The relative contributions of
inimitable, non transferable and non substitutable resources
to profitability and market performance

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INTRODUCTION

In the explanation of firm performance, proponents of the resource-based view have developed an analysis defending the dominance of firm-effects over industry-effects. The resource-based view (RBV) seeks to better understand the drivers behind differences in profitability by understanding differences between firms (Wernerfelt, 1984; Barney, 1991; Amit and Shoemaker, 1993). RBV interprets these differences in profitability as stemming from variety in the sources of rents accruing to firms, which are themselves affected by differences in the control and management of strategic resources (Winter, 1987 and 1995). A firm is considered a unique bundle of resources, and its cost position may in fact be more a function of its resource portfolio than of its market position (Wernerfelt, 1984; Rumelt, 1984).

Empirical studies often address the impact of resource endowment on firm performance (Wernerfelt and Montgomery, 1988; Balakrishnan and Fox, 1993). Researchers try to understand the complex interplay between different types of resources, which leads to increases in performance. A firm's strategic moves are often reinterpreted from the resource-based viewpoint: for instance, integration means controlling new bundles of resources in addition to controlling cost (Chatterjee, 1990); diversification implies not only hedging risk but also preserving the relatedness of the resource portfolio (Markides and Williamson, 1994). However, rather few empirical studies have tried to differentiate the various sources of competitive advantage. Although qualitative differences between resources underlying production theoretically explain firm heterogeneity (Penrose, 1959), these relationships have not been empirically studied extensively enough.

This lack of empirical studies is the motivation for this paper. Had we a clear taxonomy of the resources, the resources' properties and the resources' impact on performance, we could analyze specifically the firms' peculiarities and explain in detail the determinants of performance. This paper distinguishes three kinds of resources, three properties and three performance variables. In order to understand the connection between a firm's resources and its competitive position, we primarily need to understand the influence of each resource on performance variables.

This study shows that knowing the properties of a firm's resources -- including the properties of the firm's exchange relationships with suppliers and customers– is critical to understanding the firm's performance. We test the hypotheses of the RBV on a large sample of French firms (2875 firms within 50 industries). In particular, we show that inimitability and non-transferability of productive resources consistently contribute to increase both the firm's profitability and its market performance. However, maintaining exchange relationships that are non-substitutable entails a trade-off for the rent-seeking firm, between on the one hand profitability, and on the other, market position.

The paper is organized as follows. We begin by presenting the model and setting up the hypotheses to be tested. In the next section, we describe the data and methodology. We then detail the results. Finally, we offer some concluding remarks on the strategic implications of the results for sustaining a competitive advantage.

RESEARCH MODEL

Dependent variables of performance

Most empirical studies focus on only one indicator of performance in spite of the well-known theoretical and empirical drawbacks of this choice (Venkatraman and Ramunajam, 1986;

Schmalensee, 1989; Capon et al., 1990). The shortcoming of single-variable models can be overcome by introducing at least two or three performance variables in the empirical models. Many variables are available. First, an evaluation of the profitability of a firm is frequently used. Price Cost Margin or Return on Sales are the most common indicators, useful in assessing the way the firm is able to monitor its costs. A second indicator of profitability is an evaluation of the use of the assets (operation and financial structure). Stock valuation, return on equity (ROE) and return on assets (ROA) are valuable indicators of how efficiently management has utilized the firm's resources. Finally, another traditional assessment of a firm's performance consists of market performance, i.e. either growth of sales or market power (using the relative market share).

We use three performance variables in our model: margin, profitability and market performance. We will distinguish the multiple effects of a firm's resource portfolio on its performance by considering these three variables in our model. Indeed, the effects of each resource can be detailed for each performance variable. Moreover, these variables have causal relationships among themselves we must acknowledge. The literature has shown that high market performance is a pre-condition for high margin and high profitability to occur in many industries (Mancke, 1974; Schmalensee, 1989). In addition, a firm with high margins should experience higher profitability, all other conditions being equal. Thus, we expect two positive causal relationships. First, the higher a firm's market performance, the higher the margins and profitability of that firm. Second, high margins are likely to cause a high profitability.

Hypotheses on performance

H1. The higher a firm's market performance, the better the firm's margin and profitability.

H2. The higher a firm's margin, the higher a firm's profitability.

Resources, properties and performance

Many authors describe a firm's resources either by their nature or by their properties (Wernerfelt, 1984; Barney, 1986; Dierickx and Cool, 1989 ; Grant, 1991 ; Amit and Schoemaker, 1993 ; Teece et al., 1997). For instance, some authors distinguish the nature of resources as financial, productive, organizational and human resources (Penrose, 1959; Barney, 1991).

When dealing with manufacturing firms, at least three kinds of resources are essential to exhibit the features of these firms. First, the *productive resources*, which correspond to the nature of the technological assets and aptitudes of the firm, are likely to be the main source of differences in the actualization of rent potential. Many authors studied a firm's technological basis as a fundamental criterion for explaining competitive advantage and performance (Nelson and Winter, 1982; Levin and al., 1985; Teece, 1986; Von Hippel, 1988; Sanchez, 1995; Christensen, 1994; Teece et al., 1997). These productive resources include tangible assets as well as intangible capabilities. Second, *the exchange relationships*, which deal with the links between the focal firm and its suppliers and customers, are a natural source of explanation of the level of performance (Verdin and Williamson, 1994; Levinthal and Myatt, 1994; Powell and Dent-Micallef, 1997; Poppo and Zenger, 1998). Numerous costs (research, information, negotiation, and so on) as well as several benefits (learning, time and quality management for instance) are associated with the management of exchange relationships. The nature of the exchange relationships is likely to impact the level of the costs incurred and the amount of the benefits derived; hence the firm's performance (Larson, 1992). Third, the *level of internal coordination* within a firm can provide the firm an advantage by allowing it to better actualize the rent potential of its resources (Chandler, 1962; Galbraith, 1972). The circulation of strategic

information, the diffusion of reports, and the implementation of adequate organizational structures principally characterize internal coordination (Moingeon and Edmonson, 1996).

We acknowledge that this breakdown may be restrictive. But these elements (productive resources, exchange relationships, and internal coordination) seem to constitute the basic components absolutely necessary to define a firm (Demsetz, 1988). Without one of them, the definition would be incomplete to study the rationales of a firm's performance. Nevertheless, complementary information should be included when dealing with specific strategic decisions. For instance, the degree of coherence between resources must be included in the study of diversification (Teece and al, 1986) or past experience in the study of FDI (Shaver and al, 1997). However, for a descriptive and comparative analysis of firm performance, we estimate that the examination of these three elements consists of a necessary first test to empirically support or deny the RBV of firm performance.

