



The Autonomous Management School
of Ghent University and Katholieke Universiteit Leuven

Vlerick Leuven Gent Working Paper Series 2004/07

**LEARNING ABOUT SMALL BUSINESS PROFITABILITY:
THE INFLUENCE OF MANAGEMENT PRACTICES AND
OWNER-MANAGER HUMAN CAPITAL**

JOHAN MAES

LUC SELS

FILIP ROODHOFT

Filip.Roodhooft@vlerick.be

**LEARNING ABOUT SMALL BUSINESS PROFITABILITY:
THE INFLUENCE OF MANAGEMENT PRACTICES AND
OWNER-MANAGER HUMAN CAPITAL**

JOHAN MAES¹

KU Leuven

LUC SELS

KU Leuven

FILIP ROODHOFT

Vlerick Leuven Gent Management School,

KU Leuven

Contact:

Filip Roodhooft

Vlerick Leuven Gent Management School

Tel: +32 16 32 36 36

Fax: +32 16 32 85 81

Email: Filip.Roodhooft@vlerick.be

¹ Corresponding author

ABSTRACT

In a free market economy the importance of small business as a major job supplier, innovator and source of growth is widely recognized. Given the importance of small business for an economy, the survival, success and performance of these firms is an issue of continuous concern. Research that can lead to the identification of those factors associated with small business performance is of great interest to policy makers, owner-managers and their advisors. This article aims at detecting predictors of small business profitability. Our objective is to distinguish internal factors of small construction companies that enhance firm profitability. Based on the data of an empirical survey in the construction industry to which certified financial data has been added, this paper investigates the influence of owner-manager human capital characteristics and selected management practices on the profitability of small construction companies. For this purpose, we develop and test a structural model. Results indicate that industry experience and level of education of the owner-manager and management practices such as avoidance of cash credit and the use of actual costing systems contribute to higher profitability. Furthermore, owner-manager human capital characteristics influence profitability both directly and indirectly.

Keywords: small business profitability, management practices, owner-manager human capital, structural model

INTRODUCTION

In a free market economy the importance of small business as a major job supplier, innovator and source of growth is widely recognized. But small business failure is frequent and potentially damaging to the efficient operation of a free market economy. Moreover, many survivors achieve only marginal performance. Given the importance of small business for an economy, the survival, success and performance of these firms is an issue of continuous concern. Research that can lead to the identification of those factors associated with small business performance is therefore of great interest to policy makers, owner-managers and their advisors.

In many countries, the failure rate of small construction companies is among the highest¹. As previously suggested by other research on business success, the results of an extensive research project into the failure causes and performance of Belgian small construction businesses indicate that management is at the heart of the matter². Accurate cost accounting, well-developed financial management and management know-how have come forward as very important determinants of success. As one of the interviewed trustees in bankruptcy has put it: “Running a construction company is far away off being easy: each job is unique and poses very specific demands. As an owner-manager, one has to be able to combine excellent technical skills with managerial insights. Most owner-managers of small construction companies have sufficient technical knowledge of the construction area they are active in since they grow into their business from a technical background. However, there is a severe lack of management. One explanation is that they keep on working as craftsmen and accept that many orders that there simply isn’t any time left to spend on actual management. Another explanation is that part of the owner-managers just don’t have the necessary managerial skills to run a business.”

This situation presents a series of challenges for various parties, ranging from responsible industry officials to government agencies and academics. Academics for example should feel challenged to detect good predictors of survival/failure and performance. In identifying these predictors, they should focus on both the endogenous (i.e. within the control of the company, e.g. management practices and owner-manager attributes) and exogenous (environmental) factors affecting small business performance and survival. Consecutively, government agencies could set out a failure preventing and performance enhancing policy focusing on a specific set of predictors. Industry officials’ main responsibility is then to use the predicting models to monitor industry evolutions and trends in a systematic way. Last but

not least, most small businesses would benefit from implementing those management practices that contribute to business survival and success.

In the field of business failure and survival the work of Argenti is seminal. His objective leaves little room for interpretation: “Perhaps above all we need to know what preventive medicines there are and what healthy companies should do and not do to stay healthy” (Argenti³: p. 8). This article aims at detecting predictors of small business profitability. Our objective is to distinguish internal factors of small construction companies that help to avoid failure by enhancing firm profitability. Based on the data of an empirical survey in the construction industry, this paper investigates the influence of owner-manager human capital characteristics (such as business experience and education) and selected management practices on the profitability of small construction companies. We build on established small business theories and on a thorough exploration of existing small business performance models.

PREDICTORS OF SMALL BUSINESS PROFITABILITY

State of the field

A considerable degree of diversity in objectives, unit of analysis, data, methods, findings and so forth characterizes the research on small business performance, success and survival. A thorough exploration of existing business performance models reveals that performance models can be classified according to multiple dimensions⁴. This classification helps to understand what is being studied and how it is done. In what follows, the main idea of this paper is discussed. For the interested reader, a detailed exhibit elucidating the approach we take in this paper is included in Appendix A. For each classifying dimension, the choice we take is highlighted in gray and the advantages and disadvantages of this choice are briefly discussed.

This paper is concerned with enhancing small business performance. Profitability is a very important indicator of overall small business performance. In assessing small business performance, the financial situation of the firm is at the center of attention. Focusing on the financial situation of the small business from the point of view of the owner-manager stresses the importance of firm profitability. After all, the small business is the main source of income for the owner and this income is generated by firm profits. A persistent lack of profits can lead to the voluntary termination of the business, i.e. ceasing the operations because of lacking results. Moreover, especially in the small business context profitability is linked to growth opportunities⁵.

Profitability reflects financial performance in the narrow sense, in particular the ability of the company to yield a return on investment. Moreover, sufficient profitability is needed for retained earnings to be used as a financing source, which is a widely spread practice among small enterprises⁶. In this sense, profitability also affects the survival of the small company in the longer run.

Profitability predictors can be endogenous or exogenous. Endogenous or internal predictors are factors that lay within control of the construction company. For instance, screening clients prior to accepting a job is likely to decrease the number of insolvent clients (i.e. clients that are unable to pay their bills). This client screening is expected to affect profitability in a positive way. Exogenous or environmental factors cannot be controlled by the company. A depreciation of the dollar versus the euro for example will be unfavorable for the profitability of a construction enterprise that has to be paid in dollars for a project abroad. In this paper exogenous predictors of profitability are not considered for a number of reasons. First, in this article small enterprises are studied. For these firms the external environment can be seen as a constraint because small companies have only a minor influence on the environment. However, the owner-manager can actively influence the endogenous or internal factors, which leads to a high degree of relevancy of these factors for the practice of management and management advice. Furthermore, the external environment can be considered as stable in our survey in view of the short time period and the relatively small geographical area in which the data were collected. Moreover, all firms studied face similar market conditions since this study draws its sample from a single sector, i.e. construction.

Current theories and empirical research mainly focus on two classes of endogenous or internal predictors of small business performance: (1) owner-manager characteristics or attributes and (2) internal factors or management practices.

