

**MODELING SMALL BUSINESS PROFITABILITY. AN EMPIRICAL TEST
IN THE CONSTRUCTION INDUSTRY.**

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ABSTRACT

This paper develops a structural model to investigate the direct and indirect effects of owner-manager human capital characteristics (business experience, education and industry experience) and selected management practices on small business profitability. The empirical test of the model is based on survey data, to which certified financial data has been added. The latter consists of the one year lagged profitability and the past profitability. This paper differs in several ways from existing research: (1) it develops and tests a structural model of small firm profitability; (2) it builds upon certified financial data, including past performance and a one year lagged outcome measure; (3) the focus is on internal or endogenous predictors; (4) it is industry specific. Our sample consists of 218 small construction companies. The results show that the owner-manager human capital characteristics affect profitability both directly and indirectly. In addition, several management practices have an impact on profitability. Our findings indicate that a structural model combining owner-manager human capital characteristics and management practices is necessary when exploring their effects on small business profitability.

Key words: owner-manager, small business, construction sector, profitability, management practices, structural model

INTRODUCTION AND LITERATURE REVIEW

INTRODUCTION

In a free market economy the importance of small business as a major job supplier, innovator and source of growth is widely recognized (Lussier & Pfeifer, 2001). But small business failure is frequent (NIS, 2002) and potentially damaging to the efficient operation of a free market economy (Gaskill et al., 1993; Storey et al., 1987; Watson & Everett, 1996). Moreover, many survivors achieve only marginal performance (Cooper et al., 1994).

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. While the research tradition in this area is very rich (Bates, 1990; Cooper et al., 1994; Fu et al., 2002; Lusier, 1995; Lusier & Pfeifer, 2001; Roper, 1999), some conceptual and empirical flaws remain, as we will show. The aim of this paper is twofold. Firstly, this paper aims at furthering research on the determinants of small business financial performance by providing an answer to some of the methodological flaws or gaps. Secondly, we want to identify specific factors associated with small business profitability. In the field of business failure and survival the work of Argenti (1976; 1986) is seminal. His objective leaves no 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" (Argenti, 1976: p. 8). We could not think of a better general wording of the second objective in this paper.

In the subsequent literature review we first discuss the major types of existing business performance models and elucidate the positioning of our own approach. In a second part we

develop a structural research model and formulate our research hypotheses. By using the term ‘model’ we immediately focus on explanatory research (as opposed to purely descriptive research) (Bijmolt & Zwart, 1994).

LITERATURE REVIEW

Business performance models. Several performance, success or survival models appear in the literature. Part of the literature focuses on survival, selection or failure in general, including large companies as well as small and medium sized enterprises (SMEs). This literature covers the evolutionary theories such as population ecology (Aldrich & Pfeffer, 1976; Hannan & Freeman, 1989), evolutionary economics (Dovi & Nelson, 1994; Nelson & Winter, 1982;) and the dynamic resource-based view of the firm (Mahoney & Pandian, 1992; Wernerfelt, 1984). Durand (2001) differentiates these general models by means of three elements: (1) the unit of analysis (population, firm, resources, ...), (2) the origin of the selection force (external or internal) and (3) the role of strategic management in the conduct of organizations. Our model will focus on the firm level. Our position with regard to both other dimensions will be elucidated later on in the paper.

With regard to firm level or business performance models Lussier and Pfeifer (2001) propose a classification based on two dimensions: (1) the size of firms to which the models apply (large businesses, SMEs, ...) and (2) the type of data (financial and/or other) they use as predictors to model performance or success. As far as the latter is concerned we observe models that are purely restricted to financial data, such as the failure prediction model of Eidleman (1995). Other authors indicate that non-financial data (e.g. management practices) can predict small business failure at least as good (Storey et al., 1987) or even better (Lussier & Pfeifer, 2001). This paper applies to small companies and uses non-financial variables as

predictors in view of their more profound relevancy and their higher reliability, as stressed by Lussier and Pfeifer (2001).

Besides the two previous dimensions we suggest – based on literature (Bijmolt & Zwart, 1994; Durand, 2001) - several additional ones in order to classify the various business performance, success or survival models even further: (3) the objective of the model, (4) the nature of the model, (5) the nature of the dependent variable, (6) the nature of the operationalization of the predictor variables, (7) the industry setting and (8) the origin of the selection force. We briefly discuss each of these additional dimensions and translate them to our own approach.

