point of view, firms in the marine industry all over Australia were surveyed according to the main clusters located in areas such as Fremantle in Western Australia and others. Also, the surveyed firms were picked up from all parts of the industry: maintenance of boats, construction of boats, retailing, insurance, and so on. The necessity to survey as many firms as possible limited our choices for a more scientifically chosen sample of the industry.

Two variables of the fifth part are "sales" and "exports" which will be scrutinized subsequently as they represent performance or growth. Although sales are expressed as growth rates for the last 5 years for the surveyed firms (and for the simulated ones, see below), these growth rates were transformed into a 7-step Likert scale like the remaining variables for consistency purposes (in this way the extreme values or outliers of sales rates are also 'covered' within the scale). Exports were expressed as a "level" variable initially (e.g. $540000 of exports during "last year") in the questionnaire but they were also transformed into a 7-score Likert scale.

As the number of data is relatively small for factor analysis the following procedure was used to increase the number of cases (firms): the original data (N=80)[3] was repeated eight times. This "artificial" increase in the number of data can be considered as simulation process partly based on real data: in other words 640 (=8 by 80) cases are very similar (almost identical) to the initial 80 real cases thus emphasizing the real answers for N=80. Missing data for various questions in various cases was filled in with an approximate average of the existing available data. Note that the purpose of this analysis is to carry out a pilot analysis since the number of actual cases will soon be at least 120 and eventually greater. Hence the results in this paper are preliminary and their main target is to suggest solutions to competitiveness, business performance and entrepreneurship thus confirming the a priori theories developed by Sanidas (2005, 2006).

With these partly simulated data for N=640 we will follow the next two major methodological steps (described in the next 2 sections). First we will determine four latent variables (the Fs) through factor analysis that will correspond to the four initial PROBB as closely as possible (sub-section 3.1). Then we will position "sales" and 'exports" through multidimensional scaling on the map of PROBB and Fs (in sub-section 3.2). Second we will examine the economic variables sales and exports in the light of these four latent factors (Fs) and some other strategic variables (in section 4).

Determination of the four latent variables Fs

Factor analysis

In Sanidas (2005, 2006) it is postulated that 4 unique and interdependent processes of all activities in a firm can completely describe and explain the existence and development of the firm. These four processes have about 27 unique elements each as Table 1 shows.

[3] Although 120 have been surveyed so far, time limitations restricted our study to only the first 80 firms.

We can then apply the method of factor analysis in order to obtain preferably four independent factors that might combine the initial elements of each PROBB. Once we achieve this, we can use the suggested factors (latent variables) for further analysis.

Several factoring methods exist in well known packages such as SPSS: principal component analysis, maximum likelihood, and so on. As the purpose in this instance is to determine as close as possible four factors of almost equal content (about 27 variables each since 109 PROBB variables divided by 4 is equal to 27.25) the method of 'image factoring'[4] yielded the best result from this point of view (with varimax rotation and forcing 4 factors in the solution). These 4 factors explain about 29% of total variance (from the initial eigenvalues). Table 2 in Appendix shows the set of variables contained in each factor as determined by this method.

From the above results we can now compare the initial allocation of elements as contained in Table 1 against the allocation of elements (or observed variables) as suggested by the factor analysis. This comparison is shown in Table 3. The original POS is mainly represented by F2 and F3 or F4; the POW is mainly represented by F1 and F4, the POM by F4, and the POC by F1 and F3. This distribution shows that the original elements contained in each PROBB do not entirely belong to each factor, but for each PROBB there is one factor that heavily represents it (e.g. for POM it is F4 and so on).

In addition, we can also note by observing the elements of each latent factor that there are some good reasons for the resulting combinations. For example, the elements (or variables) of the POW (13) and the POC (13) that belong to F1 are mostly related to psychological and behavioural issues. From these results we can conclude that the meaning of the four factors Fs is more related to reasons and consequences of the initial four PROBB; whereas the meaning of the latter indicates the purpose of each one of them, e.g. the purpose of the POS is to reduce strategic costs through the right decisions, and so on. We will call these four factors Fs the four independent tools of production (ITOP)[5].