In explaining small business performance or profitability, **owner-manager characteristics or attributes** cannot be ignored. This view originates from “upper echelon” theory⁷. This theory considers an organization and everything that goes on inside as a reflection of its top managers. It links observable characteristics such as owner-manager age, functional track and other career experiences, formal education, socio-economic background, financial position and management team heterogeneity to organizational outcomes and performance. The predictive power of this theory is expected to be substantial in the context of small business, due to the assumption that small businesses are built around the entrepreneur or owner-manager. Empirical research has brought evidence for many of these hypothesized relationships. For example, owner-manager education has proven to be a

significant predictor of business success, growth and profitability⁸. A higher degree of education is expected to go hand in hand with more knowledge, capabilities and skills. Also the age of the owner-manager seems to have a positive effect on profitability⁹, as age serves as a proxy for “life experience”. Of course, there is no end to the list of owner-manager personal characteristics with a potential effect on small business performance and the studies investigating these relationships. The most often recurring directly observable characteristics of the owner-manager in small business performance literature are age and human capital elements such as education, management and technical ability and management experience.

A second series of predictors of small business success refers to **management practices**. Small business failure and marginal performance are very often attributed to the lack of managerial experience or practice¹⁰. An overall conclusion from the vast literature on this topic is that there is no generally accepted list of variables or management practices for use in forecasting business performance or profitability¹¹. Examples of management practices or internal factors cited in literature are planning sophistication, capital structure and intensity, service level or product quality (e.g. certification), use of information systems, record keeping and the use of professional advice.

Research model

As explained earlier, we focus on endogenous factors in explaining small business profitability. The research model is built in two consecutive steps. In a first step we have asked the owner-managers participating in the survey to indicate (on a three point Likert-type scale) the importance of 21 internal factors in avoiding failure. This data is used as input for an exploratory factor analysis, leading to 5 factors. The purpose of this factor analysis is to discern the main management themes that can be operationalized using factual data in the second step of the model development. This selection of themes is necessary because there is no generally accepted list of variables for use in forecasting business performance or profitability. The five factors thus obtained can be labeled as follows: costing and financial system characteristics, use of the costing and financial system, client service, equity and working capital and owner-manager human capital. A confirmatory factor analysis supports the obtained factor structure. Details on the factor analysis and the resulting five factors are included in Appendix B.

Two main categories of performance predictors emerge from these 5 factors: management practices and owner-manager human capital. These two categories correspond with the owner-manager characteristics and the management practices discussed earlier as

classes of small business performance predictors. Both categories of predictors have been studied intensively before. However, part of these studies has only considered either owner-manager human capital characteristics or management practices. Moreover, the vast majority of those studies that considered both categories used ordinary regression techniques. Although these techniques are quite valuable, they do not allow incorporating causal relationships between the categories of predictors considered. For instance, ordinary regression techniques are well suited to find out if the education level of the owner-manager and the planning sophistication have an effect on business profitability. These techniques however fall short in estimating if the education level of the owner-manager and the planning sophistication have an effect on business profitability and - at the same time - in detecting if planning sophistication is affected by the education level of the owner-manager. After all, upper echelon theory states that the organization and everything that goes on inside is a reflection of its top managers. In this sense, we may expect the adoption of management practices to depend on owner-manager characteristics such as education and experience. The fact that predictors (such as planning sophistication and owner-manager education level) are often related to each other strengthens the need for so-called structural models in explaining small business performance.

In contrast with ordinary regression, structural models are well equipped to cope with causal relationships between the categories of predictors considered. Both categories of performance predictors (management practices and owner-manager human capital) will be modeled in a structural way. The structural model incorporating both categories of variables is depicted in Figure 1.

Insert Figure 1 About Here

Company characteristics such as size and age will be used as control variables in the analysis. This is important because a lot of processes within organizations that have a bearing on performance are size or age-variant¹². While company age and size are easily observable characteristics that have proven effects on performance (although results are often ambivalent), it may often not be age or size that matter, but other, underlying processes or practices that depend on age and/or size. When examining the effect of internal predictors on profitability it is therefore imperative to control for age and size to check whether the predictors investigated truly matter, under control of age and size (or processes underlying

both). In the remaining part of this section we will fill in the blocks of the model illustrated in Figure 1 and formulate our research hypotheses.

As far as the *owner-manager human capital* is concerned, we build upon “upper echelon” theory. Our model contains three variables frequently cited in literature as having a positive effect on small business performance: business and work experience¹³ and education¹⁴. Experience is modeled twice: once as the business experience as owner-manager of the company and once as the industry experience the owner-manager had at the time she or he became owner-manager. All three variables refer to the amount of human capital embodied in the “upper echelon” of the small enterprise. And the higher the volume of human capital in an organization, the higher the profitability of that organization is expected to be in the end. Furthermore, the volume of human capital is also hypothesized to stimulate the adoption of management practices.

As we recall, four *internal management factors* emerged from the factor analysis: costing and financial system characteristics, use of the costing and financial system, client service and equity and working capital. In the construction sector each job is unique. Moreover, most jobs are assigned to the contractor whose price for a particular tender is the lowest. A construction company must therefore be able to keep down its prices without going below the actual costs linked to the job concerned. The more sophisticated the costing system used, the better it can rise to this challenge and the higher overall profitability is expected to be. The *costing and financial system factor* is represented in the model by the following variables¹⁵: production and record keeping of costing figures, the number of factors included in the pricing of jobs, the drawing of budgets, standard costing and actual costing. Any costing system offers the company valuable information on its cost structure and so forth. This information (once it has been produced) can be used for various purposes. The more this information is used, the higher the ultimate return (e.g. profitability) is expected to be.

The *use of the costing and financial system factor* is operationalized by means of the following variables: the use of costing information, client screening, payment period management and avoidance of cash credits. *Client service* is measured by quality control of finished jobs and the number of quality defects reported. Good client service is positively associated with a sustainable effect on profitability. The equity level and the working capital level constitute the last factor. The *level of equity and working capital* both can affect profitability in a positive way since the company must not turn to other, more expensive ways of financing if there is enough equity and working capital.

All detailed research hypotheses concerning the three owner-manager human capital characteristics and thirteen internal factors or management practices are summarized in Table 1 (relationships with profitability) and Table 2 (relationships with the adoption of management practices).

Insert Table 1 About Here

Insert Table 2 About Here

Profitability is measured by means of objective data originating from the certified financial statements of the enterprises studied. The measure is based on the financial statements of the year after the survey was administered. This allows testing the one year lagged effects of owner-manager human capital and management practices on profitability. This built-in time lag is important because we depart from annual financial statements, which are a reflection of the accounting situation of the firm. In practice, many activities and practices do not affect in a considerable degree the accounting situation of the year in which the activities took place, but rather the year after. We selected a profitability ratio that is widely accepted as being relevant for small companies: net return on equity. This ratio is obtained by dividing the normal net profits (resulting from normal company activity) by equity. Since the majority of small businesses is managed by the owner (shareholder, providing equity) a ratio referring to the compensation for the equity providers is highly relevant. Moreover, since this ratio is based on normal net profits (excluding exceptional profits) it allows good comparison over different companies and years. Past performance (profitability of the year before the survey was administered) is included as a control variable. After all, strategies and management practices can be self-reinforcing¹⁶. If a particular practice leads to higher profitability, then this profitability might encourage the containment or further development of this practice, or even the introduction of other ones. We refer to Appendix C for a detailed overview of the measures of all variables included in the model.