The objective of the model. The first additional dimension (or the third dimension in total) concerns the objective of the model. This dimension refers to the type of performance or success that is being modeled. Some authors aim at predicting growth (Lee & Tsang, 2001; Wijewardena & Tibbits, 1999) while others try to model profitability (Fu et al., 2002), business longevity (Bates, 1990) and still other types of performance like customer satisfaction and employee satisfaction (Robinson, 1983). With the risk of losing some detail in the discussion, one could ultimately distinguish two types of performance: survival and growth. Survival could be seen as the basic performance needed to remain in business, while growth requires ‘something more’. This paper focuses on survival. Survival is seen here as the flip side of failure. Failure refers here to going bankrupt or stop operating because of lacking results. In this respect, research that focuses on either surviving or on failing companies or aims at comparing both types of enterprises is classified into the ‘survival’ category.

We choose to focus on survival instead of growth for three reasons at least. Firstly, most small businesses are built around the owner-manager (Cooper et al., 1994; Roper, 1999), for whom the company very often is the main source of income (d’Amboise & Muldowney,

1988). For an owner-manager of a small business, avoiding failure or striving to survive is essential to ensure himself or herself of an income. Secondly, not every small company has the ambition or the desire to grow. Additional financing (let it be internal or external) and/or other resources are needed for growing, and in finding these additional means small enterprises have to overcome a lot of obstacles, often depending on the maturity of the company (Binks & Ennew, 1996; Donckels, 2000). Problems with or fear for not finding the necessary time, means and/or people are important reasons why a considerable number of small companies choose not to pursue growth (Donckels et al., 1993). Thirdly, if one – as a researcher - would still opt to use growth as a measure for small business performance there is the question of how to measure growth. Choices have to be made regarding the indicator to be used (number of employees, revenue, ...), the relative or the absolute measurement and the time span to be taken into consideration (Delmar, 1997). Thus, for the three reasons mentioned this paper focuses on survival.

The nature of the model. A fourth dimension concerns the nature or the ‘structure’ of the model. Most small business performance or survival models are non-structural. Some models however are structural models (‘path models’), incorporating causal relationships and demanding more advanced estimation techniques (Bijmolt & Zwart, 1994; Lee & Tsang, 2001). A lot of authors capture the importance of or the need for structural models in explaining small business performance, e.g. in order to handle the problem of explanatory variable relatedness (Bijmolt & Zwart, 1994; Lee & Tsang, 2001; Roper, 1999). The model developed and tested in this paper falls into the structural model category.

The nature of the dependent variable. Another dimension concerns the nature of the dependent variable and refers to the operationalization of the type of performance withheld in

the model. Both survival and growth can be operationalized using financial data (turnover, sales, debt, liquidity, profitability, ...) (Davidson & Dutia, 1991; Fu et al., 2002; Roper, 1999) or non-financial data (number of employees, survival probability or rate, ...) (Goos & Konings, 1999). This paper uses certified financial data to model small business survival. Survival or success requires a preoccupation with the financial situation of the firm (d'Amboise & Muldowney, 1988). 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 (d'Amboise & Muldowney, 1988) and this income is generated by firm profits. 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 widely spread among small enterprises (Fu et al., 2002).

The operationalization of the predictor variables. Still another dimension is the nature of the operationalization of the predictor variables. Prior studies fall into two categories. Models rarely use multiple measures for each predictor variable in a consistent way. An exception here is the study of Perry (2001) who used five measures to model the planning sophistication of US small firms. Most models however use single measures for the predictors (Cooper et al., 1994; Lussier, 1995; Lussier and Pfeifer, 2001) or turn to multiple measures for only part of the predictor variables. This finding is equally pertinent to this paper. Since we used a long questionnaire covering very diverse functional domains, a trade-off between measurement quality and non-response was necessary. The predictor variables in this paper focus on actual practices and facts, not on perceptions of facts. The latter would have demanded multiple measures for each predictor. Furthermore, our model is based on a factor analysis (cfr. infra).

And each factor is represented by two or more predictor variables. In view of these reasons single item measures are used for the predictors in this paper.