Table 3: Comparison between the Fs factors and the four PROBB

PROBB	**F1**	**F2**	**F3**	**F4**	**Total**
POS	4	10	7	6	27
POW	13	2	4	8	27
POM	3	4	5	14	26
POC	13	6	8	2	29
Total	33	22	24	30	109
Tools, Reasons, Consequences	psychological, cognitive, behavioural	predetermining actions	making rules and expediencies	coordinating actions, entrepren/ship	
Essence	Mind basis	Getting ready	Exploring markets	Leading coordination	

We confirmed the validity of the above results by first extending the 4 factors into 8 factors (so that more variance is explained, that is 42%) and secondly by using the oblimin method of rotation (so that the four factors are not orthogonal anymore). When 8 factors are estimated (through image factoring and varimax) the 4 initial factors are meaningful combinations of the extended 8 as Table 4 shows. Thus,

[4] 'Image factoring' is based on the correlation matrix of predicted variables rather than actual variables, where each variable is predicted from the others using multiple regression.

[5] The construction of the four Fs is such that they are independent (orthogonal).

for example, F1's own observed variables are made of 18 from G2 factor, 8 from G4, and 7 from G6[6].

Table 4: Correspondence between the Fs and the Gs factors

Factors	**G1**	**G2**	**G3**	**G4**	**G5**	**G6**	**G7**	**G8**	Total of Gs	Total original
F1		18		8		7			33	33
F2	14			2	2	2			20	22
F3			20	1		1	1	4	27	24
F4				5	11	3	9	1	29	30
	14	18	20	16	13	13	10	5	109	109

Note: the numbers in cells show the number of variables for each factor (e.g. 2 of F2 come from G5).

When the oblimin (not orthogonality between factors) method of rotation (instead of varimax) is used the distribution of variables per factor is shown in Table 5. The difference between the 2 methods of rotation is very small. In terms of variables contained in each factor the two sets of factors are also almost identical.

Table 5: Comparison between the varimax and oblimin methods

Method	**F1**	**F2**	**F3**	**F4**	**Total**
Varimax	33	22	24	30	109
Oblimin	33	20	27	29	109

Multidimensional scaling and positioning exports/sales

The initial four PROBB and the subsequent four Fs (ITOP) can be further analysed by using the multidimensional scaling (MDS) method (algorithm ALSCAL as per SPSS). Figure 1 in Appendix shows the results. With this method we can have a map of all elements of the PROBB, thus showing the relative distance between them. For example, x12 is situated to the furthest south and away from y39 in the opposite direction on the other extreme point. Overall with MDS we can easily see where the Fs and the original PROBB elements are situated.

The 2 axes separate the map into four quadrants: South West (SW), South East (SE), North West (NW), and North East (NE). Most of the F1 elements are situated in SW and some in SE (close to the y-axis). Most of the F2 and F3 elements are situated in the NE quadrant, whereas most of the F4 elements are situated on the north side. In terms of the original PROBB elements most of the POW variables are situated in the south; and so on. Table 6 summarizes the results of this mapping.

[6] Note that any small discrepancies between the original number of variables and the number suggested by the combination of Gs factors (see the last two columns in Table 4) are due to some variables becoming part of a different F in relation to the original F.

Table 6: Location of the Fs and the PROBB on the MDS map

	NW	NE	SW	SE	Total
F1	3	0	19	9	31
F2	3	11	1	2	17
F3	5	14	0	5	24
F4	9	8	3	8	28
Total	20	33	23	24	100
POS	4	10	3	8	25
POW	4	4	10	7	25
POM	4	9	8	4	25
POC	8	10	2	5	25
Total	20	33	23	24	100

We must also discuss the meaning of the 2 axes. It is up to the researcher to determine the meaning of these axes by observing the type of elements in each quadrant. Thus, we observe that the further south we go the more these elements are individually based and rather ad hoc in nature. Hence the more north we go the opposite is true: the PROBB variables are more group oriented and systematic in nature. For example z23 is logistics and involves group work, hence it is situated in top north, and so on. On the x-axis, the more to the west we go the more the PROBB elements are static or passive in nature; on the contrary, the more east we go the more dynamic or active they are. For example, w27 is trust and is a static or passive in its nature. It is interesting to note that the centre around the origin is empty.

