

Modelling the Link Between Management Practices and Financial Performance. Evidence from Small Construction Companies

Johan Maes
Luc Sels
Filip Roodhooft

ABSTRACT. This paper develops a structural model to investigate the direct and indirect effects of owner–manager and company characteristics and selected management practices on the financial performance of a sample of 218 small Belgian construction companies. The results show that the owner–manager and company characteristics (experience, education, financial knowledge, knowledge of cost accounting, company size and age) have no direct significant impact on financial performance. However, several significant paths have been found between the owner–manager and company characteristics and management practices. As far as the direct effects of the management practices are concerned we observe several significant paths from the management practices to financial performance. Our findings indicate that a model approach by including owner–manager and company characteristics and management practices in an intertwined way is necessary when exploring their effects on small business financial performance.

KEY WORDS: company characteristics, construction sector, financial performance, management practices, small business, owner–manager characteristics.

JEL CLASSIFICATION: L20, L74, M10.

1. Introduction and literature review

1.1. Introduction

In a free market economy the importance of small companies as major job suppliers, innovators and source of growth is widely recognized (Lussier and Pfeifer, 2001). Defining small enterprises as companies having at most 100 employees, small enterprises are very large in numbers as they account for approximately 98.6% of all companies in Belgium (Sels et al., 2002). 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 and Everett, 1996). Moreover, many survivors achieve only marginal performance (Cooper et al., 1994).

Given the importance of small business for an economy, the survival of these firms is an issue of continuous concern. Research that can lead to the identification of those factors associated with survival 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; Lussier, 1995; Lussier and Pfeifer, 2001; Roper, 1999;), some major conceptual flaws and methodological gaps remain, as we will show. The aim of this study is twofold. First, this study

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Johan Maes and Luc Sels
Research Center for Organization Studies
Katholieke Universiteit Leuven
Policy Research Center on Entrepreneurship Enterprises
and Innovation
Naamsestraat 69
B-3000 Leuven
Belgium
E-mails: Johan.Maes@econ.kuleuven.be;
Luc.Sels@econ.kuleuven.be

Filip Roodhooft
Research Center for Accountancy, Finance and Insurance
Katholieke Universiteit Leuven
Vlerick Leuven Ghent Management School
Naamsestraat 69
B-3000 Leuven
Belgium
E-mail: Filip.Roodhooft@econ.kuleuven.be

aims at furthering research on the determinants of small enterprise financial performance and survival by providing an answer to some of the methodological flaws or gaps. Second, we want to identify specific factors associated with small enterprise survival linked performance. 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 our second objective in this study.

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 and Zwart, 1994).

1.2. Literature review

1.2.1. 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 businesses. This literature covers the evolutionary theories such as population ecology (Aldrich and Pfeffer, 1976; Hannan and Freeman, 1989), evolutionary economics (Dovi and Nelson, 1994; Nelson and Winter, 1982) and the dynamic resource-based view of the firm (Wernerfelt, 1984; Mahoney and Pandian, 1992). 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 article.

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, small companies etc), (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 can predict small business failure at least as good (Storey et al., 1987) or even better (Lussier and Pfeifer, 2001). Our study focuses on 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 and 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.

1.2.1.1. 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 that is being modelled. Some authors aim at predicting growth (Wijewardena and Tibbits, 1999; Lee and Tsang, 2001) while others try to model profitability (Fu et al., 2002), business longevity (Bates, 1990) and still other types of performance. 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 study focuses on survival. Survival is seen here as the flip side of failure or bankruptcy. 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. First, most small businesses are built around the owner-manager (Cooper et al., 1994), for whom the company very often is the main source of income (d'Amboise and Muldowney, 1988). This type of firm has the advantage that the owners are more likely to take the long-term view of business (Chaganti and Schneer, 1994). In this respect, survival of the company is essential. Second, not every small company has the ambition or the desire to grow. Additional financing (let it be internal or external) and/or other resources is needed for growing. And in finding these additional means small businesses have to overcome a lot of obstacles, often depending on the maturity of the company (Binks and Ennew, 1996; Donckels, 2000). Problems with or fear for not finding the necessary time and/or people are important reasons why a considerable number of small enterprises 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 (in spite of the above) there is still the question of how to measure growth. Choices have to be made regarding (1) the indicator to be used (number of employees, revenue,...), (2) the relative or the absolute measurement and (3) the time span taken into consideration (Delmar, 1997). Thus, this study focuses on survival since we think that growth is not the main concern for most small businesses and because of the methodological concerns surrounding the sound measurement of growth.