The industry setting. The last but one dimension refers to the industry setting. A lot of models are tested in a multiple industry setting (Bates, 1990; Bijmolt & Zwart, 1994; Cooper et al., 1994; Lussier, 1995; Lussier & Pfeifer, 2001; Perry, 2001; Roper, 1999), while others are restricted to a single industry (Fu et al., 2002; Hall, 1994). Both options have advantages and disadvantages. A multiple industry setting has the advantage of a greater generalizability of the findings (if controlled for industry) but is faced with the difficulty of incorporating industry specific performance determinants in the model. For a single industry model the reverse holds. After all, the value of management know-how can depend on the suitability of this generic management know-how to a specific industry (Cooper et al., 1994). Moreover, in investigating critical (survival-related) success factors of small business performance it may very well be important to limit oneself to one branch of industry (Keasey & Watson, 1991; Wijewardena & Tibbits, 1999). This paper focuses on a single industry (construction sector), taking into account specific construction industry management know-how. Owner-managers of small construction companies can be described according to Boswell's (1971) typology as 'entrepreneurs-techniciens' and 'entrepreneurs-artisans', in view of the combination of technical expertise with goals of personal independence, survival and profitability.

We will focus on the construction sector for various reasons. Firstly, in most other free market economies the construction sector is very important. Not only for its share in the gross national product, but also in terms of employment and labor flows. As far as the latter is concerned, analyses of the job creation and job destruction rates of the construction sector compared to the economy as a whole show us that the construction sector is very turbulent. Additional research has been able to point out that in the construction sector job creation

depends more on business start-ups and job destruction more on company failure compared to the economy as a whole (Maes et al., 2000). Thus, even merely from the point of view of minimizing job destruction in the construction sector, safeguarding firm profitability to prevent business failure and enhance survival is important. Secondly, approximately 15% of all Belgian companies that went bankrupt in the last year are construction companies, and most of them are small enterprises (National Institute of Statistics, 2002). So avoiding failure is a true challenge for small construction companies.

The origin of the selection force. A final distinctive dimension classifying performance models is the content of the predictors considered (Bijmolt & Zwart, 1994) or, what Durand (2001) in his general classification of performance and survival models would call, “the origin of the selection force”. Most performance or survival models incorporate either predictors referring to endogenous factors (Bijmolt & Zwart, 1994; Bosma et al., 2000; Lussier, 1995; Lussier & Pfeifer, 2001; Perry, 2001) or external environmental predictors (Aldrich & Pfeffer, 1976; Dovi & Nelson, 1994; Rao et al., 1990). A minor part of this type of research has investigated both types of predictors in one comprehensive model (Fu et al., 2002; Zahra & Covin, 1995). In this paper the force affecting performance originates from within the firm itself or, put differently, the model developed in this paper is restricted to endogenous factors. This is done for a number of reasons. Firstly, in this study we focus on small enterprises. For these firms the external environment can be seen as a constraint because small companies have only a minor influence on the environment. 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 (Bijmolt & Zwart, 1994). 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.

To summarize, this paper builds upon a sample of small construction enterprises. The main concern is firm profitability. We use mostly single-item non-financial predictors referring to endogenous factors and a financial dependent variable to develop a structural model. In the subsequent section we will further develop our model.

Model Development

In this paragraph we will focus on the specific endogenous factors to be included in the model. The Argenti (1986) model is our starting point. Our objective is to distinguish internal factors of small construction companies that avoid failure by enhancing firm profitability. With the third differentiating element of Durand (2001) in mind, we put a strong emphasis on the proactive role of management in trying to safeguard firm profitability.

Within the literature that focuses on the endogenous or internal conditions of small business performance we observe authors who look for (1) explanatory factors at the owner-manager level, (2) internal factors or management practices, (3) company characteristics. We will give a brief overview of these three strands in small business performance literature and clarify the development of our model.

A lot of research has focused on the *owner-manager level* looking at personal characteristics of owner-managers and would-be entrepreneurs to explain small business performance. The importance of the owner-manager in understanding the small business itself can hardly be overemphasized (d'Amboise & Muldowney, 1988). Within this research domain part of the literature focuses on personal traits, attitudes and values (e.g. Becherer & Maurer, 1999)