A similar map is shown in Figure 2 in Appendix with all the elements of Figure 1, plus the variable of exports. We can see that the latter are situated at the eastern extreme of the map and very close to the x-axis. This position indicates that exports are the consequence of active operations of firms as represented by the PROBB elements (see the meaning of the axes on the Figures and in the text). In addition, it is very close mainly to the ITOP F2 and F3; and to a lesser degree to F4, but opposite to F1. In other words it shows that we need dynamic and active PROBB elements in order to generate exports (hence situated on the east side of the map). In addition, we need both individually and group based elements (those near the x-axis). As we can see in Table 7, the most correlated PROBB elements with exports are indeed located in their majority in the northern or eastern part of the map (12 North or East, as against 4 South or West). Also in Table 7 we can see that the POS is the most represented PROBB out of the four PROBB (the x elements).

Finally, Figure 3 in Appendix shows the map of PROBB elements that includes “sales” instead of exports. Sales are this time situated in the middle of the North-East quadrant, much closer to the origin but further to the North in relation to exports. This indicates that “sales” is a group-oriented effort and as for exports it is also a more pro-active activity. Again, as shown in Table 7, most of the highly correlated PROBB variables are situated in North or East (18 out of 25 in either case). In terms of the four PROBB the POS is again the most represented in being highly correlated with sales (13 out of 25).

Table 7: Correlation between PROBB elements and sales or exports

Exports

PROBB	x1	x2	x6	x12	x15	x24	y7	y18	y38	y50	z16	z24	z35	w5	w17	w23
Corr/ion	0.2	0.19	0.19	-0.2	-0.18	-0.23	0.24	-0.24	0.19	0.2	0.23	0.2	0.32	0.21	0.19	0.18

Sales

PROBB	x1	x2	x4	x5	x6	x8	x9	x12	x13	x19	x21	x26	x27	y15	y50	z30
Corr/ion	0.3	0.29	0.22	0.24	0.27	0.29	0.28	-0.26	0.26	0.21	0.24	0.23	0.21	0.23	0.18	0.19
PROBB	z35	z37	w5	w8	w10	w12	w22	w24	w33							
Corr/ion	0.22	0.18	0.28	0.18	0.22	0.22	0.19	0.24	0.2							

Testing the proposed models

The analysis in this sub-section will consider other variables which do not belong to the PROBB map. These variables (called V) are strategic or performance in nature and are given in Table 8 below. First let us see the answer to: which variables V are mostly correlated with sales and exports? Table 9 shows the results of this inquiry.

Table 8: The V variables (strategic)

V1: Customers dictate terms and requirements
V2: Suppliers dictate terms and requirements
V3: Rivals are weak (strong)
V4: Power we, the firm, have in dictating prices and/or quantities
V5: Low cost strategy (low, high)
V6: Low price strategy (low, high)
V7: Niche market strategy
V8: Product quality
V9: product uniqueness
V10: Availability of large market for our product:
V11: Adoption of technical innovations:
V12: Creation of technical innovations:
V14: Technology choice affected company operations (low, high)
V15: Company operations affected technology choice

.

Table 9: Correlations between the V variables and sales or exports

	v1	**v2**	**v3**	**v4**	**v5**	**v6**	**v7**	**v8**	**v9**	**v10**	**v11**	**v12**	**v13**	**v14**	**v15**
sales	0.10	-0.1	0.18	0.08	0.13	0.16	0.09	-0.14	0.13	0.03	0.15	0.12	0.03	0.09	0.11
exports	-0.12	-0.03	-0.09	0.11	0.11	0.10	0.05	0.04	0.11	-0.18	0.35	0.37	0.05	0.29	0.29

Note: these correlations are significant at the 5% if greater than approximately 0.075 and significant at the 1% level if greater than approximately 0.1 (2-tailed).

Sales are significantly correlated with all Vs except V10 and V13. However, there is no exceptional correlation except with V3 (0.18). On the contrary, exports are highly correlated with five variables (V12, V11, V14, V15, and V10) and not at all with four Vs (V2, V7, V8, and V13).

Now, we will regress sales and exports with the four ITOP Fs (their factor scores). The results are shown in Table 10.