1.2.1.2. The nature of the model. A fourth dimension concerns the nature of the model. This dimension refers to 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 and Zwart, 1994; Lee and Tsang, 2001). A lot of authors capture the importance of or the need for structural models in explaining small business performance, for example, in order to handle the problem of explanatory variable relatedness (Bijmolt and Zwart, 1994; Roper, 1999; Lee and

Tsang, 2001). The model developed and tested in this article falls into the structural model category. Argenti (1986) argues that business failure (as the flip side of survival) is a process, not an event. Four stages occur in this process or sequence of failure, from management defects (phase one) over mistakes (phase two) and signs or symptoms (phase three) to insolvency (phase four). This process view of failure and survival is our starting point and asks for a structural model approach.

1.2.1.3. 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 and Dutia, 1991; Roper, 1999; Fu et al., 2002) or non-financial data (number of employees, survival probability or rate,...) (Goos and Konings, 1999). In addition to the choice of the type of data used to operationalize performance, the issue of using single versus multiple item performance indicators arises. Most models fall into the first category (Fu et al., 2002; Lussier and Pfeifer, 2001; Roper, 1999). A small business performance or survival model based on multiple item performance indicators (in a single analysis) is not known to the authors of this article. In this study we use financial data to model small business survival. After all, survival or success requires a preoccupation with the financial situation of the firm (d'Amboise and Muldowney, 1988). For this purpose four financial performance domains are covered (each represented by two ratios): liquidity, solvency, profitability and value added. Value added indicates what has been added in terms of value within the company itself, using its own production factors. 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 businesses (Fu et al., 2002). Liquidity relates to the settlement of short-term debts. A company will face financial problems if the funds are not available to pay off

these debts. In the case of small companies struggling to survive, liquidity is a very important indicator of the state of financial health. Solvency indicates the financial strength of the company in the longer term and says something about the extent to which the organization is equipped to face business risks. These four domains combined provide a profound view of the state of financial health of a small enterprise (Sels et al., in press).

1.2.1.4. The operationalization of the predictor variables. Still another dimension is the nature of the operationalization of the predictor variables. As far as this dimension is concerned, prior studies fall into two categories. Models rarely use multiple measures for each predictor variable in a consistent way. An exception here is for example the study of Perry (2001) who used five measures to model the planning sophistication of small firms in the USA. 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. The latter is pertinent to this study. Since we used a long questionnaire covering very diverse functional domains, a trade-off between measurement quality and non-response was necessary. Moreover, our questionnaire focused on actual practices and facts, not on perceptions of facts. The latter would have demanded multiple measures for each predictor. In view of the above, single item measures are used for most of the predictors in this article.

1.2.1.5. 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 and Zwart, 1994; Cooper et al., 1994; Lussier, 1995; Lussier and Pfeifer, 2001; Perry, 2001; Roper, 1999), while others are restricted to a single industry (Hall, 1994; Fu et al., 2002). 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 (Wijewardena and Tibbits, 1999). This study focuses on a single industry (Belgian construction sector), taking into account specific construction industry management know-how. We will focus on the construction sector for various reasons. First, in Belgium as 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 labour flows. As far as the latter is concerned, analyses of the job creation and job destruction rates of the construction sector compared to the Belgian 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 Belgian economy as a whole (Maes et al., 2000). Thus, even merely from the point of view of minimizing job destruction in the construction sector, preventing business failure and enhancing survival is important. Second, approximately 15% of all Belgian companies that went bankrupt in the last year are construction companies (NIS, 2002). Third, a comparable study investigating factors contributing to the survival of construction companies is at hand (Hall, 1994).

1.2.1.6. The content of the predictors. A final distinctive dimension classifying performance models is the content of the predictors considered (Bijmolt and 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 and Zwart, 1994; Bosma et al., 2000; Lussier, 1995; Lussier and Pfeifer, 2001; Perry, 2001) or external environmental predictors (Aldrich and Pfeffer, 1976; Rao et al., 1990; Dovi and Nelson, 1994). A minor part of this type of research has investigated both types of predictors in one comprehensive model (Zahra and Covin, 1995; Fu et al.,

2002). In this study the selection force originates from within the firm itself or, put differently, the model developed in this article is restricted to endogenous factors. This is done for a number of reasons. First, in this study we focus on small businesses. 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 and Zwart, 1994).