while another part of the literature stresses more observable, factual characteristics. As mentioned earlier, we prefer the latter type of characteristics. This particular strand of literature originates from “upper echelon” theory (d’Amboise & Muldowney, 1988; Hambrick & Mason, 1984). In the context of small business the predictive power of this theory is expected to be substantial, due to the assumption that small businesses are built around the entrepreneur or owner-manager (Cooper et al., 1994). The Hambrick and Mason (1984) upper echelon model links observable characteristics such as owner-manager age, functional track and other career experiences, formal education, socio-economic background, financial position and managerial group heterogeneity to organizational outcomes and performance. Empirical research has brought evidence for many of these hypothesized relationships. Both Bates (1990) and Lussier and Pfeifer (2001) have found education to be a significant predictor of business success. Roper (1999) found a positive effect of owner-manager education on both growth and profitability, while the age of the owner-manager had a positive effect on profitability but no effect on growth. It should not be surprising that the list of personal characteristics with a potential effect on small business performance and the studies investigating these relationships is very long. The most recurring directly observable characteristics of the owner-manager in small business performance literature are age, education, management and technical ability and management experience (Hankinson et al., 1997; Havaleschka, 1999; Lussier, 1995).

A second series of research has focused on the impact of *internal factors or management practices* on small business success. After all, many authors attribute small business failure to the lack of managerial experience or practice (d’Amboise & Muldowney, 1988). An overall conclusion from the vast literature on this topic is that there is no generally accepted list of variables for use in forecasting business success or failure (Lussier, 1995). Examples of

management practices or internal factors cited in literature are planning sophistication (Ackelsberg & Arlow, 1985; Lussier, 1995; Matthews and Scott, 1995; Perry, 2001; Rue & Ibrahim, 1998), capital structure and intensity (Cooper et al., 1994; Fu et al., 2002; Lussier, 1995;), service level or product quality (e.g. certification) (Roper, 1999), use of information systems, record keeping (Lussier, 1995) and the use of professional advice (Lussier, 1995).

A final series of research on small business performance stresses the importance of *company characteristics*, such as the size of the company and its maturity (often measured by the age of the firm) (Bijmolt & Zwart, 1994; Fu et al., 2002; Lee & Tsang, 2001; Martin & Staines, 1994; Roper, 1999; Wijewardena & Tibbits, 1999). Empirical research shows ambivalent results as far as the effects of company size and age on performance is concerned (Bijmolt and Zwart, 1994; Martin and Staines, 1994; Roper, 1999; Wijewardena and Tibbits, 1999; Lee and Tsang, 2001; Fu et al., 2002).

RESEARCH MODEL AND HYPOTHESES

As explained in the previous section we focus on endogenous factors in explaining small business profitability. The structural 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 to 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 success or failure (Lussier, 1995).

The Kaiser-Meyer-Olkin measure of overall sampling adequacy is 0.72, which indicates that the correlation matrix is appropriate for factoring (Sharma, 1996). Items with double loadings are deleted. The 5 factors can be labelled as follows: costing system characteristics (F1), use of costing system (F2), client service (F3), equity and working capital (F4) and owner-manager human capital (F5). A confirmatory factor analysis supports the obtained factor structure. Both the goodness of fit (GFI) index and the Bentler's Comparative Fit index of this confirmatory factor analysis are 0.90. Both indexes indicate that the factor structure is supported by the data (Hatcher, 1994). Table 1 contains the 5 factors, the items, their loadings and the Cronbach's Alpha for each factor.

Insert Table 1 about here

Two main categories emerge from these 5 factors: management practices and owner-manager human capital. These two categories correspond with the owner-manager level and the internal factors or management practices discussed earlier as strands in small business performance literature. The structural model incorporating both categories of variables is depicted in Figure 1. Company characteristics (a third strand in SME performance literature) such as size and age will be used as control variables.

Insert Figure 1 about here

The purpose of the model is to detect those owner-manager human capital characteristics and internal factors or management practices that enhance the profitability of small construction companies. The model is structural in the sense that not only direct effects (indicated with a full arrow) of the two categories of variables on performance are taken into account, but also indirect (through the adoption of management practices) effects of owner-manager human

capital (blocked arrow). Indeed, based on upper echelon theory (Hambrick & Mason, 1984) we expect that the adoption of management practices can depend on owner-manager characteristics (education, experience, ...). So the effect of each owner-manager human capital element on profitability is modelled twice: once directly and once indirectly using the management practices as ‘mediators’. 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* (F5) is concerned, we build upon “upper echelon” theory (Hambrick & Mason, 1984). Our model contains three variables frequently cited in literature as having a positive effect on small business performance: business and/or work experience (Cooper et al., 1994; Gaskill et al., 1996; Hall, 1994; Jacques et al., 1994; Lee & Tsang, 2001; Lussier, 1995; Reuber & Fisher, 1999; Roper, 1999;) and education or training (Cooper et al., 1994; Hall, 1994; Lee & Tsang, 2001; Littunen, 1997; Lussier, 1995; Roper, 1999). Experience is modelled 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.