Therefore, in this study, a firm's resource portfolio corresponds to the set of a firm's productive resources, a firm's exchange relationships, and a firm's internal coordination. More specifically, we detail below the influence a firm's resource portfolio has on each of the three performance variables. We formulate the corresponding hypotheses.

Productive resources and performance

The RBV emphasizes the role productive resources play in the appropriation of rents by manufacturing firms. Productive resources, i.e. the technology as well as the knowledge and aptitudes used by the firm in the operation process, are the manufacturing firm's main assets. Theory suggests that the less imitable a firm's productive resources, the more likely the firm will create differential rents, i.e. will be able to outperform its rivals (Barney,1991; Grant,1991). The effect of inimitability is similar, namely positive, for each of the three performance variables.

Inimitability brings about higher margins and best profitability. In addition, a firm, which has inimitable productive resources, will be able to achieve better market performance. This is accomplished by tapping into the firm's specific productive resources in order to create a competitive advantage in production scale, scope, or flexibility.

But the productive resources also need to be not easily transferable to other companies (Penrose, 1959; Amit and Shoemaker, 1993; Peteraf, 1993). The absence of an accurate market valuation for strategic factors is a reason for a firm both to develop a competitive advantage and to appropriate differential rents. Causal ambiguity exists in evaluating the strategic value of a firm's productive resources (Lippman and Rumelt, 1982). As with inimitability, the non-transferability is a condition that favors the three performance variables, according to the RBV (Barney, 1991; Grant, 1991).

Hypotheses 3

H3a. The more inimitable a firm's productive resources, the better the firm's performance (margin, profitability, and market performance).

H3b. The less transferable a firm's productive resources, the better the firm's performance (margin, profitability, and market performance).

Exchange relationships and performance

Not having extended the aforementioned reasoning from the productive resources to the exchange relationships is one of the main shortcomings of the RBV (Dyer and Singh, 1998). Some studies have dealt specifically with the vertical relationships in different industries and question strategic decisions using the RBV (Cool and Henderson, 1996; Mudambi and Helper, 1998). To the best of our knowledge, however, no article has concurrently studied the effects of supplier and customer relationships on multiple performance variables.

First, we must mention that we consider the exchange relationships to be resources. Many authors have studied the relationships between suppliers, customers, and the focal firm. We define the focal firm as the firm involved in supplier and customer relationships, as described in Porter's competitive analysis model. Porter (1980) considered these relationships as adversarial and countervailing forces. The one who has the most bargaining power achieves higher performance to the detriment of the other. Williamson (1975, 1985) developed transaction cost theory on the idea that the costs associated with the management of exchange relationships explain organizational and industrial structures. However, Williamson's unit of analysis does not directly concern a firm's performance. Moreover, Williamson's agents are opportunistic by nature.

Supplier relationship. The RBV may renew these traditional views of exchange relationships. Instead of considering the power or the costs associated with the supplier/customer relationship, the RBV suggests that the quality of this resource can lead to differential rents (Verdin and Williamson, 1994; Walsh et al, 1996). More precisely, having been able to build a non-substitutable relationship with its supplier provides a source of rents to a firm that helps the firm to compete (Conner, 1991). Information sharing, trust, and co-development are factors that create a non-substitutable supplier relationship (Dyer and Singh, 1998). This relationship supports a firm's competitive advantage and contributes to the firm's market performance. However, the creation of a non-substitutable relationship demands time, coordination, trust, patience, and money (Larson, 1992). The effects on a focal firm's margins and profitability should not be as positive as they were on market performance (Walker and Poppo, 1991).

Therefore, building a non-substitutable supplier relationship will diminish a firm's profitability but improve the firm's market performance.[1]

In a nutshell, neither the transaction cost theory nor Porter analysis adequately explains the effect of supplier relationships on a firm's performance. On one hand, the transaction costs are not necessary borne by only one of the two firms involved in the exchange relationship. Also the effects of transaction costs on each performance variable may differ. On the other hand, Porter's bargaining power theory is too restrictive when analyzing the different performance indicators, because supplier/client relationships are much more complex than pure antagonistic relationships. The RBV of the exchange relationships better characterizes the rent potential the focal firm owns. This view enables one to differentiate between the cost incurred in order to develop this specific relationship –which reduce margin and profitability– and the benefits the focal firm will derive from it –in terms of market performance.

Hypotheses 4

H4a. The less substitutable the supplier relationships, the better the firm's market performance.

H4b. The less substitutable the supplier relationships, the lower the firm's margin and profitability.

Customer relationship. It appears that the RBV argument developed for the exchange relationship between a firm and its suppliers can be adapted for the relationship between the focal firm and its customers. Creating a non-substitutable relationship with its customers means to make the firm's products appealing and essential for the customers, to create a specific link between a customer and the firm, which induces confidence, satisfaction, reputation, and trustfulness between both economic actors. This will benefit the focal firm, because the firm can

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[1] The non-substitutability is a matter of degree. Exchange relationships are more or less substitutable. We mean here 'the less substitutable they are, the better for a firm's market performance'.

charge the customer a premium for having access to this non-substitutable relationship. The customer willingly pays this premium to reduce its risks (in quality, delays, and stable procurement) and to contract with a supplier that caters to its specific needs. However, in terms of market performance, the fact that the focal firm targets some customers deprives the firm of being able to target a wider market. Consequently, the positive effect on margins and profitability is likely to be counterbalanced by reduced market performance, resulting from the need for the firm to narrow its target market in order to develop these intense and non-substitutable customer relationships.

Hypotheses 5

H5a. The less substitutable the customer relationships, the lower the firm's market performance.

H5b. The less substitutable the customer relationships, the better the firm's margin and profitability.

Internal coordination

Regarding internal coordination, it is difficult to assume a direct link between the level of internal coordination and the three firm performance variables. We expect the relationship between the level of internal coordination and performance to be indirect. In fact, assessing the level of internal coordination in our generic model can not give a clear indication of its direct effect on performance. Internal coordination should enable a firm to improve its efficiency, but it concurrently creates associated management costs (Chandler, 1962; Galbraith, 1972; Walker and Poppo, 1991; Larson, 1992). Consequently, we assume that a high level of internal coordination creates a climate in which the use of resources is efficient and effective, thus leading to inimitability, non transferability and non substitutability of the other resources (McGrath et al, 1995). Thus, a high level of internal coordination within a firm facilitates the actualization of the

rent potential of its other idiosyncratic resources (inimitable and non-transferable productive resources, and non-substitutable exchange relationships), which in turn positively impact the performance of the firm.

Hypothesis 6

H6. The level of internal coordination within a firm is positively correlated with its other resources (productive resources and exchange relationships) but does not have a direct impact on the firm's performance variables.