DATA AND METHODS

Our sample consists of 218 Belgian small construction companies having 6 to 50 employees and that are legally obliged to publish (certified) financial statements. This means that these companies are partnerships (e.g. with limited liability or of incorporated nature). As financial performance will be measured on the basis of data available from financial accounts, this additional restriction is necessary. A survey allowed us to gather data about the actual management practices of various small construction companies and about the managers' perceptions and opinions on several important topics (failure causes, the importance of certain management practices etc.). The survey was preceded by a series of interviews with owner-managers of small construction companies that went bankrupt and with trustees in bankruptcy. These interviews were held in the context of an extensive research project into the failure causes of small construction companies. These interviews also supported the development of the questionnaire used to monitor the management behavior of active small construction businesses. This questionnaire was sent to the owner-managers of 750 small companies that were selected by means of stratified random sampling. The strata concerned were the three main subdivisions of the construction sector (civil construction, building completion and installation). Control variables are included in the model for these three subdivisions of the construction sector. The overall response rate was approximately 30%.

For model estimation purposes we used structural equation modeling with manifest variables (or 'path analysis') by means of the CALIS procedure in the SAS software. Structural equation modeling enables us to study both direct and indirect effects of the various predictor variables simultaneously and thus to test the structural nature of the model. The sample size (218 observations) is excellent for this purpose.

EMPIRICAL FINDINGS

Appendix D contains the fit measures of the analyses. All goodness-of-fit measures indicate that the optimized model is supported by the data. Compared to the theoretical model (which was run first), redundant paths were deleted and extra paths were added in order to avoid significant residuals. The correlation matrix can be found in Appendix E. Tables 3 and 4 contain the results of the estimation. Table 3 contains the path coefficients of the owner-manager human capital characteristics and management practices on small business profitability while the path coefficients of the owner-manager human capital characteristics on the management practices are included in Table 4.

Insert Table 3 about here

Insert Table 4 about here

A first and overall conclusion is that profitability is affected by both internal factors or management practices (for example actual costing) and owner-manager human capital characteristics (for example the level of education). And more importantly, the adoption of management practices really depends on owner-manager characteristics such as education and experience, as expected. So, both classes of predictors (management practices and owner-manager human capital characteristics) are indeed related, as proven by the results of the structural model. We will now discuss both types of predictors and their relatedness in more detail.

The influence of management practices on profitability

Table 1 predicted that all management practices or internal factors (with the exception of the number of quality defects reported) have a positive impact on firm profitability. As we recall, the management practices or internal factors included in the model correspond to four factors: costing and financial system characteristics, use of the costing and financial system, client service and equity and working capital.

Equity and working capital is a factor of which the importance is stressed by official economic policy. Government particularly monitors the level of equity very closely. A minimum level of equity is required to start up a partnership (a company of e.g. incorporated nature or with limited liability). One reason this is done for is to ensure the newly formed company of a minimal provision of capital that can buffer the organization during a certain period of time. In this way “time is bought”. A sufficiently high level of equity also increases the probability of being granted a bank loan when the company has applied for one. If the cash flow resulting from the company’s activities is high enough to ensure additional working capital even more time can be bought. The longer an organization survives, the more it will be able to develop specific capabilities that contribute to its further survival and performance¹⁷. A sufficiently high level of working capital also facilitates the settlement of the company’s short-term debts. A second reason why a minimum level of equity is required is to compel the

founder(s) to think through their business project more seriously. After all, if the founders are obliged to invest more than they would have done if the legal commitment did not exist, they are expected to put more energy into their business project since they now have even more to lose.

The analyses however, show no effect of an equity level higher than the minimum required by law or of the working capital level on profitability (Table 3). This “no effect” is likely to be attributed (at least partially) to the so-called survivor-bias. Research in the past has noted that sampling on survivors (which is been done in this paper) may lead to an underestimation of the effect of variables that normally have a positive effect on performance. This bias is especially strong for variables that are necessary for survival but do not contribute to above-average performance¹⁸. An imposed equity barrier and a sufficiently high level of working capital might very well be two of those variables. After all, all ten interviewed trustees in bankruptcy mentioned both elements as very important causes of small construction company failure. Their findings are not compromised by a survivor-bias since they exclusively focus on enterprises that went bankrupt. An additional explanation of the “no effect” of an equity level higher than the minimum required by law is that not all practitioners are convinced of the “more equity is always better” statement. In this respect, bootstrapping or working with a minimum level of equity is often propagated since bootstrapping compels companies to monitor their financial situation much more rigidly¹⁹.

The *costing and financial system characteristics* factor comprises the record keeping of costing figures, budget drawing, the number of factors included in the pricing of the job, standard costing and actual costing. Each order or job in the construction sector is unique. Moreover, most jobs are assigned to the contractor whose price for a particular tender is the lowest. A construction company must therefore be able to keep down its prices without going below the estimated costs linked to the job concerned. In order to be able to do so in a profitable way, the construction firm must be in a position to fall back on an effective costing system. A prerequisite for any costing and financial system is that costing figures (e.g. quantity and price of materials used) and other information (e.g. client information) are kept in records. Based on the costs data, the company is then able to calculate the estimated cost of a particular order or job by means of standard costing, based on its cost records. The more factors (e.g. personnel costs, material costs, costs of equipment usage etc.) that are included in the standard costing process, the more accurate the estimated cost will be and the less likely it will be below the actual cost. Once the job is finished, the company can assess the quality of its costs estimation by means of actual costing (actual quantity and price of materials used), as

well as polish up its estimation techniques and replenish the costing figure records. For a construction company, most jobs are pre-paid by the company itself: in many cases the main part of the bill is only paid for once the job is finished. A construction enterprise can therefore reap the rewards of drawing budgets. Budgets (simply stated: plans expressed in terms of money) are an expression of the amount of financial means the company will need in carrying out all planned orders and projects. Budgeting also counteracts overexpenditure on behalf of the owner-manager since budgets clearly show the financial consequences of the planned expenditures. Budgeting thus also helps to make sound financial decisions.

The analyses show a positive effect on profitability of actual costing only (Table 3). So, profitability benefits from performing actual costing. The effects of the record keeping of costing figures, the number of factors included in the pricing of jobs and standard costing are not significant. Figures show that 88% of all companies in the sample (survivors) perform standard costing and 96% keep records of costing figures. Thus, standard costing and record keeping of costing figures are widespread among construction companies (survivors). This might explain the fact that standard costing and record keeping of costing figures do not contribute to above-average profitability. On the other hand, however, these practices are considered very important in terms of survival, as stated by the trustees in bankruptcy. Furthermore, one has to take in mind that actual costing is simply impossible without records of costing figures and without standard costing preceding. Thus, while standard costing and record keeping of costing figures might be necessary for survival, actual costing contributes to above-average profitability.