The four *internal management factors* emerging from the factor analysis are represented in the model by the following variables: production and record keeping of costing figures (Argenti, 1976; Liefoghe, 1997) (F1), budget drawing (Argenti, 1976) (F1), standard costing (F1), actual costing (F1), the use of costing information (F2), the number of factors included in the pricing of jobs (Hall, 1994) (F2), client screening (Vandevoort et al., 1989) (F2), payment period management (Hall, 1994) (F2), avoidance of cash credits (Vandevoort et al., 1989; Liefoghe, 1997) (F2), quality control of finished jobs (Vandevoort et al., 1989; Liefoghe, 1997) (F3), the number of quality defects (Vandevoort et al., 1989; Liefoghe, 1997) (F3), equity level (Vandevoort et al., 1989; Liefoghe, 1997) (F4) and working capital

level (Vandevoort et al., 1989; Liefoghe, 1997) (F4). The factor to which the variable belongs is mentioned between brackets.

All our research hypotheses concerning the three owner-manager human capital characteristics and twelve internal factors or management practices are summarized in Table 2 (relationships with profitability) and Table 3 (relationships with the adoption of management practices).

Insert Table 2 about here

Insert Table 3 about here

METHODS

Sample and Procedure

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 of limited liability or 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.). A 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). The overall response rate was approximately 30%.

Measures

In this section we will briefly discuss the measures of the variables to be used in our model. We refer to appendix A for a more detailed overview.

Internal factors or management practices. One measure is a percentage: the *number of quality defects*. All other internal management factors or practices are measured by means of a score (the score range is mentioned between brackets): *record keeping of costing figures* (0 to 1), *budget drawing* (0 to 1), *standard costing* (0 to 1), *actual costing* (0 to 1), *use of costing information* (1 to 6), *number of factors included in the pricing of jobs* (1 to 7), *client screening* (1 to 3), *payment period management* (1 to 3), *avoidance of cash credits* (1 to 4), *quality control of finished jobs* (1 to 3), *equity level above the legally required minimum* (0 to 1) and *working capital level* (1 to 3).

Owner-manager human capital characteristics. As far as the human capital characteristics are concerned, the measures are as follows (the score range is mentioned between brackets): *industry experience when becoming owner-manager* (1 to 3), *business experience as owner-manager* (number of years) and *level of (finished) education* (1 to 4).

Financial performance. When it comes to the profitability of the small enterprise our measure is based on the financial statements of 1999. This allows testing the one year lagged effects of

owner-manager human capital and management practices on profitability. 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.

Control variables. Control variables are included for company size and age, past financial performance and for the three subdivisions of the construction sector: civil construction, building completion and installation (sector dummies). Civil construction is the point of reference in the analysis. Company size and age are measured by the number of employees and the number of years the company is active. As a measure for past profitability we use the net return on equity for 1997, i.e. the 1997 counterpart of the profitability outcome measure. Past performance is included as a control variable since strategies and management practices can be self-reinforcing, as suggested by Miles and Snow (1978). 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.

Model Estimation

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 (which is equivalent to the well known LISREL software). Structural equation modeling enables us to study both direct and indirect effects of the various variables simultaneously and thus to test

the structural nature of the model. The sample size (218 observations) is excellent for this purpose.

RESULTS

The path analysis enables us to test the theoretical research model of Figure 1 to the full extent, including both direct and indirect effects as worked out in our research hypotheses. Table 4 contains the bivariate correlation coefficients of all variables. Table 5 shows the goodness-of-fit indices of the theoretical model and the optimized model. The theoretical model contains all relationships hypothesized in Table 2 and 3, plus the paths from the control variables to all other variables. Four goodness-of-fit measures (chi-square, the goodness of fit index (GFI), Bentler's Comparative Fit Index and Bentler & Bonett's Non-normed Index) indicate that the theoretical model is not supported by the data. Therefore, the theoretical model had to be optimized using the CALIS modification indices. This modification procedure entails deleting redundant paths and adding new ones to avoid significant residuals. All five goodness-of-fit measures indicate that the optimized model is supported by the data (Hatcher, 1994): the average off-diagonal standardized residual (0.29), the chi-square test (p-value 0.54), Bentler's Comparative Fit Index (1.00), the goodness of fit index (GFI) (0.97) and Bentler and Bonett's Non-normed Index (1.01).