To summarize, this study builds upon a sample of small enterprises from a single industry (construction). The main concern is survival. We use mostly single-item non-financial predictors referring to endogenous factors and a multiple-item financial dependent variable to develop a structural model. This approach is in agreement with the belief of Argenti (1986) who stated that “in order to catch a company in trouble early enough to do any good it is necessary to use a completely different approach and so identify the non-financial signs of failure” (Argenti, 1986, p. 101). In the subsequent section we will further develop our model.

1.2.2. 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 (“causes”) that prevail their survival by enhancing financial performance linked to survival (“symptoms”). With the third differentiating element of Durand (2001) in mind, we put a strong emphasis on the proactive role of (strategic) management in trying to avoid the failure process described by Argenti (1986).

Within the literature that focuses on the endogenous or internal conditions of small business performance we observe sources that look for explanatory factors at (1) the owner–manager level, (2) internal factors or management practices and (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 over-emphasized (d’Amboise and Muldowney, 1988). Within this research domain part of the literature focuses on personal traits, attitudes and values (e.g. Becherer and 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 (Hambrick and Mason, 1984; d’Amboise and Muldowney, 1988). In the context of small businesses 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 be of no surprise 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 and 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 and Arlow, 1985; Lussier, 1995; Matthews and Scott, 1995; Rue and Ibrahim, 1998; Perry, 2001), capital structure and intensity (Cooper et al., 1994; Lussier, 1995; Fu et al., 2002), 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 and Zwart, 1994; Fu et al., 2002; Lee and Tsang, 2001; Martin and Staines, 1994; Roper, 1999; Wijewardena and Tibbits, 1999).

2. Research model and hypotheses

As explained in Section 1.2.2 we distinguish three types of internal variables that affect the small business performance: variables at the owner–manager level, internal factors or management practices and company characteristics. As mentioned earlier, we use a structural model to detect the relationships between these variables and financial performance.

The purpose of the model is to detect those owner–manager and company characteristics and internal factors or management practices that enhance the survival linked financial performance of small construction companies. The model is structural in the sense that not only direct effects of the three types of factors on performance are taken into account, but also indirect (i.e. through the adoption of management practices) effects of owner–manager and company characteristics. Indeed, based on upper echelon theory (Hambrick and Mason, 1984) and on company life cycle models (Churchill and Lewis, 1983; Durand and Coeurderoy, 2001) we expect that the adoption of management practices can depend on owner–manager characteristics (education, experience, ...) and on company factors (size and

age). So the effect of each owner–manager and company characteristic on performance 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 this model and formulate our research hypotheses.

As far as the *owner–manager level* is concerned, we build upon “upper echelon” theory (Hambrick and Mason, 1984). Our model contains four variables frequently cited in literature as having a positive effect on small business performance: business and/or work experience (Cooper et al., 1994; Hall, 1994; Jacques et al., 1994; Lee and Tsang, 2001; Lussier, 1995; Reuber and Fisher, 1999; Roper, 1999), education and training (Cooper et al., 1994; Hall, 1994; Lee and Tsang, 2001; Littunen, 1997; Lussier, 1995; Roper, 1999), financial knowledge or know-how (Hall, 1994) and knowledge of cost accounting (Hall, 1994). The latter two are included as specifically pertinent to the construction industry (Hall, 1994; Maes et al., 2000).

The *company characteristics* included in the model are the size of the company (number of employees) and its age. Both company size and age are expected to be positively related to small business performance, although empirical research sometimes shows ambivalent results (Bijmolt and Zwart, 1994; Fu et al., 2002; Lee and Tsang, 2001; Martin and Staines, 1994; Roper, 1999; Wijewardena and Tibbits, 1999;).