The *use of the costing and financial system* factor is operationalized by means of the following variables: the use of costing information, client screening, payment period management and avoidance of cash credits. Any costing and financial system offers the company valuable information on its cost structure and so forth. Once it has been produced, this information can be applied for various purposes, such as the pricing of jobs or projects, inventory valuation, cost control and decision-making. The higher the number of different applications of the obtained costing information, the higher the ultimate return (e.g. profitability) is expected to be. The same holds for the other types of information kept in records, such as client information, information on payment periods and so on. As mentioned earlier, most jobs are pre-paid by the construction company itself. Enterprises should therefore avoid situations in which payment for finished jobs is uncertain. In this respect, client screening based on earlier experiences with clients is a useful practice if the company is to avoid discussion and possible legal procedures later on. A first reason for this is that some

clients have the reputation of making abuse of (real or imagined) quality defects in order to avoid payment of (part of) the job. Companies that are not credited or that must turn to long and complex legal procedures if they want to have a chance of receiving one day what is owed to them are very vulnerable in terms of survival. However, if the company has a record with information on malicious clients, it can avoid taking on a job from them ever again. A second reason is that there seems to be a societal trend that the number of people who spend more than they can afford is increasing. These clients are not necessarily malicious, but rather they have difficulties in gearing their expenditures to their earnings. Again, if the company has a record with information on clients who had difficulties of paying their bills in the past, it can think twice before considering taking on a job of one of these clients. Information on both types of clients is easy to record. Payment period management is another simple technique that helps companies to maximize their cash flow at a certain point in time. All companies have clients who have to pay bills as well as suppliers who must be paid. Setting the payment period of the clients (so-called client credit) below that of the suppliers (so-called supplier credit) results in speeding up the inflow and slowing down the outflow of cash. Particularly in the construction sector where most jobs are pre-paid by the company and where some orders can take several weeks or even months of work, this technique is very helpful to improve the financial situation of the companies concerned. If the cash flow is high enough and if working capital is sufficiently available, companies will not have to look for other means of financing daily operations. If construction enterprises are in financial difficulties however, additional financial means are necessary. In those cases, cash credits (or bank overdrafts) are very often used. This type of debt financing is meant to cover very short periods of non-structural financial problems. However, since it is rather easy to obtain from the bank (yet also rather expensive) companies could feel tempted to use it more frequently, resulting in a poorer financial situation in the longer run. As suggested by previous research²⁰ and confirmed by our analyses (Table 3), avoiding this widely spread type of debt financing contributes to company profitability. The other three variables referring to the use of the costing or financial system do not prove to be significant in obtaining above-average profitability.

Finally, the *client service* factor is represented by two variables: quality control of finished jobs and the number of quality defects reported. As already mentioned, some clients report quality defects in order to avoid payment of (part of) the job. On the other hand, jobs in the construction sector tend to be rather complex. One small mistake somewhere in the process can have serious consequences later on (even years later), often resulting in legal procedures dragging along. One way of preventing this problem is to strive for very high

quality standards. This should lead to a low number of reported quality defects. Also a quality control system in which the client is involved can avoid problems. Systematically checking the quality of jobs during and after the construction process is helpful in avoiding annoying situations later on. According to the analyses (Table 3), both elements of client service do not contribute to profitability. Again, the absence of an effect can be attributed to the so-called survivor-bias, as discussed earlier. So it is likely that these practices do not contribute to above average performance. On the other hand, however, these practices are considered very important in terms of survival. Companies that cannot rise to this challenge are likely to be pushed out of the market at some point in time. Survey data indicate that 70% of all companies (survivors) always check the quality of the jobs. On average, a small construction company has a complaint rate of 12 out of 100 jobs finished. However, this average is strongly influenced by a minor part of the companies that are responsible for a major part of all quality defects.

The influence of owner-manager human capital on profitability

The concept of human capital pertains to individuals' knowledge and abilities that allow for changes in action and economic growth²¹. The level of human capital is generally considered as having an impact on business success. Human capital theory distinguishes several types of human capital: general and specific a.o.²². Referring to an owner-manager of a construction company, the level of finished education can be considered as *general human capital*, i.e. human capital that is not specifically linked to the state of being owner-manager (or employee) of a construction enterprise. *Specific human capital* is twofold in this particular context: it can be industry-specific or role-specific. In this paper, the first is labeled industry experience when becoming owner-manager, the latter business experience as an owner-manager. Of course, industry experience is also acquired while managing a construction company. But one can also get used to aptitudes typical of the construction sector by working in the industry as an employee or skilled laborer. A majority of the owner-managers has followed this pathway towards becoming self-employed. The analyses indicate that two owner-manager human capital characteristics affect profitability directly, i.e. the level of finished education and the industry experience the owner-manager had at the time of gaining control of the small business. Business experience as an owner-manager seems not to contribute to above-average profitability. As far as the level of education is concerned, the hypothesized positive direct relationship on profitability (Table 1) can be accepted (Table 3). Previous empirical research shows similar results. For instance, both Bates²³ and Lussier and

Pfeifer²⁴ have found education to be a significant predictor of business success. Roper²⁵ found a positive effect of owner-manager education on both growth and profitability. When it comes to industry experience at the time of becoming owner-manager, our hypothesis must be rejected since the expected positive effect seems to be negative. However, Roper also came to the conclusion that owner-manager industry experience has a negative effect on profitability. This might implicate that industry experience can cause rigidity. Additionally, it is worth mentioning that industry experience at the time of becoming a small construction business owner-manager is mainly technical experience instead of management experience²⁶. After all, most construction companies are started up by skilled employees who decide to become self-employed at a certain point in time. As skilled employees, these persons have been trained and have many years of technical experience in the specific branch of construction their former employer was active in. This, however, offers no guarantee for sufficient management capabilities.

Management effects of owner-manager human capital

As explained earlier, upper echelon theory states that the organization and everything that goes on inside is a reflection of its top managers. The predictive power of this theory is expected to be substantial in the context of small business, due to the assumption that small businesses are built around the entrepreneur or owner-manager. In this sense, we may expect the adoption of management practices to depend on owner-manager characteristics. The analytic technique used in this paper allows us to verify this. The results of this part of the analyses are depicted in Table 4, which contains for each of the thirteen management practices the standardized path coefficient of the owner-manager human capital characteristics. As can be learned from Table 4, we observe several significant paths going from owner-manager human capital characteristics to management practices. We notice that some of these paths have a negative sign where a positive sign was expected. In general, however, the findings indicate that the adoption of certain management practices in small construction companies depends on owner-manager characteristics (education, experience, ...), as suggested by the “upper echelon” theory.

The relative importance of owner-manager human capital and management practices

Given the structural nature of the model, it is interesting to investigate the total effects on profitability of all variables included in the model. These total effects are reported in Table 3. We notice that the total effect of all but one owner-manager human capital characteristics is

positive. The total effects of the management practices give rise to mixed results. Nevertheless, the two strongest (positive) total effects on profitability are due to management practices, i.e. actual costing and the avoidance of cash credits. According to Table 4, these particular two management practices do not depend on owner-manager human capital characteristics. As such, a tentative but rather bold conclusion might be that the contribution of management practices to above-average profitability is slightly more substantial than that of owner-manager human capital.

Other effects and findings

Tables 3 and 4 contain some additional findings that are worth mentioning. First, profitability is also affected by past profitability, as could be expected. The other control variables have no significant effect on profitability (Table 3). Particularly in the case of company age and size, the absence of an effect can be attributed to the so-called survivor-bias. After all, past research has found business mortality risk to depend on organization age and size²⁷. Further, all control variables seem to influence the adoption of one or more management practices (Table 4). Company size has a positive effect on client screening and budget drawing. The latter is negatively affected by company age. So, in older companies the drawing of budgets is less likely. Interesting as well is the finding that past profitability has a negative effect on the record keeping of costing figures. This might be explained by a lack of motivation to keep up the discipline when the company is performing well.