Insert Table 4 about here

Insert Table 5 about here

Table 6 contains the standardized path coefficients of the owner-manager human capital characteristics and management practices on small business profitability while the

standardized path coefficients of the owner-manager human capital characteristics on the management practices are included in Table 7. Note that paths indicated with “0.00” in either Table 6 or 7 are paths that were hypothesized and tested, but have proven to be redundant and had to be deleted in order to optimize the model.

Insert Table 6 about here

Table 6 indicates 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. As far as the level of education is concerned the hypothesized positive direct relationship on profitability (Table 2) can be accepted. Previous empirical research shows similar results. For instance, both Bates (1990) and Lussier and Pfeifer (2001) have found education to be a significant predictor of business success. Roper (1999) 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 (1999) also came to the conclusion that owner-manager industry experience has a negative effect on profitability. 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 experience (Maes et al., 2000).

As far as the link of management practices with profitability is concerned, we observe two significant paths. First of all, there is the strongly positive effect on profitability of avoiding cash credits (or bank overdrafts). 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.

As suggested by previous research (Fu et al., 2002) and confirmed by Table 6, avoiding this widely spread type of debt financing results in better financial performance. Secondly, we also notice the positive effect of actual costing. This costing is considered to be very important for the construction sector since no construction job is perfectly alike previous ones. Actual costing is the only procedure to learn about the costs structure of jobs in order to improve pricing and standard costing for future jobs. Finally, profitability is also affected by past profitability, as could be expected.

Insert Table 7 about here

So, we have found evidence for direct effects of owner-manager human capital characteristics on financial performance. It is however equally interesting to find out if these characteristics affect the adoption of management practices. This is reported in Table 7, 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 7, 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, 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 (Hambrick & Mason, 1984).

An additional interesting conclusion that can be drawn from Table 7 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. This

preliminary evidence might suggest that there are “bundles” of good management or “core management practices” that facilitate the adoption of other management practices.

Finally, all control variables seem to influence the adoption of one or more management practices. 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.

Given the structural nature of the model with direct effects of management practices and direct and indirect effects of owner-manager human capital characteristics on profitability, it is interesting to investigate the total effects on profitability of all variables included in the model. These total effects are reported in Table 6. 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, as some of the practices appear to affect profitability in a negative sense. Nevertheless, the two strongest (positive) effects on profitability are due to actual costing and the avoidance of cash credits.

CONCLUSION AND DIRECTIONS FOR FUTURE RESEARCH

This paper developed a structural model to investigate the direct and indirect effects of owner-manager human capital characteristics and selected management practices on the profitability of a sample of 218 small construction companies. We used a wide range of non-financial predictors referring to endogenous factors. Together with a financial dependent variable these predictors were used to develop a structural model focusing on profitability.

We have shown that the suggested structural approach including both direct and indirect effects is useful to model the impact of endogenous factors on small business performance. For instance, we have been able to demonstrate that in the presence of a direct link between owner-manager human capital characteristics and profitability, these characteristics also play an important role in influencing the adoption of management practices. Compared to previous research our approach has the advantage of showing how owner-manager human capital characteristics can affect performance. While other empirical research has directly linked owner-manager human capital characteristics to performance, our approach has provided evidence that this link is both direct and indirect, i.e. mediated by certain management practices that affect profitability.

The advanced estimation technique has also allowed us to investigate the total effect of all variables included. This has led us to the conclusion that in general management practices show total effects on profitability comparable to those of owner-manager human capital characteristics.

We have used financial data to form an indicator of profitability pertinent to the small business owner-manager, not limiting ourselves to more common measures of performance such as sales growth or increase in staff. Doing so, we have introduced a time lag for the effects on profitability and we have controlled for a series of variables, including past profitability. Time lags are important to counter the fact that some management practices may be cost increasing in the short run but prove to be “cost killers” in the longer run. And after all, for the owner-manager who depends heavily upon the small business for his income, it is the long-term return on investment that counts. Past financial performance might help to explain why companies adopt management practices leading to superior profitability. So we have used financial performance not only as a dependent variable, but also as an explanatory variable. Last but not least, we have shown that certain management practices such as

avoiding cash credits and a priori screening of clients do make a difference to the profitability and survival struggle of small construction enterprises. With Argenti's (1976; 1986) appeal for "preventive medicines for healthy companies" in mind this is after all an excellent way to convince owner-managers and their advisors of incorporating these practices into management.