Table 10: Regressions between sales or exports and the four ITOP factors

		F1		F2		F3		F4	
sales	=	0.04	+	0.29	+	0.52	+	0.14	R square = 0.825
significance		0.51		0.000		0.000		0.024	
exports	=	-0.14	+	0.3	+	0.1	+	0.36	R square = 0.654
significance		0.024		0.000		0.118		0.000	

Note: a significance figure of 0.024 means that the coefficient has 97.6% chances to have been correctly estimated. Also note that the Fs are orthogonal and hence there is no multicollinearity at all in these regressions.

The regression results are satisfactory. Exports are performing worse than sales (R square is 0.654 as against 0.825 for sales) mainly because a high proportion of firms (mainly SMEs) do not export at all. For sales, F2 and mainly F3 are the most influencing factors on this performance variable. This is not a surprising result if we look at Table 6 where we can see that F2 and F3 are mostly situated in the NE quadrant of the PROBB map (see Figures 1, 2, and 3); this NE quadrant is precisely where “sales” is situated in the PROBB map that contains this variable (see Figure 3). For exports, F2 and F4 are mainly influencing this performance variable. Exports are situated on the far East of the PROBB map (see Figure 2) and they are also almost leaning on the x-axis; on the other hand, F4 elements are both on the North and South side hence being close to exports in either case; F2 is primarily situated in North East.

Out of all the V variables, Porter’s five competitive forces are related to the following ones: V1, V3, V4, V6, and V9 (see Table 8 for definitions). We then regressed sales and exports to these five Porterian variables. The results are shown in Table 11.

Table 11: Regressions between sales or exports and the five V variables (Porter’s)

		V1		V3		V4		V6		V9	
sales	=	0.15	+	0.27	+	0.17	+	0.2	+	0.2	R square = 0.828
significance		0.000		0.000		0.000		0.000		0.000	
exports	=	-0.03	+	0.07	+	0.19	+	0.17	+	0.2	R square = 0.633
significance		0.416		0.055		0.000		0.000		0.000	

For sales, the regression results are as expected and satisfactory. “Sales” are significantly explained by all five Porterian variables. For exports, V1 is not significant, V3 is only significant at the 5.5% level and the R square is not as high as for sales. We know from the correlation results (see Table 9) that other V variables such as V12 are much more correlated with exports than the five Porterian variables. The results are shown below (the Porterian variable V6 is included with the non-Porterian variables V11, V12, V14, and V15):

		V6		V11		V12		V14		V15	
exports	=	0.08	+	0.11	+	0.17	+	0.1	+	0.15	R square = 0.71
significance		0.004		0.003		0.000		0.014		0.000	

Finally, it will be necessary to examine regressions which have one to two explanatory variables maximum. Thus, as can be seen in Table 12 in Appendix, sales are well explained by F3, or F3 and F2. Similarly, exports are well explained by F2, or F2 and F4. For comparison, sales are also regressed against one or two Porterian variables V3 and V9; and similarly exports are regressed against V4 and V9.

It would also be possible to combine the ITOP with the V variables for better results. Effectively, although not shown here, their combination yields slightly better results than when Fs or Vs are regressed separately against sales or exports.

Conclusions and discussion

We proposed that competitiveness in business depends on the internal structure and operational mode of firms which in turn can be represented through the model PROBB(“process of the black box”). The latter incorporates about 110 elements or factors that fully describe how a firm grows. Out of these fundamental elements, a factor analysis was first performed on primary data obtained through a survey of marine industry firms in Australia. We thus generated 4 independent latent factors or variables (ITOP or Fs) which provide us with a much more succinct way to describe the firm. We have checked this factor analysis in various ways, such as relating the initial four PROBB with the four factors (ITOP), or extending the latter into eight factors. Then we used the method of multidimensional scaling (MDS) in order to see all 100[7] elements depicted on a two-dimension map and in relation to the four factors ITOP. In this map we included “exports” or “sales” in order to determine the position of these performance variables in relation to the PROBB elements and the ITOP latent factors. In addition this map is a very useful and truthful tool to see at a glimpse the whole firm’s picture in terms of management and organization.