An additional interesting conclusion that can be drawn from Table 4 is that certain management practices facilitate the adoption of other management practices. Although these paths were not hypothesized, they had to be added while optimizing the model. For instance, it appears that actual costing stimulates controlling the quality of finished jobs. Furthermore, standard costing and client screening affect the number of factors included in job pricing. Also, applying standard costing has a positive effect on practicing actual costing, as discussed earlier. This preliminary evidence might suggest that there are “bundles” of good management activities, formed by “core management practices” that facilitate the adoption of other management practices and – in combination – further stimulate profitability.

DISCUSSION

Summary

Our empirical results show that both internal factors or management practices, such as actual costing and avoidance of cash credits, and owner-manager human capital characteristics, such as industry experience when becoming owner-manager and level of finished education, contribute to above-average profitability, even when controlled for past profitability. Other variables studied here do not add to profitability, but might still affect the chances of survival. After all, many “no effects” found here can be attributed to the so-called survivor bias. Research in the past has noted that sampling on survivors (which is been done in this paper) may lead to an underestimation of the effect of variables that normally have a positive effect on performance. This bias is especially strong for variables that are necessary for survival but do not contribute to above-average performance, such as profitability. Furthermore, our results indicate that the adoption of management practices often depends on owner-manager human capital characteristics. Our analyses have been able to demonstrate this effect very clearly, due to the more advanced nature of the estimation technique used. Finally, although not theorized beforehand, we have found that certain management practices facilitate the adoption of other management practices. This preliminary evidence might suggest that there are “bundles” of good management activities, formed by “core management practices” that facilitate the adoption of other management practices and that – in combination - further stimulate profitability.

Implications for practice

Owner-managers of small (construction) businesses can increase their companies' profitability by paying close attention to their own human capital. Realizing that the person of the owner-manager puts his marks on everything that goes on inside the enterprise is a necessary insight every owner-manager should have. While policy makers most often stress the importance of financial capital such as equity as critical success factors for survival in the initial resource profile of a company, this research has demonstrated that human capital might be even more important if the company is to surpass marginal performance and achieve above-average profitability. Thus, also nascent entrepreneurs should be aware of the impact of their pre-venture experience on the performance and profitability of the business they are starting up. Prior to the start-up process they should consider investing in their human capital, e.g. experience and education. Training, in particular off-the-job training (i.e. formal

education), could prove to be an interesting way of achieving a solid human capital base. In addition, the practice of management has to be developed if the company is to survive and to prosper. This entails structural aspects (e.g. setting up an effective costing system), as well as optimizing aspects (such as using the costing system as intensively as possible). The specific nature of the management structures and optimizations must depend (at least partially) on the industry the company is active in. For small construction businesses for instance, practicing actual costing and avoiding cash credits both are important managerial aspects. Developing one particular management aspect can demand the preceding development of other managerial aspects or structures. For example, actual costing is not possible without record keeping of costing figures and materials used. Alternatively, once a certain management activity or structure has been developed, others might follow, demanding a much smaller effort.

Implications for future research

Although our study's main objective is to contribute to management practice by means of identifying those factors associated with small construction business profitability, our findings also entail implications for future research. First, the study illustrates the importance of having a considerable degree of diversity in small business research objectives. Research focusing on profitability predictors of survivors is quite different (both in aim as in method) from research aiming at detecting the causes of small business failure. While the first often suffers from a survivor-bias, the latter is limited by the lack of available in-depth data on failed companies. The research objective has to be stated clearly at every point in time so as to avoid giving rise to so-called myths of management, however plentiful available these myths might be. Second, the study shows the merits of using more advanced estimation techniques. The proven fact that predictors are often related to each other strengthens the need for so-called structural models in explaining small business performance, leading to more advanced empirical insights. Still, even more empirical insight into predictors of small business profitability is needed so as to stimulate future theory-building on this topic. Third, the findings of this study also suggest that there are "bundles" of good management practices. However, these bundles of management practices were not intentionally theorized in this study. Consequently, the need for theoretically sound and empirically proven recommendations on core management practices is high. For small and/or newly developed enterprises these recommendations might be a tremendous asset in deciding which management activities merit taking priority in developing the business. More investigations in

this area would inspire SMEs to make the best use of their scarce resources, thereby increasing their chances of survival and of surpassing marginal financial performance.

REFERENCES

1. G. Hall. Factors distinguishing survivors from failures amongst small firms in the UK construction sector, *Journal of Management Studies*, 31, 737-760 (1994); S.M. Karmel and J. Bryon. *A comparison of small and medium sized enterprises in Europe and in the USA*, Routledge, London (2002); J. Maes, L. Sels and F. Roodhooft. *Onderzoek naar oorzaken van faillissementen van kleine en middelgrote bouwondernemingen*, CTEO, Leuven (2000).
2. Maes et al. (2000). See Reference 1; S. Makridakis. What can we learn from corporate failure?, *Long Range Planning*, 24, 115-126 (1991); A.C. Maltz, A.J. Shenhar and R.R. Reilly. Beyond the balanced scorecard: the search for organizational success measures, *Long Range Planning*, 36, 187-204 (2003); M. Scott and R. Bruce. Five stages of growth in small business, *Long Range Planning*, 20, 45-52 (1987).
3. J. Argenti. *Corporate collapse: the causes and symptoms*, McGraw-Hill, London (1976).
4. J. Maes, L. Sels and F. Roodhooft. Modelling the link between management practices and financial performance. Evidence from small construction companies, *Small Business Economics* (forthcoming).
5. M. Cowling. The growth-profit nexus, *Small Business Economics*, 22, 1-9 (2004).
6. T.-W. Fu, M.-C. Ke, and Y.S. Huang. Capital growth, financing source and profitability of small business: evidence from Taiwan small enterprises, *Small Business Economics*, 18, 257-267 (2002).
7. D.C. Hambrick and P.A. Mason. Upper echelons: the organization as a reflection of its top managers, *Academy of Management Review*, 9, 193-206 (1984).
8. T. Bates. Entrepreneur human capital inputs and small business longevity, *The Review of Economics and Statistics*, 72, 551-559 (1990); R.N. Lussier and S. Pfeifer. A crossnational prediction model for business success, *Journal of Small Business Management*, 39(3),

228-239 (2001); S. Roper. Modelling small business growth and profitability, *Small Business Economics*, 13, 235-252 (1999).

9. Roper (1999). See Reference 8.

10. G. d'Amboise and M. Muldowney. Management theory for small business: attempts and requirements, *Academy of Management Review*, 13, 226-240 (1988); S. Thornhill and R. Amit. Learning about failure: bankruptcy, firm age, and the resource-based view, *Organization Science*, 14, 497-509 (2003).

11. R.N. Lussier. A nonfinancial business success versus failure prediction model for young firms, *Journal of Small Business Management*, 33(1), 8-20 (1995).

12. Thornhill and Amit (2003). See Reference 10.

13. and 14. A.C. Cooper, F.J. Gimeno-Gascon and C.Y. Woo. Initial human and financial capital as predictors of new venture performance, *Journal of Business Venturing*, 9, 371-395 (1994); L.R. Gaskill, H.E. Van Auken and R.A. Manning. A factor analytic study of the perceived causes of small business failure, *Journal of Small Business Management*, 31(4), 18-31 (1993); Hall (1994). See Reference 1; D.Y. Lee and E.W.K. Tsang. The effects of entrepreneurial personality, background and network activities on venture growth, *Journal of Management Studies*, 38, 583-602 (2001); Lussier (1995). See Reference 11; Roper (1999). See Reference 8.