Causal scheme of the relative contributions of inimitable, non-transferable, and non-substitutable resources to profitability and market performance

Figure 1 provides a template for the theoretical model. It integrates the three resources (productive resources, exchange relationships, and internal coordination) with the dependent variables (margin, profitability, and market performance).

<Insert here Figure 1>

DATA AND ESTIMATION

Data and sample

The data used in this research were gathered by the French central bank, "Bank of France," in 1995 and 1996. Bank of France launched this survey in order to complement its traditional financial analysis of small to medium firms risk with an in-depth evaluation of these firms' strategy –for which public data is often rare. Qualitative data was collected in face-to-face interviews with CEOs, using a computer-aided questionnaire. For this kind of survey, the top manager is considered the person with the most comprehensive knowledge about strategy and performance (Hambrick, 1981). These interviews were conducted by specially trained Bank of

France employees. The questionnaire dealt chiefly with the following topics: the business environment, the firm's strategy in each business, and internal organization and management features.

Fifty industries within thirteen industrial sectors are represented in this survey (Table 1). The majority of companies are small and medium sized industrials (from 30 to 2000 employees) that tend to be focused on one or two 4 digit "SIC code equivalent" industries. The sample represents a random sample of small to medium manufacturing firms and of industries that have primarily small to medium sized firms (Table 2). Nonetheless, we can expect that our results will be similar for larger public companies.

In order to minimize the possible effects of outliers in the sample for this study, we included only the industries (4 digit SIC code equivalent) for which at least fifteen firms were competing. In order to prevent the study from being biased by diversification effects we removed firms for which the main business represented less than seventy percent of their sales. Finally, we eliminated firms with missing data. Size of our final sample is 2875 firms, operating in fifty industries.

Variables

Dependent variables

We selected three variables for performance. First, margin was measured by the firm's return on sales (ROS). Variable ROS is an average for the years 1995 to 1997. Second, the proxy for profitability was the 1995-1997 average value of the firm's return on assets (ROA).

Finally, market performance was evaluated using two variables, KEYPOS and BCG. KEYPOS is an indicator calculated by the Bank of France, which estimates a firm's relative position among rivals. At the beginning of the questionnaire, each CEO defines within a

provided list the key success factors (KSF) of their industries. At the end of the questionnaire, on the same list, CEOs evaluate their company on a five-point Likert scale. The Bank of France methodological services then calculate KEYPOS as a weighted average of the distance between the competitive advantage acknowledged by the CEOs and the KSF of the industry. BCG is the ratio between a firm's market share and the main competitor's market share. Together, KEYPOS and BCG estimate a firm's market performance.

Inimitability of productive resources

We used two variables for the operationalization of the inimitability of productive resources. First, the degree of flexibility characterizes the endowment a technological base provides a firm (Sanchez, 1995). Following several studies, we assumed that the more flexible a firm's technology, the less imitable were its productive resources (Kogut and Zander, 1992; Christensen, 1994). If a technology enables a firm to greatly differentiate its production, then the firm has the capability to manage flexibility, complexity, and operations in such a way that competitors are unlikely to easily imitate (Sanchez and Mahoney, 1996). The proxy DIFF estimates the degree of product differentiation provided by a firm's technology basis.

Second, we created an indicator, DESTIME, as a proxy for the 'Time Compression Diseconomies' a new competitor will incur in trying to imitate a firm's productive resources (Dierickx and Cool, 1989). A firm trying to accumulate strategic resources in a minimized period of time will stumble upon inevitable friction costs. These costs are time compression diseconomies (TCD), which reduce the imitability of a firm's productive resources (Dierickx and Cool, 1989). Creation of DESTIME consists of three steps [2]. 1) The CEOs determined the strategic dimensions that primarily affected their firm's cost of production –CEOs' choices

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[2] See Appendix for complete questions

included: the size of units of production, the volume of activity, the specificity of the technology, a privileged access to a source of procurement, and labor productivity. 2) The CEOs then evaluated TCD as the difficulty a new entrant faces in imitating their firm on every dimension of production chosen in step1 using a five-point Likert scale. 3) Finally, we calculated DESTIME as a compounded average of the value of the advantage corresponding to the selected strategic dimensions (see Appendix).

Non transferability of productive resources

We used three variables as proxies for the non-transferability of productive resources. Non-transferability must be built within the firm and R&D is the main factor enabling the productive resources to be non-transferable. In order to assess the non-transferability of productive resources within a firm, CEOs are asked which functions they focus on in order to compete against rivals. If they quote R&D as a high priority, this indicates that their firm is developing specialized assets, specific resources, and idiosyncratic aptitudes. Each of these factors increases the non-transferability of a firm's productive resources. Therefore, the FUNR&D variable represents the priority CEOs gave the R&D function in comparison with other functions (marketing, procurement, etc.).

However, this measure alone is not sufficient to highlight how R&D and non-transferable productive resources are related. Hence, a more quantitative measure of R&D has to be included. Accordingly, we used an evaluation of the level of a firm's R&D expenditures and compared it to the industrial average. The resulting variable, R&DREL shows how a firm is building specific productive resources, which are neither easily valued by the market nor transferable (Barney, 1986). The formulation of a strategic objective regarding R&D, combined with effective above average R&D expenditures, characterizes a commitment to obtaining non-transferable resources.

Finally, we created a third indicator concerning the nature of a firm's productive resources. We assumed that there were two kinds of resources, those directly connected to production (cost, quality, and technical performance) and those dealing with sales (brand image, delays, and complementary services). Resources linked to production require more resource stocks than sales resources require (Dierickx and Cool, 1989). In addition, productive resources precede sales resources, and they have stocks that are not as easily eroded as the stocks of sales resources. "In general, only variables that have the nature of a stock, as opposed to a flow, can carry a credible threat, and the more so, the slower the stock is decaying over time" (Dierickx and Cool, 1989,:1508). Therefore, by evaluating the difference between the stocks of the resources linked to sales (supposedly more transferable) and the stocks of resources linked to production (assumed to be less transferable), we created another proxy, DEGTRANS, for the non-transferability of productive resources. [3]

Non substitutability of supplier relationships

Three observable variables serve to evaluate the non-substitutability of supplier relationships. First, CEOs appraised the two switching costs describing their exchange relationship. The switching cost incurred by the firm is SCSup, and the switching cost the supplier incurs if it wants to change its customer (i.e. the focal firm) is SCSupCus. Applying RBV to these exchange relationships leads to the conclusion that when both switching costs are high, a special relationship unites both players. This relationship is non-substitutable.

Second, to solidify this interpretation, we add a third variable, COMPSup. COMPSup measures the level of competitive pressure the focal firm exerts over its supplier. Competitive pressure occurs for companies that systematically require competitive bids in procurement rather

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[3] For more detail on the calculation of DEGTRANS, see Appendix I

than giving priority to past suppliers. If the firm prefers a less competitive mode of selecting its suppliers, the firm and the supplier are involved in a non–substitutable relationship, especially if both switching costs are high.