Once we located the performance variables sales and exports in the appropriate area of management and organization, we attempted to measure more precisely the impact that the way a firm is organized and managed has on the performance of the firm. Thus there is quantitative evidence that there is a significant relationships between the PROBB elements and performance indicators such as sales and exports. More precisely, sales can be mostly explained and predicted by using the factor scores of the latent variable ITOP of F3 (“exploring markets”). In other words once we know the performance of a firm in terms of F3 (through the appropriate elements of PROBB) we can predict sales with a good degree of accuracy[8]. Sales can also be explained in a different way by one or more V variables related to Porter’s analysis (such as V1 indicating the degree to which customers dictate terms and requirements, and so on). Hence the two

[7] MDS with SPSS can only handle 100 variables at a time.
[8] Of course this simple relationship can be further improved but this is out of the scope of this paper.

models of PROBB and Porter's can yield good results [9] . Similar conclusions hold for exports.

Overall, we can measure competitiveness and in particular international competitiveness[10] beyond the well known Porter's model. The idea here is very simple: business and entrepreneurship as seen through the model PROBB is successfully used to assess performance variables such as sales and exports. In particular the latter, as a function of the PROBB model, can be a good indicator for international competitiveness. Simple regressions have shown that it is possible to predict sales or exports as a function of 1-2 latent factors (ITOP) quite accurately. In parallel, Porter's model was also checked with simple regressions, regressing the same performance variables with proxies for the five competitiveness forces as outlined by Porter. In brief, Sanidas's and Porter's models can be used to predict sales and exports both on a national and international level, but from two different points of view.

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List of acronyms

ITOP:independent tools of production Fs: latent variables of factor analysis (=ITOP)

POC: process of contracts PROBB: process of the black box

POM: process of movements MDS: multidimensional scaling

POS: process of strategies Vs: strategic variables

POW: process of wisdom

[9] It is also beyond the scope of this paper to conduct a detailed comparison of the two models.

[10] Porter's 5 competitive forces are applicable both domestically and internationally (Porter, 1990, p. 53).

Appendix

Table 1: The complete four processes of the black box (PROBB)

P O W	**P O S**	**P O M**	**P O C**
Process of wisdom	**Process of strategies**	**Process of movements**	**Process of contracts**
Power	**Survival**	**Infrastructure**	**Superstructure**
Ability and memory	Initiatives for action	Movement relations between the tangible inputs	Rules of the relations between the tangible inputs
Wisdom costs*	**Strategic costs**	**Kinetic costs**	**Transaction costs**
Purpose*: to decrease '**negative' * knowledge**	Purpose: to produce fewer **mistakes**	Purpose: to produce less **waste***	Purpose: to produce less **friction**
Potential energy	**Reaction energy**	**Kinetic energy**	**Friction energy**
Experience	Strategies	Timing	Contracts with employees*
Tacit knowledge	Everyday decisions*	Kinetic Procedures (e.g. in just-in-time)	Legal form of the firm
Education and training	Planning	Kinetic routines	Contracts with suppliers*
Culture and aesthetics	Vision	Layout	Contracts with customers
Information and data	Mission	Transport	Contracts with society
Competences and capabilities*	Objectives	Teamwork	Legal standards
R&D*	Attacks	Kinetic coordination (harmonization)	Accounting rules
Imitation	Defense	Implementation	Institutions
Innovations*	Inertias	Execution	Governance
Leadership*	Momentum	Kinetic organization*	Trust*
POW	**POS**	**POM**	**POC**
Techniques of analysis	Entrepreneurship*	Effort non-physical	Standards
Needs* (e.g. for exploration)	Domination and Exploitation	Effort physical*	Authority
Motivation*	Initiatives	Fatigue	Control
Cognitive capacity and attention	Inspiration for action	Cooperation (actual kinetic)	Opportunism
Bounded rationality: Subjectivity	Decision making*	Work satisfaction as a team	Supervision rules
Idiosyncrasy	Forecasting	Kinetic tasks	Incentives
Attitudes and beliefs*	Uncertainty	Ergonomics	Functions
Marketing intelligence*	Mistakes	Logistics	Autonomy
Sophistication	Policies	Problem solving*	Negotiations
Socio-Psychological states*	Organizational defensive routines*	Mechanisms of feedback*	Documentation