14. Argenti (1976). See Reference 3; Hall. (1994). See Reference 1; B. Liefoghe. Causes et mécanismes des faillites d'entreprise: une synthèse bibliographique, *Cahiers de la Faculté des Science Economiques, Sociales et de Gestion – Collection Finance*, 189, 1-43 (1997); L. Vandevort, M. Janssens and L. Lagrou. *Wegens faillissement. Ervaring van zelfstandigen*, Acco, Leuven (1989).

15. R.E. Miles and C.C. Snow. *Organization strategy, structure and process*, McGraw-Hill, New York (1978).

17. Thornhill and Amit (2003). See Reference 10.

18. J. Denrell. Vicarious learning, undersampling of failure, and the myths of management, *Organization Science*, 14, 227-243 (2003); J.J. Heckman. Sample selection bias as a specification error, *Econometrica*, 47, 153-161 (1979); C. Winship and R.D. Mare. Models for sample selection bias, *Annual Review of Sociology*, 18, 327-350 (1992).
19. J. Winborg and H. Landström. Financial bootstrapping in small business. Examining small business managers' resource acquisition behaviors, *Journal of Business Venturing*, 16, 235-254 (2001).
20. Fu et al. (2002). See Reference 6.
21. J.S. Coleman. Social capital in the creation of human capital, *American Journal of Sociology*, 94, S95-S120 (1988).
22. G. Becker. *Human Capital*, National Bureau of Economic Research, New York (1964).
23. Bates (1990). See Reference 8.
24. Lussier and Pfeifer (2001). See Reference 8.
25. Roper (1999). See Reference 8.
26. Maes et al. (2000). See Reference 1.
27. H.E. Aldrich and E.R. Auster. Even dwarfs started small: liabilities of age and size and their strategic implications. In B. Staw and L.L. Cummings (eds.). *Research in organizational behaviour*, JAI Press, Greenwich (1986); Thornhill and Amit (2003). See Reference 10.

SYNOPSIS

To what extent do owner-manager human capital characteristics and management practices influence small business profitability? Are those management practices affected by the human capital of the owner-manager, resulting in an indirect effect of owner-manager human capital on profitability? Using a sample of Belgian construction companies, we combine survey data and certified financial data from the annual accounts to study predictors of small business profitability. Results indicate that industry experience and level of education of the owner-manager and management practices such as avoidance of cash credit and the use of actual costing systems contribute to higher profitability. Our findings not only confirm the direct effects of industry experience, level of education and management practices on profitability found in previous research, but also point to the indirect effect of these human capital characteristics on profitability through their influence on management practices.

BIOGRAPHIES

Johan Maes holds a degree of Commercial Engineer of the Katholieke Universiteit Leuven. Currently he is a Ph.D. scholar and researcher for the Policy Research Center “Entrepreneurship, Enterprises and Innovation”. He is preparing a Ph.D. in Applied Economics on the topic of the antecedents and consequences of corporate entrepreneurship in Flemish enterprises. His research focuses on entrepreneurship, corporate entrepreneurship, strategic management, small business management and human resource management. Telephone: +32 16 32 68 68 Fax: +32 16 32 67 32 E-mail: Johan.Maes@econ.kuleuven.ac.be

Luc Sels is professor in Human Resource Management at the Katholieke Universiteit Leuven. He has published international articles in the areas of psychological contract and employment relationship research, strategic human resource management and small business management. His current research deals with the HRM-performance link, psychological contract typologies and corporate entrepreneurship. His articles have appeared in various journals including *Human Relations*, *Labour*, *Journal of Organizational Behavior*, *Work, Employment and Society*, *New Technology*, *Work & Employment*, *International Journal of Human Resource Management*, *International Journal of Manpower*. Telephone: +32 16 32 68 72 Fax: +32 16 32 67 32 E-mail: Luc.Sels@econ.kuleuven.ac.be

Filip Roodhooft is full professor in Management Accounting at the Katholieke Universiteit Leuven and chairman of the competence centre accountancy and finance at Vlerick Leuven Gent Management School. He has taught in executive development programs

at several business schools, including the London Business School, the Rochester MBA program in Bern, the University of Antwerp Management School, and Leti-Lovanium Sint Petersburg. His research interests include the application of case study research and experimental research in cost and management accounting and the use of financial accounting databases in business economics. His research has been published in *Accounting, Organisations and Society*; *the Journal of Business Finance and Accounting*; *Harvard Business Review*; *Journal of Cost Management*; *the European Journal of Operational Research*; *the Journal of the Operational Research Society*; and *the Journal of Supply Chain Management*, among others. Telephone: +32 16 32 69 22 Fax: +32 16 32 67 32 E-mail: Filip.Roodhooft@econ.kuleuven.ac.be

FIGURE 1

Research model

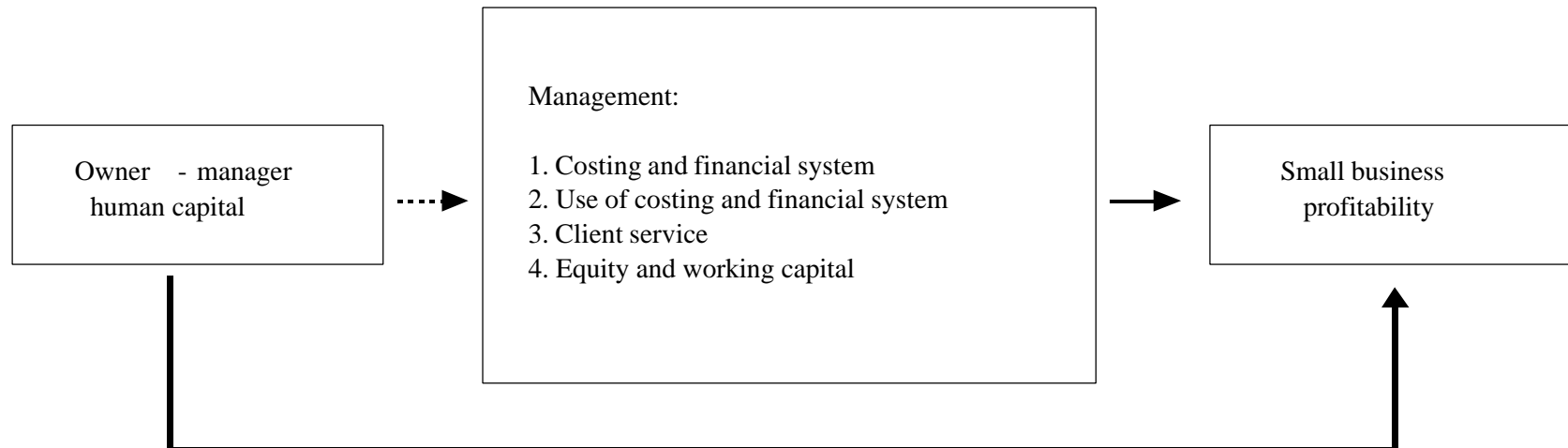


TABLE 1**Overview of the hypothesized relationships on profitability (+ = positive, - = negative).**

<i>Path from/to</i>	Profitability	Explanation
<i>Costing and financial system characteristics (F1)</i>		
Record keeping of costing figures	+	Profitability is expected to benefit from an elaborated costing system. We expect all costing and financial system characteristics to have a positive effect on profitability
Budget drawing	+	
Standard costing	+	
Actual costing	+	
Number of factors included in pricing of jobs	+	
<i>Use of costing and financial system (F2)</i>		
Use of costing information	+	Profitability is expected to benefit from using the costing system in diverse ways. We expect all uses of the costing and financial system to have a positive effect on profitability
Client screening	+	
Payment period management	+	
Avoidance of cash credits	+	
<i>Client service (F3)</i>		
Quality control of finished jobs	+	The more thoroughly the quality is controlled and the lower the number of reported defects, the higher the profitability is expected to be
Number of quality defects reported	-	
<i>Equity and working capital (F4)</i>		
Equity level above the minimum required by law	+	The higher the equity and working capital level, the higher the profitability is expected to be
Working capital level	+	
<i>Owner-manager human capital (F5)</i>		
Level of education	+	Profitability is expected to benefit from a high level of owner-manager human capital. We expect all human capital characteristics to have a positive effect on profitability
Business experience as owner-manager	+	
Industry experience at the time of becoming owner-manager	+	

TABLE 2

Overview of the hypothesized relationships on the adoption of management practices (+ = positive, - = negative).