Non substitutability of customer relationships

Symmetrically to the operationalization of non-substitutable supplier relationships, we used the switching costs incurred between the focal firm and its customers for the operationalization of non-substitutable customer relationships. SCCus represents the cost incurred by the firm if it changes one of its main customers. SCCusSup is an evaluation of the cost for a customer if it chooses to change its supplier (i.e. the focal firm). As before, when both switching costs are high, a non-substitutable exchange relationship is likely to exist between both players.

Secondly, to support this measure, we added a variable that evaluates the focal firm's level of commitment to its customers (ADAPT). If the focal firm has consented to some specific investment for maintaining good relationships with its customer, the focal firm is involved in a non-substitutable relationship since its investment are likely to have fewer value for another customer. Consequently, the three observable variables altogether indicate the degree of non-substitutability of the customer relationship.

Internal coordination

The level of diffusion of a firm's strategic objectives within the organization (DIFOBJ) is an indicator of the level of internal coordination. The better informed the members of the organization are, the higher the level of a firm's internal coordination. Accordingly, the presence and efficiency of managerial accounting and reporting increase the quality of internal coordination, this is especially true for small and medium-sized firms. Specifically, the deeper

this information is distributed within a company, the better the level of the company's internal coordination. DIFINFO is the variable that evaluates the diffusion of managerial accounting information within a firm. DIFOBJ and DIFINFO focus on the communication component of the coordination mechanisms. In order to add information to our construct regarding the structure of the organization, the third variable estimates how often the firm uses transversal modes of coordination. Transversal modes of coordination include different liaison roles, similar to the role of a project manager (Galbraith, 1972). Consequently, the frequency with which a firm makes use of these coordinating mechanisms (COORD) gives an indication about the level of sophistication of the firm's internal coordination. Altogether, these three variables enabled us to assess the level of internal coordination.

Control variables

We control our model from three major effects. First, we included variables regarding the level of concentration inside the industry. Industry concentration was measured as the four-firm concentration ratio at the 4 digit SIC equivalent level. We also controlled for the effects of industry growth. Industry growth measurement was the industry's annual change in sales, expressed as a percentage, for the three years preceding the survey.

Second, we analyzed the significance of the average differences of independent variables according to firm size. It appeared that the fourth quartile (firms with more than 200 employees) presented some significant differences in comparison with the other quartiles. Consequently, we created two subsamples. We studied the effects of a firm's size on our model by testing the theoretical model on each subsample.

Finally, we analyzed the impact of the sector. We used the French statistical classification developed by INSEE that distinguishes four general categories of manufacturing industries: food

and agro-industries, consumer goods industries, intermediary industries, and equipment industries. We tested our theoretical model on each industrial sector.

Model

Integration of the different elements (observable variables, resources, and performance variables) requires a model that incorporates the causal links between explanatory variables and dependent variables, the relationships among the set of explanatory variables, and within the dependent variables. We used Lisrel for estimating the different parameters and fit indexes. Lisrel explicitly differentiates between observed and latent variables, and estimates the quality of the constructs (Bollen, 1989). It requires both explicitly stating the correspondence between observed and latent variables and specifying the relationships among theoretical constructs precisely. Lisrel gives fit indexes for the overall model (GFI, AGFI, RMR, total coefficient of determination) and for each causal relationship (coefficients, T-values, and squared multiple correlations for structural equations). Specifically, due to the nature of our variables, we used the polychoric matrix and the WLS procedure of estimation, as recommended by Joreskog and Sorbom (1989).

RESULTS

The correlation matrix is presented Table 3. No result appears to question the use of our variables. On the contrary, correlations among the observable variables supposed to operationalize an explanatory variable are high. Variables are ordinal, and most of them are not normal. We led a Principal Component Analysis on our observable variables in order to pre-test the quality of the representation of the resource portfolio. Results are provided in Table 4. Signs and loadings are well oriented. The axes obtained by this procedure correspond to the expected

explanatory variables. Therefore, the observable variables are the expression of the latent variables.

The loadings $?_x$ and $?_y$ represent the estimation by Lisrel of the relationships between latent variables and observable variables. Our assumptions are well supported by these loadings (Table 5). The coefficients are relatively high (7 out of 10 are equal or greater than 0.6), and all the signs conform to our hypotheses, as the Component Analysis had previously indicated. T-values are very significant. Furthermore, the total coefficient for X-variables, which measures the overall quality of these relationships, is very good (0.96).

Regarding the squared multiple correlations for structural equations, ROS presents a significant but relatively low coefficient (7%), whereas ROA and market performance both have remarkably high coefficients (57% and 39%). Overall, the total coefficient of determination is highly satisfactory (42%). Fit indexes (GFI, AGFI and RMR) confirm an excellent global fit of the model, given the size of the sample and the nature of the variables (Baumgartner and Homburg, 1996; Hulland et al., 1996).

Causal relationships

Productive resources

H3a and H3b receive strong support. Inimitability of productive resources impacts positively ROS (+0.181) and market performance (+0.243). Non transferability of productive resources greatly impacts market performance (+0.46) but seems to have little significant effect on margin and ROA.

Exchange relationships

Regarding supplier relationships, H4a and H4b are confirmed. Non substitutable supplier relationships give leverage to a firm increasing its market performance (+0.166). However, the

cost of developing such a relationship obliterates margins, since the focal firm must incur costs (information, communication, and coordination) to build the relationship. As expected then, the impact on ROS is negative and significant (-0.095).

We expected converse effects on performance variables regarding customer relationships (H5a and H5b). The results confirmed these hypotheses. A non-substitutable customer relationship increases ROS (+0.121) but decreases a firm's market performance (-0.275) by preventing the firm from targeting a wider market.

Internal coordination

In the Lisrel model, we left 'free' the relationships between internal coordination and the dependent variables. None of the coefficients were significant. Therefore, as expected, there is no significant direct effect between the level of coordination and either profitability or market performance. However, the relationships between the level of internal coordination and the other resources are positive (from 0.15 to 0.23). These correlations indicate that the higher the level of internal coordination, the more likely the resources to be inimitable, non-transferable and non-substitutable. Accordingly, in order to develop inimitable, non-transferable, and non-substitutable resources, a firm requires high levels of internal coordination. These results provide strong support for H6.

Performance variables

The relationships linking market performance to both ROS and ROA are positive and significant (+0.19 and +0.16). It appears therefore that market performance positively affects profitability, as assumed by H1. The relationship between ROS and ROA is positive and significant, conformably to H2.