With respect to the *internal factors or management practices* we used the following approach to draw a list of variables to be included in the model. This approach was necessary because there is no generally accepted list of variables for use in forecasting business success or failure (Lussier, 1995). In a first stage we used the extensive list (containing 94 variables) of Hall (1994) and the earlier work of Birley and Westhead (1990) to conduct personal interviews with business lawyers specialized in law suites involving construction companies and with former managers of construction companies that failed. These interviews allowed us to compose a list of approximately 45 important management practices and to get in touch with the population-level selection pressures (Lewin and Volberda, 1999) and the industry setting

(i.e. the construction sector). This list was then integrated in the questionnaire we sent to the owner-managers of 750 non-failed small construction companies. The managers were asked to rate the importance of each of these practices on a 5-point Likert-type scale. Then, by means of frequency analysis we reduced the number of variables. Some of these retained practices can be seen as a combination of various variables Hall (1994) has included (e.g. standard costing and factors used in the costing process), while other practices have not been mentioned by Hall (1994) but have been suggested during the interviews mentioned earlier (e.g. a priori screening of clients, avoidance of cash credits, etc.). The 14 selected management practices on the basis of this approach are: shareholder equity level above the minimum level required by law, percentage of owner-manager time spent on administrative affairs, use of external professional advice, planning horizon, a priori screening of the clients, use of cash credits, the gathering of non-financial information (market share, productivity, ...), standard costing, actual costing, cost elements used in the costing process (direct materials, direct labour, overhead, profit margin and other), budgeting, quality control, use of information technology and percentage of jobs carried out as a subcontractor.

The latter factor is particularly applicable to the construction sector because often a substantial part of the orders is carried out on demand of other (construction) companies. This type of work is believed to be less profitable because of the greater bargaining power of such company-clients, while the underlying business risk is higher (the client is also a company that can go bankrupt) (Maes et al., 2000). So the larger the percentage of jobs carried out as a subcontractor, the weaker the financial performance is expected to be. The percentage of owner-manager time spent on administrative affairs is also expected to affect performance in a negative sense. After all, the more time the owner-manager has to spend on administrative requests, the less time remains for other, more crucial owner-manager activities. All other internal factors are expected to have a positive impact on small business performance and survival. We refer to Table I for a brief description of the

internal factors and management practices. All our research hypotheses concerning the four owner-manager level characteristics, two company characteristics and 14 internal factors or management practices are summarized in Table II (relationships with performance) and Table III (relationships with the adoption of management practices).

3. Methods

3.1. Sample and procedure

Our sample consists of 218 (non-failed) Belgian small construction companies having 6 to 50 employees and that are legally obliged to publish 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. The research population defined in this way consists of 3089 small companies.

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 businesses 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%.

As mentioned earlier, in addition to the survey we interviewed former owner-managers of companies that failed and business lawyers specialized in law suites involving small construction companies. These interviews served a dual purpose: (1) they gave us additional information in order to select the most important management practices in the construction sector and (2) they allowed us to compose a classification of the various management practices that can be used to develop our measures.

3.2. Measures

In this section we will briefly discuss the measures of the four types of variables to be used in

TABLE I
Explanation of the internal factors/management practices

Practice	Explanation
(1) Equity above the legally required minimum level	The use of equity as a funding source
(2) Percentage of owner-manager time spent on administrative affairs	The more time is taken by purely administrative tasks, the less time that can be spent on actual management and business activities (which affects performance)
(3) Use of external professional advice	Using external professional advice can have a positive effect on small business financial performance
(4) Planning horizon	Taking into account both short and long term views on the business can have a beneficial effect on performance
(5) A priori screening of clients	Screening of clients is important to rule out non-solvent clients before the work is carried out (thus minimizing business risk)
(6) Avoidance of cash credits	Cash credits are a wide-spread example of debt financing. The use of debt financing as a funding source can have a negative effect on small business financial performance
(7) Gathering of non-financial information	Gathering of non-financial information (market share, customer satisfaction, ...) can be useful additional information and is important in view of continuous improvement
(8) Standard costing	The use of standard costing can have a positive effect on small business financial performance (improves price setting)
(9) Actual costing	The use of actual costing can have a positive effect on small business financial performance (improves costing process, price setting and gives important information about material usage etc.)
(10) Factors used in costing process	Incorporating enough cost factors in the costing process facilitates good standard and actual costing
(11) Budgeting	Budgeting means expressing a plan in terms of money and is important to safeguard business cash flow, liquidity and solvency
(12) Quality control	Quality control (materials, work done, ...) is important to improve customer satisfaction and avoid costly law suits
(13) Supporting use of informatics	Using informatics can support good management by eliminating repetitive tasks and improving record keeping
(14) Percentage of jobs as a subcontractor	Depending too much on orders as a subcontractor can have a negative effect on performance