The paper also faces a number of limitations. First of all, it is important to bear in mind that the findings are not entirely transferable to other industries since a minor number of management practices are construction-specific. The structural approach is useful and necessary but needs to be applied to different single industry settings or even a multiple industry environment. Moreover, the list of variables included in the model is not at all exhaustive. After all, there is no generally accepted list of such variables (Lussier, 1995). For instance, other interesting variables (both in general as specifically for the construction sector) such as cooperation, networking and alliance formation have not been investigated here. So, future research should keep an open view as to the composition of the model.

Some unanswered questions require further research. For instance, some of the management practices coefficients showed contra-intuitive signs. A possible explanation of the contra-intuitive signs of several path coefficients could be related to the fact that the relationship between these practices (particularly the cost-focusing ones) and performance is curvilinear (inverted-U shaped) instead of linear (Dess et al., 1999). Thus, beyond a certain level or intensity the management practices can have a negative impact on performance.

Secondly, this paper has provided evidence that the link between owner-manager human capital characteristics and profitability is both direct and indirect. However, owner-manager human capital characteristics may yield rich but very complex information (Hambrick & Mason, 1984). For instance, the direct effects of owner-manager human capital characteristics

on profitability we have found in this paper may be due to indirect effects through other management practices not modeled in this paper. Further research into the link between these characteristics and profitability or performance in general is therefore necessary. However, this might be more easily said than done since structural models require a lot of computational capacity. Perhaps too much computational capacity to be able to test a more elaborated small business profitability model at this point in time.

Additionally, for quite a few management practices no effect on profitability has been found. This might be explained by the fact that these practices have a ‘neutral’ effect, while not performing them might harm profitability (Van Gelderen, 2002). A research design that actually compares the impact of these practices on the extreme ends of the profitability dimension would be very appropriate in this respect. A further issue concerns the possible existence of “core management practices” that facilitate the adoption of other management practices, leading to “bundles” of management practices. The evidence for these practices in this paper was unintended and very preliminary. After all, such linkages were not included in our theoretical model but were added during the optimization procedure. Future research should investigate the links between management practices in more detail and with a design adapted for that particular purpose. The structural approach developed in this paper could be a good starting point.

This paper focused on internal factors that can support small companies to safeguard profitability. Future research should also focus in more detail on *how* management practices can improve firm profitability or other performance measures. In this respect, additional research incorporating non-financial performance criteria is needed. Non-financial outcome measures such as quality, customer satisfaction, employee turnover and productivity may explain near-term outcomes, while financial measures might be better suited to capture longer term effects (Dess et al., 1999).

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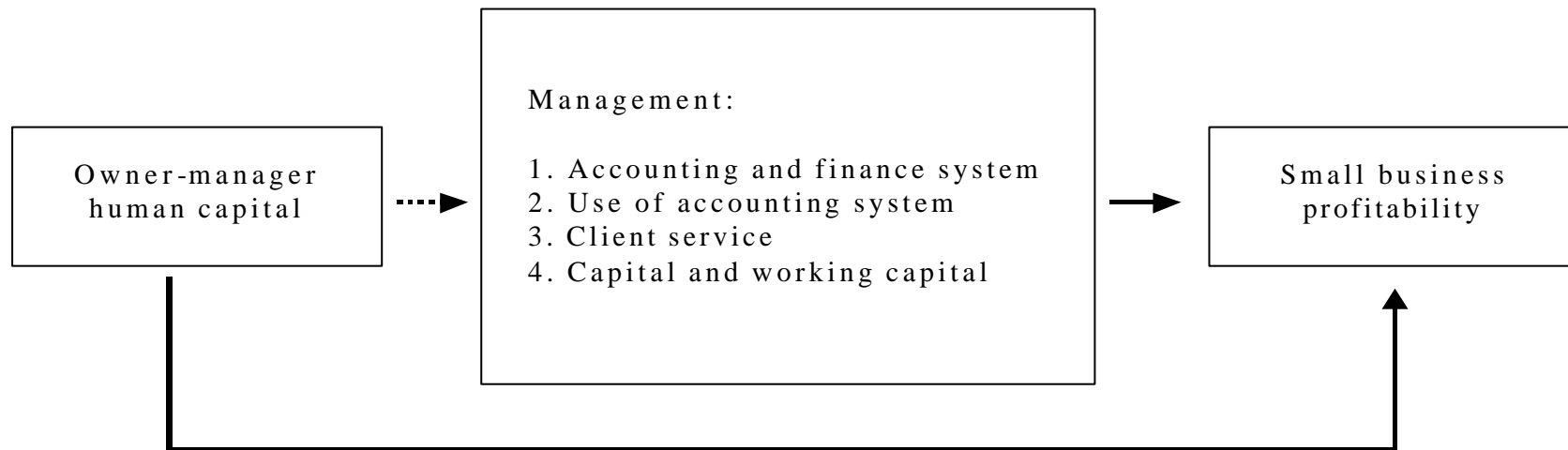