The square multiple correlation, which expresses the quality of explanation of a dependent variable, is high for ROA (57%) although no exogenous explanatory variables have a significant direct impact on ROA. According to our results, only ROS and market performance directly 'cause' ROA. Consequently, we tested another model, creating a new dependent latent variable, using both ROS and ROA as proxies. All the preceding results were confirmed, suggesting the robustness of the model. The square multiple correlation for the new performance variable is 9% and the total coefficient of determination for the two-dependent-variable model is 40.2% (compared to 42% with the three-dependent-variable model).

<Insert Figure 2>

Additional comments

System effect

Correlation between inimitability and non-transferability of the productive resources (0.7), and correlation between the two exchange relationships (0.5) are both high. We interpret these results as a reinforcement effect between related resources, i.e. productive resources and exchange relationships (see figure 2). The more inimitable a firm's productive resources are, the higher the degree of non-transferability of these resources. The more non-substitutable the relationships a firm has with its suppliers, the more likely the firm is to have non-substitutable customer relationships. These two aforementioned reinforcement effects, when combined with the positive effect of internal coordination on the four other resources, create an overall system effect.

Direct and indirect effects

No masked effect appeared from the analysis of the direct, indirect and total effects provided by Lisrel. On the contrary, two additional results emerged that complement the overall

coherence of the model. First, there is an indirect and significant effect that links non-transferable productive resources with ROS (+0.265). Second, inimitable productive resources have a significant indirect effect on ROA (+0.134).

Control variables

Industry growth has a positive impact on profitability, but a non-significant effect on market performance. On the contrary, market concentration impacts significantly (and negatively) market performance but has no significant effect on profitability. This last result indicates that the more concentrated the industry, the more intense the competition, and then the more difficult it is for a firm to achieve high market performance.

We tested our theoretical model on two subsamples, according to firm size. No discrepancies appeared in the results between small and larger firms. This result confirms the validity of the RBV analysis of performance, since no size bias is found between smaller and larger firms.

Finally, four additional models were tested based upon the sector in which a firm competes: food and agro-industries, consumer goods industries, intermediary industries, and equipment industries. Again, the structure of the results was found to be stable. No differences appeared in signs or coefficients. Yet, it is worth noting some nuances in the significance of the relationships, according to the sector. These nuances provide a more fine-tuned analysis of the results, in accordance with the specificity of the sectors. For instance, the significance of the exchange relationships was preponderant for the 'intermediary industries' that principally produce by-products to be used by other industries.

DISCUSSION

In this discussion section, we review our results and take a step back in order to place them in the perspective of a firm's competitive position. At this point nevertheless, we feel it is necessary to comment on two limitations of the study.

Limitations

The first limitation of our study concerns the use of secondary data. We did not collect the data for this study, but instead used data already available, which had been gathered by the Bank of France's services. As a consequence, many additional questions that could have greatly contributed to the operationalization of latent variables in the model could not be asked.

The second limitation relates to the use of CEOs' answers. Researchers suggest cross-evaluating the answers using other methods when possible. Unfortunately, we could not cross-validate the CEOs answers. However, previous studies have shown that subjective data is worthwhile when evaluating general strategic issues and performance (Hambrick, 1981; Venkataraman and Ramanujam, 1988). According to Tull and Hawkins (1980) personal interviews are advantageous for handling complex questions, collecting large amounts of data, and obtaining in-depth information. In addition, Bank of France uses trained interviewers in order to attenuate over-confident and careless answers. Face-to-face interviews led by trained interviewers tend to reduce the inconsistency of individual answers (deLeeuw *et* al., 1995).

Contributions

This paper is one of the first cross-sectional studies to test the RBV on a large representative sample of non-US industries. The overall fit of the model is notably high (over 40%), and the causal links validate the RBV of performance. Our study confirms that a firm's resources each contribute differently to its performance. Some are more important to market

performance, while others are vital to profitability. In particular, the non-transferability and the inimitability of a firm's productive resources (technology, levels of R&D expenditures, accumulated experience, and time diseconomies) are positively linked to the observed performance variables, but especially to market performance.

Second, the non-substitutability of the exchange relationships is complexly linked with a firm's performance. The relationship between the focal firm and its supplier is considered non-substitutable when both switching costs between the firm and the supplier are high, and when the firm prefers the continuity of long-term relationships with its suppliers rather than short-term competition among potential suppliers (Dyer and Singh, 1998). These high switching costs indicate that a specific relationship exists between both companies. In this case, we found that building this relationship has a cost and lowers profitability, but enables the focal firm to obtain better market performance (Mudambi and Helper, 1998). Conversely, the non-substitutability of the relationships with the customers implies the firm targets specific customers –consequently the firm can charge a premium to these customers over and above the costs of the specific investments incurred to offer adapted products. Therefore, in the case of customer non-substitutability, the margins and profitability are positively influenced while market performance will be reduced. Thus, in either case, managing the non-substitutability in exchange relationships entails a tradeoff for the rent-seeking firm between market performance and profitability.

Third, we found that internal coordination does not have a direct impact on the performance variables. However, as expected, strong positive coefficients with the explanatory variables confirms that internal coordination is a catalyst for the enhancement of the non-transferability, the inimitability and the non-substitutability of the other resources.

Finally, we would like to emphasize the importance of considering multiple variables of performance in empirical studies. Too often, general results proceed from significant relationships linking explanatory variables to either market performance or profitability variables. This study clearly illustrates the real complexity underlying the analysis of firm performance. More specifically, some explanatory variables may have opposite effects on each of these performance variables. Only appropriate methods such as for instance Lisrel makes possible to distinguish between these multiple effects.

Conclusion

This study provides managers with a clarification of the relationships linking their firm's resources and performance. Three principal lessons can be drawn from our study. First, managers must enable the firm to develop idiosyncratic productive resources, using continuous flows of R&D investment in order to build economies of time, to incite innovations, and to increase the flexibility of its technological base. Inimitable and non-transferable resources ensure that the company develops a source of differential rents, which competitors are unlikely to easily imitate. Second, as an interface, the focal firm should increase the switching cost of its different exchange relationships. Investing in suppliers' non-substitutability is costly in terms of immediate profitability, but the investment pays back in terms of market performance. With customers, investment in non-substitutability has a positive impact on profitability. Third, managers willing to pursue a resource-based strategy should improve the level of internal coordination within the firm. By diffusing clear objectives, using managerial accounting and transversal coordination, managers can induce a system effect, improving the properties of all the other resources, and creating an *efficient* bundle of resources.