TABLE II

Overview of the hypothesized relationships on performance
(+ = positive, - = negative)

Path from/to	Financial performance
Owner-manager characteristics	
Experience	+
Education	+
Financial knowledge	+
Knowledge of cost accounting	+
Company characteristics	
Size	+
Age	+
Internal factors or management practices	
(1) Equity above minimum level	+
(2) Percentage of time spent on administrative affairs	-
(3) Use of external professional advice	+
(4) Planning horizon	+
(5) A priori screening of clients	+
(6) Avoidance of cash credits	+
(7) Gathering of non-financial information	+
(8) Standard costing	+
(9) Actual costing	+
(10) Factors used in costing process	+
(11) Budgeting	+
(12) Quality control	+
(13) Supporting use of informatics	+
(14) Percentage of jobs as a subcontractor	-

our model. We refer to Appendix A for a more detailed overview.

3.2.1. Internal factors or management practices

As already discussed, the interviews with the business lawyers and the former owner-managers

allowed us to define measures for the various management practices. Two measures for internal factors are percentages: the *time spent by the owner-manager on administrative affairs* (in % of total available working time) and the *percentage of the total orders that was carried out as a sub-contractor*. All other internal factors or practices are measured by means of a score (the score range is mentioned between brackets): *equity above the legally required minimum level* (0–1), *use of external professional advice* (1–5), *planning horizon* (1–3), *a priori screening of clients* (1–3), *avoidance of cash credits* (1–4), *gathering of non-financial information* (1–4), *standard costing* (1–5), *actual costing* (0–1), *factors used in costing process* (1–5), *budgeting* (0–1), *quality control* (1–4) and *supporting use of informatics* (1–4).

3.2.2. Owner-manager characteristics

As far as the personal characteristics are concerned, a score was given in a comparable way to the level of *business experience* (score ranging from 1 to 4), *(finished) education* (1–6), the *financial knowledge* (1–4) and the *knowledge of cost accounting* (1–4).

3.2.3. Company characteristics

As company characteristics, the *age* and *size* were entered as continuous variables (number of years since start-up and number of employees, respectively).

3.2.4. Financial performance

When it comes to the performance of the company a financial measure has been used based on the financial statements of 1998. We selected eight

TABLE III

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

[illegible]

financial ratios that are widely accepted as being relevant for small businesses and particularly important in the context of survival (Maes et al., 2000; Sels et al., in press): current ratio and acid test; cash flow over equity ratio and profitability of total assets; solvency ratio and degree of self-financing; share of the personnel costs in the value added and the value added per employee. Two by two these ratios give us a thorough indication of, respectively, the liquidity, the profitability, the solvency and the value added. We used internal benchmarking (median, 25th and 75th percentile borders) to form categories for each of the eight financial ratios. In that way any given company obtained a score for each ratio ranging from 1 (very bad; lowest quartile) to 4 (very good; highest quartile). These categorical data have then been used to construct a single scale indicating the state of financial health of the small enterprise. The Cronbach alpha reliability for this financial performance variable is 0.72. The specific formula used is given in the Appendix. The financial performance index score ranges from 8 (company scored 'very bad' on all financial ratios, or put differently, the company can be situated in the lowest quartile for all ratios considered) to 32 (company scored 'very good' on all financial ratios). The average score is 20.27.

3.2.5. Control variables

Control variables are included 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.

3.3. Model estimation

For model estimation purposes we used structural equation modelling 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 modelling 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.

4. Results

The path analysis enables us to test the theoretical research model to the full extent, including both direct and indirect effects as worked out in our research hypotheses. As a whole, the non-financial predictors (the management practices, the owner-manager and the company characteristics) explain 34.77% of the variability in the financial performance indicator. Comparing this R^2 -square with that of other studies is difficult, due to the inclusion of other variables or the use of different estimation techniques etc.

Bivariate correlation analysis reveals several significant associations ($p < 0.05$) between company characteristics and management practices on the one hand and the financial performance index on the other hand. However, no significant associations between owner-manager characteristics and financial performance could be found. Further, the correlation analysis indicates several significant bivariate relationships between the owner-manager characteristics and the management practices. The same holds for the bivariate relationships between the management practices and the company characteristics. Testing the full path model should refine the findings of this correlation analysis.