Figure. 1. Research model.

Table 1. Factor structure

item	F1 Costing system characteristics	F2 Use of costing 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

Table 2. Overview of the hypothesized relationships on profitability (+ = positive, - = negative).

Path from/to	Profitability	Explanation
<i>Costing system characteristics (F1)</i>		
Record keeping of costing figures	+	Profitability is expected to benefit from an elaborated costing system. We expect all costing system characteristics to have a positive effect on profitability (Argenti, 1976; Liefvooghe, 1997)
Budget drawing	+	
Standard costing	+	
Actual costing	+	
<i>Use of costing system (F2)</i>		
Use of costing information	+	Profitability is expected to benefit from using the costing system in diverse ways. We expect all costing system uses to have a positive effect on profitability (Vandevoort et al., 1989; Hall, 1994; Liefvooghe, 1997)
Number of factors included in pricing of jobs	+	
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 (Vandevoort et al., 1989; Liefvooghe, 1997)
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 (Vandevoort et al., 1989; Liefvooghe, 1997)
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 (e.g. Cooper, 1994; Lussier, 1995; Roper, 1999)
Business experience as owner-manager	+	
Industry experience at the time of becoming owner-manager	+	

Table 3. Overview of the hypothesized relationships on the adoption of management practices (+ = positive, - = negative).

Path from/to	(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 = use of costing information 6 = number of factors included in job pricing 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 4. Correlations among the variables.

Variable	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

Table 4 (continued).

Variable	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

Variable	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 < .01

Table 5. Comparison of the 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

Table 6. Standardized path coefficients and total effects of the relationships on profitability.

Path from/to	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
Use of costing information	-0.02	-0.02
Number of factors included in job pricing	-0.05	-0.05
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 characteristics</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 7. Standardized path coefficients of the relationships with the management practices.

Path from/to	(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	0.07	-0.06	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	0.16 ^{**}	0.23 ^{***}	-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	-0.04	-0.02	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 ^{***}	0.64 ^{***}	0.19 ^{**}							
Actual costing (4)										0.21 ^{**}			
Use of costing information (5)													
Number of factors included in job pricing (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	0.06	-0.14 [*]	-0.14	-0.05	0.08	0.14	0.06	-0.21 ^{**}	-0.07
Installation dummy	0.19 [*]	0.08	-0.02	-0.27 ^{***}	0.08	-0.19 [*]	-0.07	-0.08	-0.08	-0.02	0.03	-0.09	0.04
Company size	0.05	0.19 ^{**}	0.08	0.06	-0.03	0.07	0.21 ^{**}	-0.01	-0.07	0.08	0.10	0.09	-0.07
Company age	0.10	-0.18 [*]	0.09	-0.05	-0.08	0.13	0.02	-0.07	0.04	-0.01	-0.12	0.11	0.15
Past profitability	-0.16 [*]	0.02	0.00	0.08	-0.06	0.07	-0.03	0.05	-0.04	0.03	0.05	-0.04	0.11

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

APPENDIX A: Detailed information about 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
Use of costing information	Number of different applications of the obtained costing information (job pricing, inventory valuation, ...)
Number of factors included in pricing of jobs	Number of factors included in pricing of jobs (labor costs, raw materials, equipment costs, ...)
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.