Explicit knowledge	Risk	Performance	Ownership rules
Design of products	Reactions to fortuitous events	*Ad hoc* non-routine movements	Informal rules
Operations research techniques	Readiness and emergence*	Operations research applications (e.g. PERT)	Conventions
Intuition*, impressions, perception*	Interpretation and judgment	Work rationalization (e.g. scientific management)	Conflict solutions
Organizational spirit* and capital	Sense making*	Location	Communications rules
Imagination* and Afflatus	Improvisations and Heuristics*	Projects	Status
Unconscious*	Expectations	Transfer	Hierarchy
Illusions*	Will		Form or structure of the firm (e.g. M-form)
Conception, insights			Equity
Subconscious and emotions*			
Utility versus virtue*			

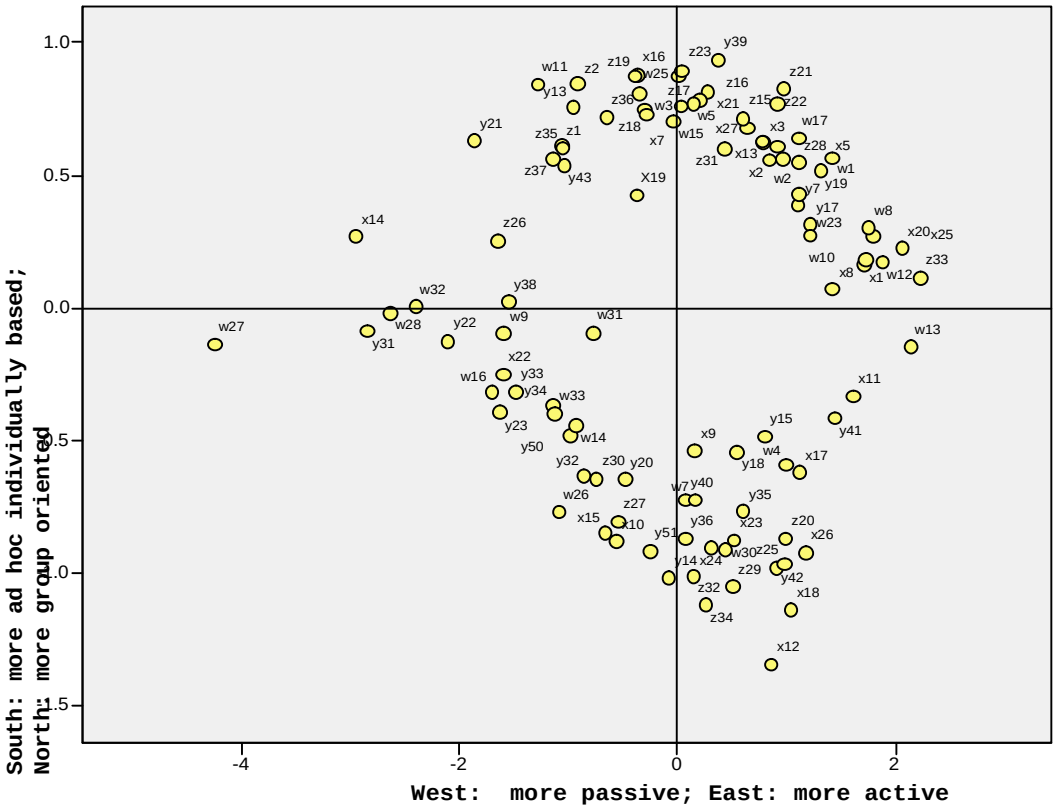
*For the terms with an asterisk see Appendix 2 of Sanidas, 2006.
Source: Sanidas (2006).