<i>Path from/to</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Level of education	+	+	+	+	+	+	+	+	+	+	-	+	+
Business experience as owner-manager	+	+	+	+	+	+	+	+	+	+	-	+	+
Industry experience at the time of becoming owner-manager	+	+	+	+	+	+	+	+	+	+	-	+	+

1 = record keeping of costing figures 2 = budget drawing 3= standard costing 4= actual costing 5 = number of factors included in job pricing 6 = use of costing information 7 = client screening 8 = payment period management 9 = avoidance of cash credits 10 = quality control of finished jobs 11 = number of quality defects reported 12 = equity level above the minimum required by law 13 = working capital level

TABLE 3

Standardized path coefficients and total effects of the relationships on profitability.

<i>Path from/to</i>	Path coefficient	Total effects
<i>Internal factors or management practices</i>		
Record keeping of costing figures	-0.03	-0.03
Budget drawing	0.00	0.00
Standard costing	0.00	0.02
Actual costing	0.14*	0.16
Number of factors included in job pricing	-0.05	-0.05
Use of costing information	-0.02	-0.02
Client screening	0.00	-0.02
Payment period management	-0.09	-0.09
Avoidance of cash credits	0.22***	0.20
Quality control of finished jobs	0.08	0.08
Number of quality defects reported	-0.09	-0.09
Equity level above minimum required by law	0.02	0.02
Working capital level	-0.12	-0.12
<i>Owner-manager human capital</i>		
Level of finished education	0.15*	0.13
Business experience as owner-manager	0.00	0.01
Industry experience when becoming owner-manager	- 0.17*	-0.16
<i>Control variables</i>		
Building completion dummy	-0.05	-0.03
Installation dummy	0.09	0.03
Company size	0.01	0.01
Company age	-0.07	-0.08
Past profitability	0.16*	0.14
Chi-square (p-value)	0.54	
Average off-diagonal standardized residual	0.29	
Goodness of Fit Index (GFI)	0.97	
Bentler's Comparative Fit Index	1.00	
Bentler & Bonett's Non-normed Index	1.01	
Number of observations	218	

* p < .05 ** p < .01 *** p < .001

TABLE 4

Standardized path coefficients of the relationships with the management practices.

<i>Path from/to</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<i>Owner-manager human capital characteristics</i>													
Business experience	-0.16	0.20*	-0.05	0.08	-0.06	0.07	0.02	0.19*	0.03	-0.12	-0.13	0.05	-0.02
Industry experience becoming owner-manager	0.11	0.07	0.20**	0.06	0.23***	0.16**	-0.02	-0.13	0.07	-0.01	-0.01	0.16*	0.16*
Level of finished education	-0.17*	-0.01	0.05	0.09	-0.02	-0.04	0.11	-0.02	-0.13	-0.18*	0.11	0.19**	-0.02
<i>Internal factors or management practices</i>													
Record keeping of costing figures (1)		-0.17**											
Budget drawing (2)													
Standard costing (3)		0.13*		0.23***	0.19**	0.64***							
Actual costing (4)										0.21**			
Number of factors included in job pricing (5)													
Use of costing information (6)													
Client screening (7)		0.26***			0.28***								
Payment period management (8)													
Avoidance of cash credits (9)													0.21**
Quality control of finished jobs (10)													
Number of quality defects reported (11)													
Equity level above minimum required by law (12)		0.16*											
Working capital level (13)													
<i>Control variables</i>													
Building completion dummy	-0.09	0.09	0.05	-0.02	-0.14*	0.06	-0.14	-0.05	0.08	0.14	0.06	-0.21**	-0.07
Installation dummy	0.19*	0.08	-0.02	-0.27***	-0.19*	0.08	-0.07	-0.08	-0.08	-0.02	0.03	-0.09	0.04
Company size	0.05	0.19**	0.08	0.06	0.07	-0.03	0.21**	-0.01	-0.07	0.08	0.10	0.09	-0.07
Company age	0.10	-0.18*	0.09	-0.05	0.13	-0.08	0.02	-0.07	0.04	-0.01	-0.12	0.11	0.15
Past profitability	-0.16*	0.02	0.00	0.08	0.07	-0.06	-0.03	0.05	-0.04	0.03	0.05	-0.04	0.11

* p < .05 ** p < .01 *** p < .001

TABLE 4 (CONTINUED)

<i>Variable</i>	mean	SD	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
Equity level above minimum level (12)	.77	.42	1.00											
Working capital level (13)	2.59	.81	-.08	1.00										
Level of finished education (14)	3.02	.88	.21**	-.07	1.00									
Business experience as owner-manager (15)	12.96	8.57	.07	.09	-.22**	1.00								
Experience becoming owner-manager (16)	1.94	.81	.17*	.15*	.06	-.00	1.00							
Net return on equity 1999 (17)	9.07	32.70	-.01	-.15*	.18*	-.17*	-.12	1.00						
Company size (18)	26.91	31.97	.13	-.07	.23*	.04	-.01	.03	1.00					
Company age (19)	17.24	14.93	.17*	.16*	.00	.55**	.03	-.10	.23**	1.00				
Net return on equity 1997 (20)	9.91	53.97	-.00	.09	.03	-.04	-.05	.09	-.02	-.05	1.00			
Civil construction (21)	.37	.48	.16*	-.15*	.15*	-.20**	.04	.08	.13	-.11	.03	1.00		
Building completion dummy (22)	.29	.46	-.16*	.08	-.08	.07	-.03	-.08	-.09	.13	-.04	-.55**	1.00	
Installation dummy (23)	.33	.47	-.00	.08	-.07	.14	-.00	-.01	-.05	-.01	.01	-.50**	-.46**	1.00
<i>Variable</i>	mean	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	
Company age (19)	17.24	14.93	.05	.06	.11	.08	.03	.03	.07	-.01	.05	-.01	-.13	
Net return on equity 1997 (20)	9.91	53.97	-.05	-.02	.05	.07	.02	.05	-.07	.04	.06	-.03	-.02	
Civil construction (21)	.37	.48	-.08	.04	-.02	.12	-.05	.16*	.15*	.04	-.04	.01	-.01	
Building completion dummy (22)	.29	.46	.05	-.05	.04	.12	-.02	-.07	-.10	.00	.08	.12	.01	
Installation dummy (23)	.33	.47	.03	.01	-.02	-.25**	.07	-.10	-.05	-.05	-.04	-.13	-.01	