Figure 1. Theoretical Model
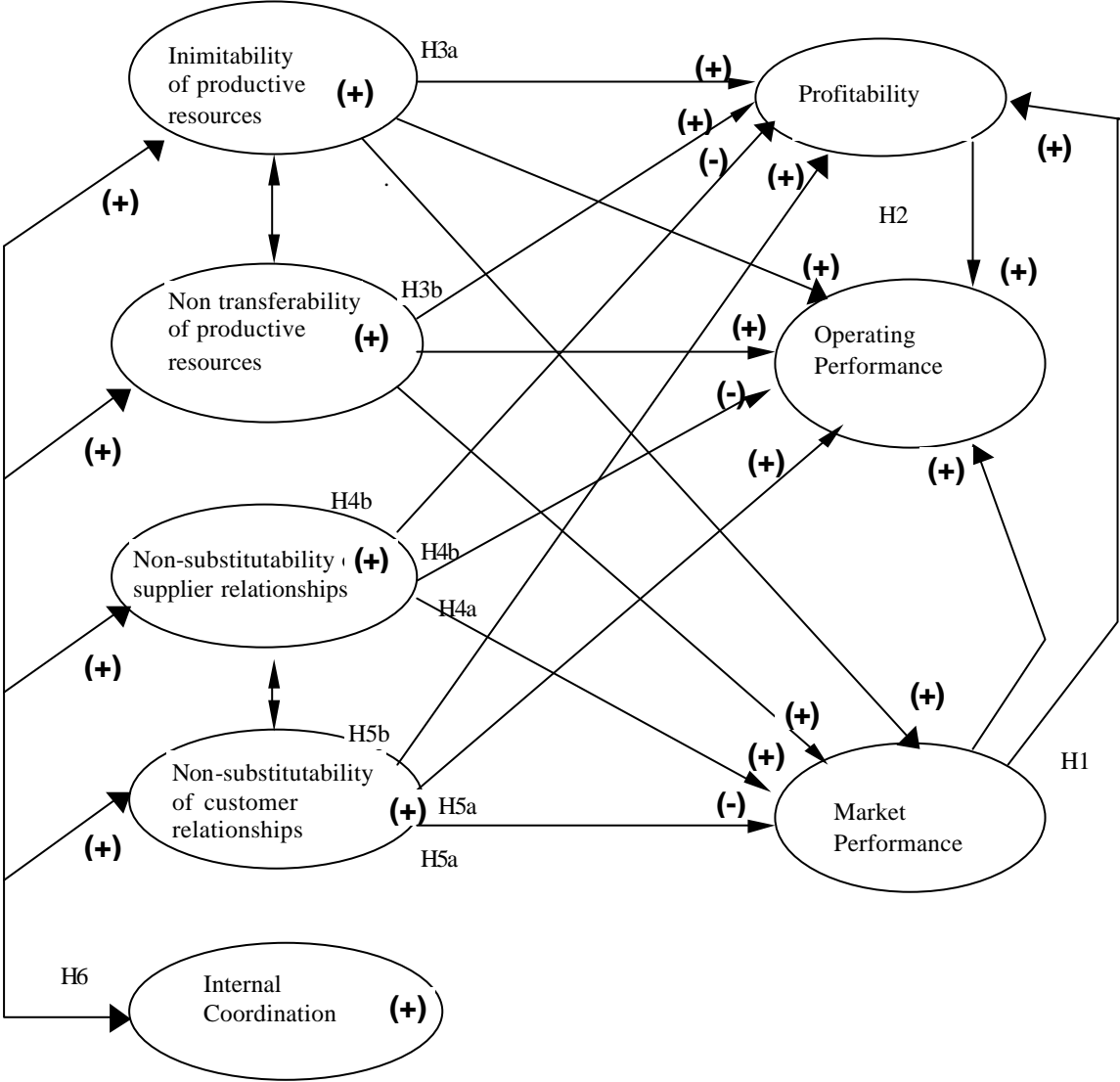
Figure 2. Lisrel Results
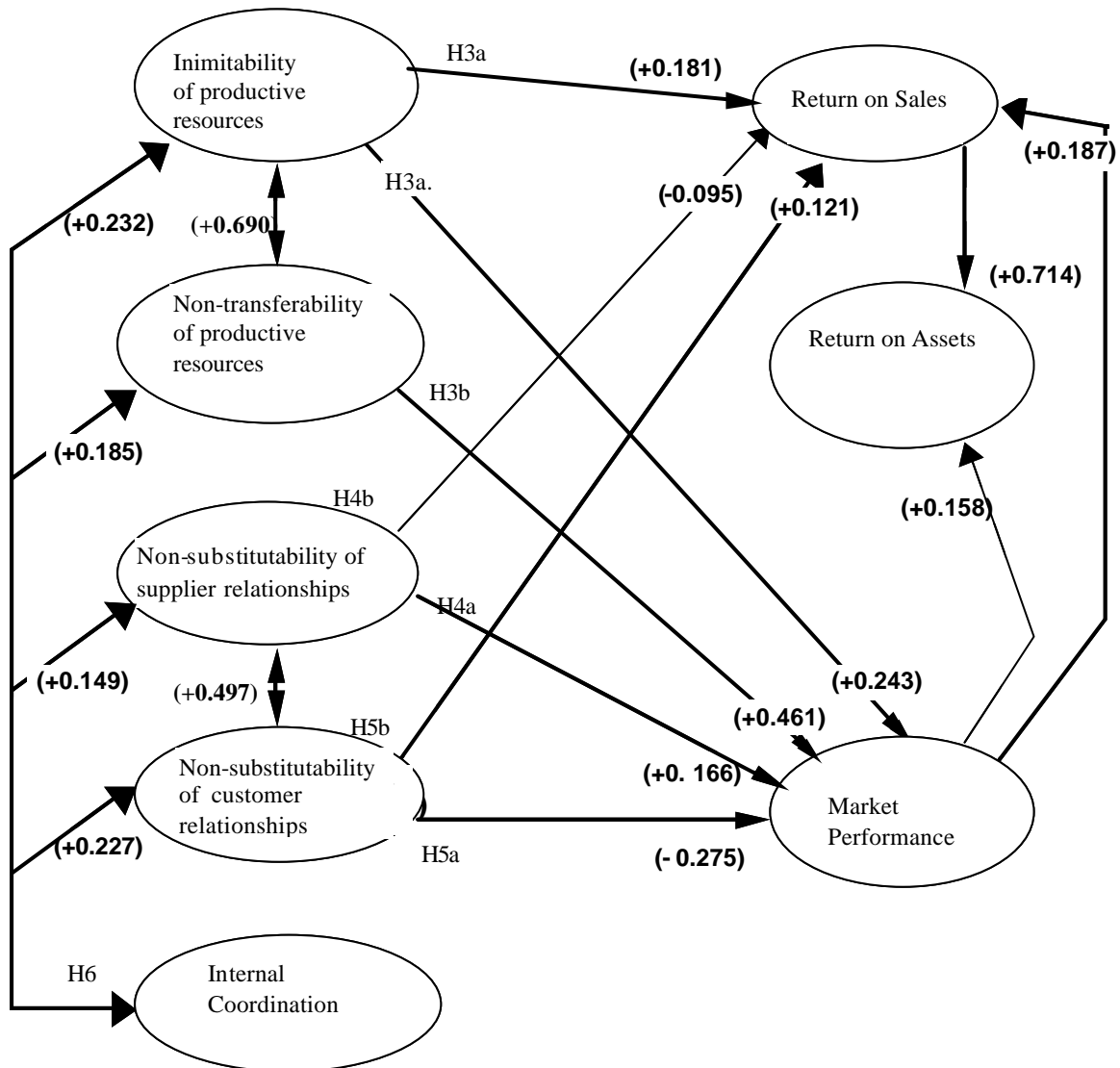
Significant Relationship at 10%