Table 2: The 4 PROBB based on the factor analysis

F1 (mind basis)	F2 (getting ready)	F3 (exploring markets)	F4 (leading coordination)
X10: Inertia state	X1: use of formal strategies	X7: expectations reflecting markets	X11: momentum
X19: Readiness to adversity	X2: use of formal planning	X8: aggression in markets	X12: cautious style management
X22: asses/t before decisions	X3: use of formal vision	X9: defending in markets	X13: initiatives far reaching
X26: uncertainty facing	X4: use of formal mission	X17: decisions market share	X14: reaction unexpected
Y15: thinking capacity	X5: use of formal objectives	X21: aggression re staff	X15: rational decisions
Y20: insightful staff	X6: use of formal policies	X24: improvisations deciding	X16: driven outside square
Y22: rational thinking	X18: ad hoc decisions extent	X27: taking risks	Y14: information/ data
Y23: attitudes/beliefs of staff	X20: easy decisions extent	Y8: experience knowledge	Y19: product design
Y31: socio-psycho/al values	X23: interpreting surroundings	Y13: education/ training	Y39: imitating other firms
Y32: intuition/perceptions	X25: use of formal forecasts	Y17: marketing intelligence	Y41: leadership vision
Y33: social relationships	Y7: using quant/e techniques	Y18: transmitted knowledge	Y42: leadership motivation
Y34: imagination constructive	Y21: culture in relationships	Z1: using teamwork	Y43: unique culture
Y35: emotional state	Z2: resolve problems as team	Z15: using operations research	Y44: other firms imitating you
Y36: self-interest of staff	Z27: physical efforts reliance	Z24: feedback mechanisms	Y51: outdated knowledge
Y38: distinct capabilities	Z31: teamwork satisfaction	Z33: ergonomics	Z16: rationalize work
Y40: accumulated knowledge	Z37: execution as expected	Z38: performance as per customers	Z17: reduce work time
Y50: needs in markets	W5: rigorous contracts/documents	W1: contracts with employee	Z18: link work stages
Z29: fatigue problems	W15: functions	W2: contracts with suppliers	Z19: production routines
Z30: automatic cooperation	W17: hierarchy structure	W3: contracts with customers	Z20: using transportation
Z32: layout problems	W23: standard legal documents	W7: traditions & institutions	Z21: movements organ/on
W4: support community	W24: international standards	W8: supervision rules documented	Z22: movements tasks

W9: ownership rules assistance	W32: resolving conflict	W10: informal v formal rules	Z23: logistics
W11: conventional behaviour		W12: rules of communication	Z25: non-routine operations
W14: governance appreciation		W13: firm form affecting you	Z26: transfers people and equipment
W16: status hindering			Z28: physical efforts monitoring
W22: firm structure assisting			Z34: location of activities
W26: autonomy employees			Z35: harmonized activities
W27: trust your employees			Z36: implementation prod/n
W28: attitude re authority			W6: rigorous accounting rules
W29: selfish staff members			W25: control measures
W30: performance incentives			
W31: negotiating with man/t			
W33: equity if crucial			
Total : 33	Total: 22	Total: 24	Total: 30

Figure 1: The map of the PROBB elements



Note: For all MDS Figures Euclidean distance with standard deviations of 1 are used.