Table IV shows the goodness-of-fit indices of the theoretical model and the optimized model. The theoretical model contains all relationships hypothesized in Tables II and III, plus the paths from the control variables to all other variables. Three goodness-of-fit measures (chi-square, Bentler's Comparative Fit Index and Bentler & Bonett's Non-normed Index) indicate that the theoretical model is not supported by the data.

TABLE IV
Comparison of goodness-of-fit measures of the theoretical model and the optimized model

Measure	Theoretical model	Optimized model
Chi-square (p -value)	0.0001	0.75
Average off-diagonal standardized residual	0.48	0.62
Goodness-of-fit index (GFI)	0.90	0.94
Bentler's comparative fit index	0.76	1.00
Bentler & Bonett's non-normed index	0.34	1.04

TABLE V
Standardized path coefficients and total effects of the relationships on performance

Path from/to	Path coefficient	Total effects
Owner–manager characteristics		
Experience	0.00	−0.03
Education	0.00	−0.08
Financial knowledge	0.08	0.08
Knowledge of cost accounting	−0.09	−0.08
Company characteristics		
Size	0.05	0.02
Age	0.05	0.07
Internal factors or management practices		
Equity above minimum level	0.00	0.00
Percentage of time spent on administrative affairs	−0.18**	−0.18
Use of external professional advice	−0.07	−0.07
Planning horizon	−0.18**	−0.18
A priori screening of clients	0.19**	0.18
Avoidance of cash credits	0.44***	0.44
Gathering of non-financial information	0.00	0.00
Standard costing	0.00	−0.01
Actual costing	0.05	0.05
Factors used in costing process	−0.15*	−0.10
Budgeting	0.00	0.00
Quality control	0.00	−0.02
Supporting use of informatics	−0.12*	−0.12
Percentage of jobs as a subcontractor	−0.08	−0.03
Control variables		
Building completion dummy	0.00	0.01
Installation dummy	−0.07	−0.09
Chi-square (p-value)	0.75	
Average off-diagonal standardized residual	0.62	
Goodness of fit index (GFI)	0.94	
Bentler's comparative fit index	1.00	
Bentler & Bonett's non-normed index	1.04	
Number of observations	218	

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Therefore, the theoretical model had to be optimised using the CALIS modification indices. All five goodness-of-fit measures indicate that the optimised model is supported by the data (Hatcher, 1994): the average off-diagonal standardized residual (0.62), the chi-square test (p -value 0.75), Bentler's Comparative Fit Index (1.00), the goodness-of-fit index (GFI) (0.94) and Bentler and Bonett's Non-normed Index (1.04).

Table V contains the standardized path coefficients of the owner–manager and company characteristics and management practices on small business financial performance while the standardized path coefficients of the owner–manager

and company characteristics on the management practices are included in Table VI. Note that paths indicated with “0.00” in either Table V or VI are paths that were hypothesized and tested, but have proven to be redundant and had to be deleted in order to optimize the model.

Table V indicates that no significant direct effects (path coefficients) of owner–manager characteristics on financial performance are found. The hypothesized relationships of this type in Table II must then be rejected. These findings are in contradiction with previous empirical research. For instance, both Bates (1990) and Lussier and Pfeifer (2001) have found education to be a

TABLE VI
Standardized path coefficients of the relationships with the management practices (* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$)

Path from/to	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Owner-manager characteristics														
Experience	-0.22**	0.00	0.00	0.18*	0.00	0.00	0.00	0.00	0.00	0.00	0.15*	0.00	0.00	0.00
Education	0.16*	0.00	0.25***	0.00	0.15*	-0.16*	0.00	0.00	0.00	0.00	0.00	-0.22***	0.17*	0.00
Financial knowledge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.12	0.00	-0.16**	0.00	0.00	0.00
Knowledge of cost accounting	0.00	0.00	0.00	0.00	0.00	0.00	-0.15*	0.00	0.00	-0.17*	0.00	0.00	0.00	-0.08
Company characteristics														
Size	0.18*	0.00	0.19**	0.00	0.00	0.00	0.17*	0.00	0.16*	0.21**	0.00	0.00	0.00	0.00
Age	0.19*	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Internal factors or management practices														
Equity above minimum level (1)														
Percentage of time spent on administrative affairs (2)							0.19**							
Use of external professional advice (3)														
Planning horizon (4)														
A priori screening of clients (5)											0.28***	0.16*		
Avoidance of cash credits (6)														
Gathering of non-financial information (7)											0.35***			
Standard costing (8)									0.16*				0.21**	
Actual costing (9)												0.23***		
Factors used in costing process (10)					0.32***			0.27***						
Budgeting (11)														
Quality control (12)			0.25***											
Supporting use of informatics (13)														
Percentage of jobs as a subcontractor (14)					0.22***									
Control variables														
Building completion dummy	0.00	-0.21**	0.00	0.13	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00
Installation dummy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.30***	-0.15*	0.00	0.00	0.12	0.00