Significant Relationship at 5%

Squared multiple correlations for structural equations

ROS	.064	ROA	.576	Market Performance	.390

Total coefficient of determination **.**423

Global fit

G.F.I.	.990	A.G.F.I	.984	RMR	.030
?2	324	Df	93		

Table 1. Descriptive statistics. Breakdown of the sample by industrial sector

Industrial Sector*	N	%
Food and kindred products	483	16.8
Broadwoven fabrics and textile mill products	342	11.9
Leather goods and footwear	66	2.3
Wood products	37	1.3
Paper and allied products	257	8.9
Chemical and allied products	134	4.7
Rubber and plastic products	170	5.9
Stone, clay, and glass products and nonferrous metals	90	3.1
Fabricated metal products	459	16.0
Industrial machinery and equipment	293	10.2
Electronic and other electric equipment	229	8.0
Transportation equipment	116	4.0
Miscellaneous	199	6.9
Total	2875	100

*European Nomenclature

Table 2. Descriptive statistics. Breakdown of the sample by firm size

Deciles	# of employees	Annual revenue (FF million)
1	42	21.8
2	48	30.3
3	60	40.4
4	46	53.2
median	94	71.6
6	121	94.1
7	165	134.2
8	240	207.7
9	404	430.8

Table 3. Correlation Matrix

	ROS	ROA	KEYPOS	BCG	FUNRD	DEGTRANS	R&DREL	DESTIME	DIFF	COMPSup	SCSupCus	CTFR	ADAPT	SCusSup	Scus	CCORD	DIFINFO
ROA	**0.5978** Sig ,000																
KEYPOS	**0.0651** Sig ,000	**0.0828** Sig ,000															
BCG	**0.0695** Sig ,000	**0.0874** Sig ,000	**0.1435** Sig ,000														
FUNRD	0.0507 Sig ,002	0.0057 Sig ,721	0.0657 Sig ,000	0.0828 Sig ,000													
DEGTRANS	-0.0032 Sig ,832	-0.0279 Sig ,068	-0.1221 Sig ,000	-0.0636 Sig ,000	**-0.1239** Sig ,000												
R&DREL	0.0387 Sig ,014	0.006 Sig ,705	0.0078 Sig ,613	0.0435 Sig ,014	**0.1036** Sig ,000	**-0.0655** Sig ,000											
DESTIME	0.054 Sig ,000	0.0186 Sig ,224	0.0152 Sig ,311	0.0287 Sig ,096	0.0676 Sig ,000	-0.0112 Sig ,463	-0.003 Sig ,849										
DIFF	0.0962 Sig ,000	0.0681 Sig ,000	0.1615 Sig ,000	0.0868 Sig ,000	0.2052 Sig ,000	-0.1276 Sig ,000	0.0652 Sig ,000	**0.1564** Sig ,000									
COMPSup	0.0093 Sig ,544	-0.0165 Sig ,283	-0.0633 Sig ,000	0.0114 Sig ,508	0.0384 Sig ,017	0.0339 Sig ,027	-0.001 Sig ,949	0.0653 Sig ,000	0.0108 Sig ,480								
SCSupCus	0.0199 Sig ,192	0.0598 Sig ,000	0.0646 Sig ,000	0.0844 Sig ,000	0.0382 Sig ,017	-0.0288 Sig ,059	0.0085 Sig ,588	0.0657 Sig ,000	0.0684 Sig ,000	**-0.0682** Sig ,000							
SCSup	0.0117 Sig ,445	-0.0128 Sig ,404	0.0145 Sig ,334	0.0401 Sig ,020	0.0735 Sig ,000	-0.0043 Sig ,781	0.036 Sig ,022	0.03 Sig ,051	0.0846 Sig ,000	**-0.122** Sig ,000	**0.1686** Sig ,000						
ADAPT	0.0579 Sig ,000	0.0275 Sig ,071	-0.0251 Sig ,091	-0.0038 Sig ,822	0.1113 Sig ,000	-0.0069 Sig ,652	0.0499 Sig ,001	0.059 Sig ,000	0.0869 Sig ,000	0.0519 Sig ,001	0.0223 Sig ,142	0.0969 Sig ,000					
SCCusSup	0.0498 Sig ,001	0.0219 Sig ,155	0.0559 Sig ,000	0.031 Sig ,074	0.1068 Sig ,000	-0.0365 Sig ,018	0.0619 Sig ,000	0.0848 Sig ,000	0.1713 Sig ,000	0.0318 Sig ,040	0.0637 Sig ,000	0.1745 Sig ,000	**0.2063** Sig ,000				
SCCus	-0.0117 Sig ,441	-0.0263 Sig ,083	-0.0209 Sig ,159	0.0022 Sig ,900	0.0408 Sig ,011	-0.016 Sig ,291	0.0331 Sig ,034	0.0135 Sig ,375	-0.0043 Sig ,778	-0.0074 Sig ,629	0.04 Sig ,008	0.1113 Sig ,000	**0.2176** Sig ,000	**0.1753** Sig ,000			
COORD	0.0496 Sig ,001	0.0099 Sig ,519	0.0084 Sig ,577	0.0466 Sig ,007	0.0618 Sig ,000	0.0163 Sig ,290	0.0592 Sig ,000	0.0717 Sig ,000	0.0516 Sig ,001	0.051 Sig ,001	0.043 Sig ,005	0.0261 Sig ,091	0.0786 Sig ,000	0.074 Sig ,000	0.0483 Sig ,002		
DIFINFO	0.0031 Sig ,842	-0.0043 Sig ,784	0.0007 Sig ,963	0.0632 Sig ,000	0.0522 Sig ,001	-0.0277 Sig ,076	0.0281 Sig ,079	0.0709 Sig ,000	0.0414 Sig ,008	0.0495 Sig ,002	0.0969 Sig ,000	0.0512 Sig ,001	0.0428 Sig ,006	0.0395 Sig ,012	0.0281 Sig ,069	**0.2149** Sig ,000	
DIFOBJ	-0.0126 Sig ,419	-0.0214 Sig ,168	0.0245 Sig ,106	0.0081 Sig ,642	0.0509 Sig ,002	0.0064 Sig ,678	0.0568 Sig ,000	0.0502 Sig ,001	0.0154 Sig ,321	0.0859 Sig ,000	0.0422 Sig ,006	0.0122 Sig ,435	0.0308 Sig ,046	0.0534 Sig ,001	0.0063 Sig ,681	**0.2384** Sig ,000	**0.2655** Sig ,000