Figure 2: The map of the PROBB elements plus exports

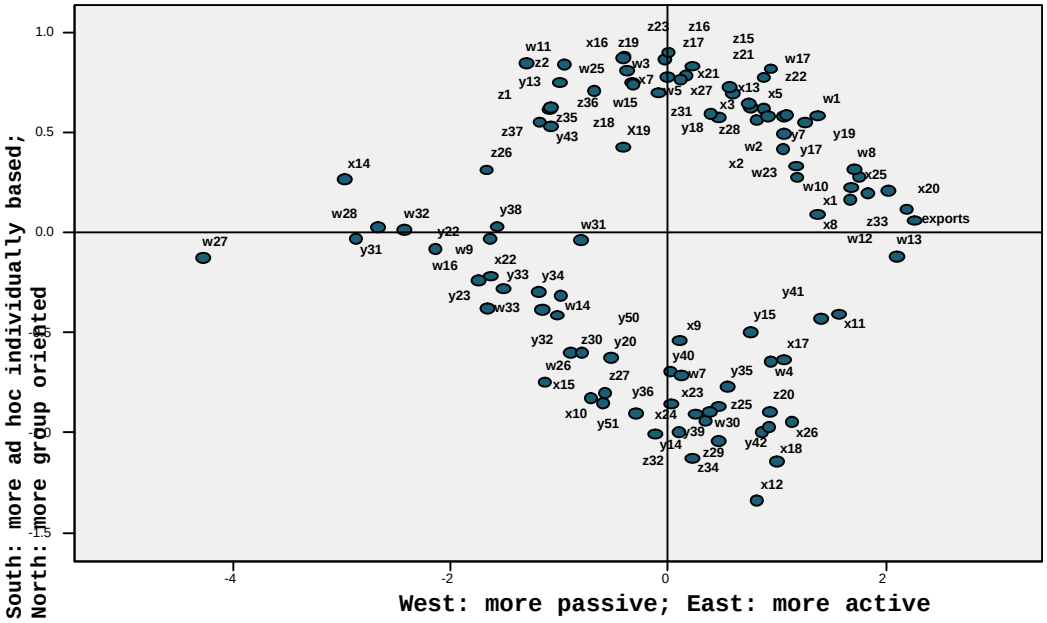
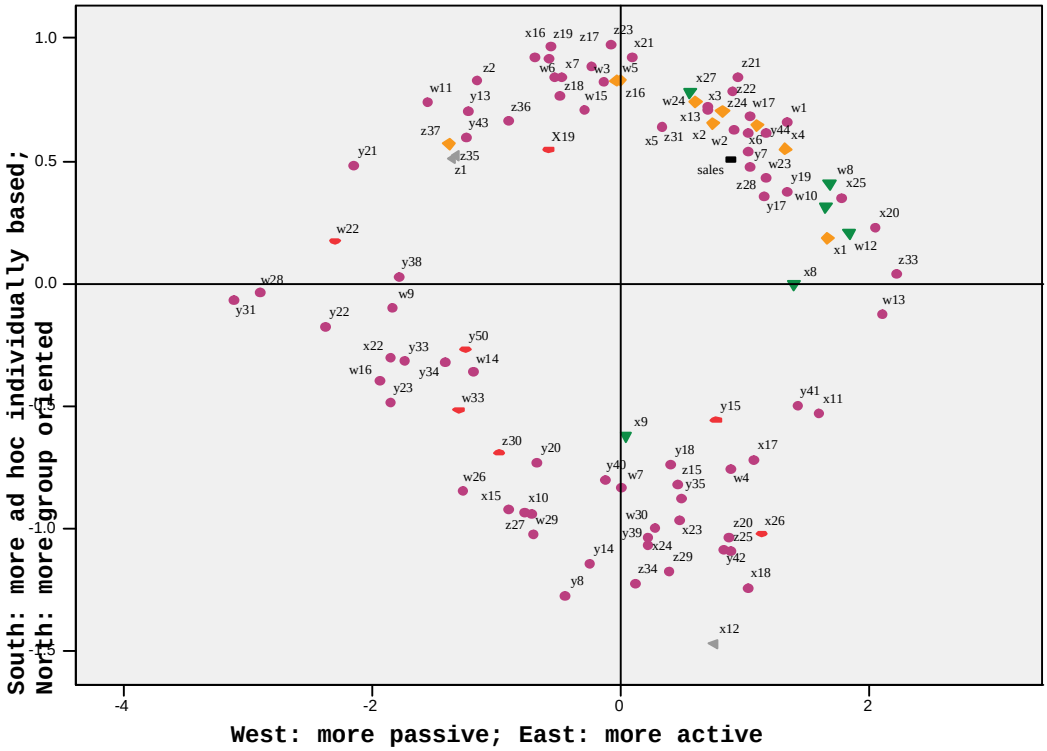


Figure 3: The map of PROBB and sales



Note: the RSQ is equal to 0.79 and stress = 0.26. Similar results of RSQ and stress are obtained for the previous Figures 1 and 2.

Table: 12 Sales or exports regressions

	F2		F3		F4		V3		V4		V9	
sales =			0.97									R square = 0.809
significance			0.000									
sales =	0.38	+	0.61									R square = 0.823
significance	0.000		0.000									
sales =							0.8					R square = 0.734
significance							0.000					
sales =							0.41	+			0.37	R square = 0.797
significance							0.000				0.000	
exports =					0.6							R square = 0.635
significance					0.000							
exports =	0.28			+	0.34							R square = 0.651
significance	0.000				0.000							
exports =											0.41	R square = 0.590
significance											0.000	
exports =									0.2		0.3	R square = 0.613
significance									0.000		0.000	