* p < .05 ** p < .0

APPENDIX A

Classification dimensions for business performance models applied to this paper

Dimension	Description	Choices	Strong points	Weak points
1. Size of firms studied	The size of the firms to which the model applies	1. Large firms	-	-
		2. Small businesses		
		3. Combination of 1 and 2		
2. Industry setting	The industry setting in which the model is tested	1. Single industry setting	Ease of incorporating industry specific determinants	Lower generalizability of findings
		2. Multiple industry setting		
3. Objective of research model	The type of performance modeled	1. Survival	Survival is needed for all companies while growth is an option pursued	-
		2. Growth		
4. Origin of selection force	The content of the predictors considered	1. Endogenous	High degree of relevancy of endogenous factors for the practice of management	No weak points of this choice in view of focus on small businesses (external environment can be seen as a constraint for these firms) and on single industry (similar market conditions for all firms)
		2. Exogenous		
		3. Combination of 1 and 2		
5. Nature of research model	Nature or structure of the model; structural models incorporate causal relationships	1. Non-structural	Ability to handle explanatory variable relatedness	Complexity and computational capacity required
		2. Structural		
6. Nature of dependent variable	Operationalization of the type of performance modeled	1. Non-financial	-	-
		2. Financial		
7. Nature of independent variables (predictors)	Type of data used as predictors to model performance	1. Non-financial	-	-
		2. Financial		
8. Operationalization of independent variables (predictors)	Operationalization of each predictor (measures)	1. Single measure for all predictors	Better response	Lower measurement quality (but this point is weakened by the fact that we focus on actual practices and facts, not on perceptions of facts)
		2. Multiple measures for all predictors		
		3. Multiple measures for part of predictors		

APPENDIX B

Factor structure

item	F1 Costing and financial system characteristics	F2 Use of costing and financial system	F3 Client service	F4 Equity and working capital	F5 Owner- manager human capital
Lack of financial management	0.782				
Lack of commercial management	0.715				
Inaccurate costing procedures	0.452				
Too much investments		0.595			
Overexpenditure by owner-manager		0.549			
Lack of use of accounting information		0.418			
Low quality products or services			0.641		
Cheating of clients by the company			0.609		
Bad market positioning of products/services			0.514		
Bad client service			0.511		
Insufficient equity				0.902	
Insufficient working capital				0.847	
Lack of vocational training of owner-manager					0.966
Lack of management training of owner-manager					0.570
Insufficient technical expertise of owner-manager					0.539
Cronbach's Alpha	0.65	0.67	0.70	0.86	0.80

Exploratory followed by confirmatory factor analysis: goodness of fit (GFI) index = 0.90; Bentler's Comparative Fit index = 0.90

APPENDIX C

Detailed information on the measures

Variable	Indicator(s)
<i>Owner-manager human capital characteristics</i>	
Business experience	the number of years working as owner-manager of the company
Level of finished education	1 = primary school 2 = lower secondary 3 = higher secondary 4 = higher education
Industry experience when becoming owner-manager	1 = no experience 2 = limited experience 3 = ample experience
<i>Management practices</i>	
Record keeping of costing figures	0 = no 1 = yes
Budget drawing	0 = no 1 = yes
Standard costing	0 = no 1 = yes
Actual costing	0 = no 1 = yes
Number of factors included in pricing of jobs	Number of factors included in pricing of jobs (labor costs, raw materials, equipment costs, ...)
Use of costing information	Number of different applications of the obtained costing information (job pricing, inventory valuation, ...)
Client screening	1 = never 2 = sometimes 3 = systematically
Payment period management	1 = negative difference between the supplier credit (number of weeks) and the client credit (number of weeks) 2 = no difference between the supplier credit (number of weeks) and the client credit (number of weeks) 3 = positive difference between the supplier credit (number of weeks) and the client credit (number of weeks)
Avoidance of cash credits	Number of times cash credits have been used in 1998: 1 = 5 times or more 2 = 4 to 2 times 3 = one time only 4 = not at all

(continued)

Variable	Indicator(s)
Quality control of finished jobs	1 = never 2 = sometimes 3 = systematically
Number of quality defects reported	% of jobs where a quality defect was reported by the client
Equity level above the minimum required by law	0 = no 1 = yes
Working capital level	1 = negative 2 = zero 3 = positive
<i>Profitability</i>	
Net return on equity	Normal net profits / equity in 1999
<i>Control variables</i>	
Civil construction	0 = no 1 = yes
Building completion	0 = no 1 = yes
Installation	0 = no 1 = yes
Company size	Number of employees
Company age	Number of years since start-up
Past profitability	Normal net profits / equity in 1997

Note: With the exception of the profitability and the past profitability all measures refer to 1998.

APPENDIX D

Goodness-of-fit measures of the theoretical model and the optimized model

Measure	Theoretical model	Optimized model
Chi-square (p-value)	0.0001	0.54
Average off-diagonal standardized residual	0.47	0.29
Goodness of Fit Index (GFI)	0.89	0.97
Bentler's Comparative Fit Index	0.62	1.00
Bentler & Bonett's Non-normed Index	-0.10	1.01

APPENDIX E

Correlations among the variables

<i>Variable</i>	mean	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Record keeping of costing figures (1)	.96	.20	1.00										
Budget drawing (2)	.40	.49	-.11	1.00									
Standard costing (3)	.88	.32	.07	.24**	1.00								
Actual costing (4)	.88	.33	.06	.19**	.35**	1.00							
Use of costing information (5)	1.06	.58	.10	.18**	.68**	.24**	1.00						
Number of factors included in pricing of jobs (6)	4.00	1.15	.05	.18**	.25**	.20**	.20**	1.00					
Client screening (7)	2.06	.57	.02	.33**	.19**	.09	.09	.38**	1.00				
Payment period management (8)	1.84	.82	-.01	-.06	-.01	-.02	.09	-.02	-.08	1.00			
Avoidance of cash credits (9)	2.50	1.31	.06	.04	-.02	-.01	.00	-.00	.04	-.13	1.00		
Quality control of finished jobs (10)	2.66	.55	-.00	.08	.10	.18*	.00	-.02	.02	.07	.07	1.00	
Number of quality defects reported (11)	12.73	17.06	-.14*	-.03	-.13	-.09	-.07	-.05	-.06	.03	-.17*	0.00	1.00
Equity level above minimum level (12)	.77	.42	-.11	.19*	.02	.05	.05	-.02	-.01	.02	-.13	-.19*	.10
Working capital level (13)	2.59	.81	.06	-.05	.06	.05	.05	.08	.09	-.14*	.22**	-.01	-.11
Level of finished education (14)	3.02	.88	-.05	.14*	.07	.14*	.06	.14*	.12	-.06	-.14*	-.13	.12
Business experience as owner-manager (15)	12.96	8.57	-.02	.14*	.09	.07	.10	-.11	-.03	.06	.04	-.04	-.21**
Experience when becoming owner-manager (16)	1.94	.81	.02	.13	.19**	.11	.19**	.24**	.02	-.08	.01	-.05	0.02
Net return on equity 1999 (17)	9.07	32.70	-.07	.05	-.00	.12	.00	.05	.10	-.06	.12	.06	-.09
Company size (18)	26.91	31.97	.00	.27**	.11	.11	.04	.20**	.27**	-.04	-.07	0.06	.03

* $p < .05$ ** $p < .01$