Tableau 4. Principal Component Analysis
Pourcentage of inertia represented by the axes: 50,2%

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
ADAPT	**,72723**	,11642	,05624	-,12668	,08372
SCCusSup	**,70472**	,02288	-,10200	,00582	-,12084
SCCus	**,61175**	,05960	-,16607	-,10755	,33282
DIFOBJ	,01607	**,71904**	,04391	-,02269	,06738
DIFINFO	,01521	**,69830**	-,14023	-,05694	,08001
COORD	,17128	**,69067**	,03820	-,08564	,05987
SCSup	,28320	,04579	**-,67693**	-,05294	,07234
SCSupCus	,00491	,14968	**-,65605**	,04465	,23506
COMPSup	,10959	,17171	**,62266**	,15418	,31387
DEGTRANS	,04687	,05371	,06950	**,66485**	-,02576
R&DREL	,12639	,19544	-,03820	**-,56612**	-,15833
FUNRD	,16936	,09460	,03119	**-,55430**	,29057
DESTIME	,05471	,13375	-,02049	,03291	**,74011**
DIFF	,12909	,01585	-,13128	-,46549	**,60363**

Tableau 5. Parameters from Lisrel: operatio nalization of the latent variables

Latent Variable	X Variables	Loadings ?x
Inimitability of productive resources	DESTIME DIFF	.391*** 1
Non-transferability of productive resources	R&DREL FUNRD DEGTRANS	.451*** 1 -.658***
Non-substitutability of customer relationship	SCSup SCSupCus COMPSup	.593*** 1 -.597***
Non-substitutability of supplier relationship	SCCus SCCusSup ADAPT	1 .424*** .564***
Internal coordination	DIFINFO DIFOBJ COORD	1 1*** .938***
	Y Variables	**Loading ?y**
Margin	ROS	1
Profitability	ROA	1
Market	KEYPOS	.659***
Performance	BCG	1

* significant at 10%   ** significant at 5%   ***significant at 1%

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APPENDIX. OPERATIONALIZATION OF VARIABLES

NON IMITABILITY OF PRODUCTIVE RESOURCES

Variable DIFF

Relative to your main competitors, your technological base enables you to differentiate your production: less   more

                           1   2   3   4   5

Variable DESTIME

$$\text{DESTIME} = \frac{\sum_{i,j} FACT_i \cdot EVAL_j}{\sum_i FACT_i}$$

?? where FACT corresponds to the binary answer (0 or 1) to the following question:

Among these factors, indicate which have the most influence your production costs during the past two years:

1. the size of the production unit
2. the volume of production
3. the use of specific technology
4. a privileged access to a supply source
5. the labor productivity

?? Eval is the answer to additional question evaluating the time deseconomies for new competitors for each of the selected item
1. The difficulties for new competitors to reach a sufficient plant size are:

                     low   high

                     1   2   3   4   5
2. The difficulties for new competitors to reach a sufficient cumulated volume of production are (same scale)
3. The difficulties for new competitors to have access to your production technologies are (same scale)
4. The difficulties for new competitors to find equivalent conditions of raw material or component access are (same scale)
5. The difficulties for new competitors to reach a similar labor productivity level are (same scale)

NON TRANSFERABILITY OF PRODUCTIVE RESOURCES

Variable R&DREL

$$R\&DREL_i = R\&D_i - R\&D_{NAF}$$

where $R\&D_i$ is firm i's R&D expenditure as a percentage of sales, and $R\&D_{NAF}$ is the average of all the firms' R&D expenditure as a percentage of sales in the industry –at the four digit SIC level (French equivalent is NAF)

Variable FUNRD

Please, indicate which functions primarily enabled your firm to sustain a competitive position in your market?

Technological Development   graded from 1 to 3
Marketing
Finance
Procurement

Variable DEGTRANS

DEGTRANS results from the following formula :

$$\text{DEGTRANS} = \frac{?_{d,e,f}\, RjS\, ?\, S_{d,e,f}}{?_{d,e,f}\, RjS} - \frac{?_{a,b,c}\, RjS\, ?\, S_{a,b,c}}{?_{a,b,c}\, RjS}$$

The higher DEGTRANS value, the more a firm focused on developing likely transferable productive resources. Two questions were asked

?? First, in order to determine the Strategic Resources (RjS) :

What are the factors on which you have focused your efforts during the past two years?
Binary answers. Several possible answers among

a) price/cost b) quality c) technical performance, innovation

d) brand image, reputation e) delays f) additional services

Thus, RjS $_{a,b,c}$ are cost, quality and technical performance; and RjS $_{d,e,f}$ are brand image, delays, and additional services.

?? Second, in order to estimate the value of the stocks (S) of strategic assets:

For each of the selected resources, evaluate your position relatively to your main competitors (five-point Likert scale, with 5 a very high competitive advantage).

NON-SUBSTITUABILITY OF SUPPLIER RELATIONSHIP

Variable SCSup
For your firm, changing your main suppliers will entail switching costs that are
            low   high
                 1   2   3   4   5

Variable SCSupCus
For your main suppliers, the loss of you as a customer will have consequences that are
            low   high
                 1   2   3   4   5

Variable COMPSup:
You systematically prefer to put your suppliers in competition rather than giving priority to the continuity of your relationships:
         complete disagreement   complete agreement
                 1   2   3   4   5

Variable SCCus
For your firm, the costs incurred for replacing one of your main customers are :

            low   high
              1   2   3   4   5

Variable SCCusSup
For your main customers, the loss of you as a supplier will entail switching costs that are:

            low   high
              1   2   3   4   5

Variable ADAPT
To satisfy your main customers, you adapted by making specific investments for that are:

            low   high
              1   2   3   4   5

INTERNAL COORDINATION

Variable DIFOBJ
The objectives followed by top management are communicated to all employees

        complete disagreement   complete agreement
                  1   2   3   4   5

Variable DIFINFO
Managerial accounting service develops and diffuses to the middle managers reporting tables, analytical accounting results, and business plans

        complete disagreement   complete agreement
                  1   2   3   4   5

Variable COORD
The firm has implemented specific means of transversal coordination (inter-service coordinator, team workshop, and committee)

           seldom   permanently
              1   2   3   4   5