significant predictor of business success. Roper (1999) found a positive effect of owner–manager education on both growth and profitability, while the industry experience of the owner–manager had a negative effect on profitability. However, Roper (1999) also found no effect of industry experience on one of the performance indicators, i.e. growth. Intuitively, our findings seem acceptable since we would expect performance to be influenced by actual behaviour (practices) and not (directly) by background characteristics such as education that (might) affect behaviour. Put differently, our approach has the potential of showing how owner–manager and company characteristics can affect performance. And by now it is clear that these possible effects on performance are not direct.

The same conclusion holds for the company characteristics size and age. Although we observe the expected (positive) sign, both paths are not statistically significant. So again, the hypothesized relationships of this type in Table II must be rejected. Previous empirical research has also shown ambivalent results with regard to these two relationships (Bijmolt and Zwart, 1994; Fu et al., 2002; Lee and Tsang, 2001; Martin and Staines, 1994; Roper, 1999; Wijewardena and Tibbits, 1999).

As far as the link of financial performance with management practices is concerned, we observe six significant paths. First of all, there is the strongly positive effect on financial performance of avoiding cash credits. 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 proven by Table V, avoiding this widely spread type of debt financing results in better financial performance. Second, we also notice the positive effect of a *a priori* client screening in order to rule out non-solvent clients who have proven to be unable to pay several bills in the past. This screening is considered to be very important for the construction sector since construction jobs frequently involve serious investments in non-retrievable materials. Third, the percentage of time the owner–manager has to spend on purely administrative affairs has

a significant negative effect on financial performance, which corresponds to what was hypothesized. Three other management practices (planning horizon, factors used in the costing process and the supporting use of informatics) also show significant effects on financial performance. However, the signs of these three coefficients are negative, while they were hypothesized as being positive. One possible explanation might be that these practices are cost increasing in the short run, which of course affects the financial ratios used to compose the performance index.

Although we have not found evidence for direct effects of owner–manager and company characteristics on financial performance, it is interesting to find out if these characteristics affect the adoption of management practices. This is examined in Table VI, which contains for each of the 14 management practices the standardized path coefficient of the owner–manager and company characteristics. As can be learned from Table VI, we observe several significant paths going from both owner–manager and company characteristics to management practices. As far as the paths from owner–manager characteristics to management practices are concerned, 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 enterprises depends on owner–manager characteristics (education, experience, ...), as suggested by the “upper echelon” theory (Hambrick and Mason, 1984).

Table VI also shows us that the adoption of management practices or internal factors (e.g. equity above minimum level, use of external professional advice, and actual costing) often depends on company characteristics, such as age and (even more) size. In this case, all the coefficient signs are as they have been hypothesized. These findings allow us to say that the management as a whole goes through certain learning stages, improving with age and forced by the extra demands an increase in size brings.

An additional interesting conclusion that can be drawn from Table VI is that certain management practices or internal factors 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 the gathering of non-financial information is stimulated by the use of external professional advice. Furthermore, working as a subcontractor leads to a more thorough *a priori* screening of clients. Perhaps the latter can be explained by the fact that in the case of subcontracting the client is a company. The additional business risk of having clients that can go bankrupt appears to stimulate the screening of these companies–clients. This preliminary evidence might suggest that there are “bundles” of good management or “core management practices” that facilitate the adoption of other management practices.

Given the structural nature of the model with direct effects of management practices and direct and indirect (management practices as mediators) effects of owner–manager and company characteristics on performance, it is interesting to investigate the total effects on performance of all variables included in the model. These total effects are presented in Table V.

We notice that the total effect of all but one owner–manager characteristics is negative (while positive effects were expected). The company characteristics however show positive total effects on performance. Moreover, the total effect of age is stronger than the one of size. Put differently, reaching or having a certain size can be important for small businesses, but reaching a mature age is it even more.

The total effects of the management practices or internal factors give rise to mixed results as some of the practices appear to affect performance in a negative sense. Again, this might be related to the cost increasing effect of certain practices or internal factors. Above all, the total effect of some management practices is considerably higher than the total effect of owner–manager and company characteristics. Said otherwise, the internal factors or management practices as such have the potential of affecting small business financial performance to a larger extent when compared to owner–manager and company characteristics.

5. Conclusion and directions for future research

This study developed a structural model to investigate the direct and indirect effects of owner–

manager characteristics, company characteristics and selected management practices on the financial performance of a sample of 218 small Belgian construction companies. We used a wide range of single and multiple-item non-financial predictors referring to endogenous factors. Together with a multiple-item financial dependent variable these predictors were used to develop a structural model focusing on financial performance measures related to survival.

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 even in the absence of a direct link between owner–manager and company characteristics and financial performance, these characteristics still play an important role in influencing the adoption of management practices. In particular, owner–manager experience and education and company size have proven to be important in this respect. Compared to previous research our approach has the advantage of showing how owner–manager and company characteristics can affect performance. While other empirical research has directly linked owner–manager and company characteristics to performance, our approach has provided evidence that this link is not direct but is mediated by certain management practices that affect performance.

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 or internal factors have stronger total effects on performance compared to owner–manager and company characteristics.

We have used financial data to form an indicator of financial performance based on multiple financial measures pertinent to small business survival, not limiting ourselves to more common single-item measures of performance such as sales growth or increase in staff. 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 performance and survival struggle of small construction companies. With Argenti’s (1976, 1986) appeal for “preventive medicines for healthy companies” in mind

this is after all an excellent way to convince entrepreneurs, owner-managers and their advisors of incorporating these practices into small business management in order to enhance small business survival and lower the high number of bankruptcies the construction sector is struggling with.

The study also faces a number of limitations. First of all, our indicator of financial performance is based on cross-sectional data for 1998 only. Repeating the analysis with a series of repeated measurements would greatly improve the validity of our findings. In this respect, a panel study to follow up both dependent and predictor variables in time has been set up.

Furthermore, it is important to bear in mind that the findings are not completely 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 (Lusier, 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. One possible explanation for this is the cost increasing nature of many of the management practices. In this respect, we think it is important to take into account the issue of time lags. Some management practices might indeed be cost increasing in the short run but prove to be “cost killers” in the longer run. Recent research on the impact of human resource management on small business performance has provided some evidence for these time lags (Sels et al., in press). Again, repeating the analyses with a series of financial data can be helpful in this respect. A further 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

(inversely U-shaped) instead of linear (Dess et al., 1999). Thus, beyond a certain level or intensity the management practices have a negative impact on performance.

Furthermore, also past financial performance might help to explain even further why (probably well performing) companies adopt management practices leading to superior financial performance. Thus, one should consider using financial performance not only as a dependent variable, but also as an explanatory variable. Additionally, for quite a few management practices that were thought to be essential for the survival of the company, no effect on performance has been found. This might be explained by the fact that these practices have a ‘neutral’ effect, while not performing them might cause failure (Van Gelderen, 2002). A research design that actually compares the impact of these practices on the survival versus failure 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. The evidence for these practices in this article was unintended and very preliminar. 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 study could be a good starting point.

This study focused on internal factors that can support small businesses in their struggle for survival. Future research should also focus on *how* management practices can safeguard survival and/or improve financial performance. In this respect, additional research incorporating non-financial performance criteria is needed. Non-financial outcome measures such as quality, customer satisfaction, 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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APPENDIX A
Detailed information about the measures

Variable	Indicator(s)
Personal characteristics	
Experience	the number of years working as owner-manager of the company
Education	1 = primary school 2 = lower secondary 3 = higher secondary 4 = higher education 5 = higher secondary with additional management education (secondary level) 6 = higher education with additional management education (higher level)
Financial knowledge	1 = very limited 2 = limited 3 = good 4 = very good
Knowledge of cost accounting	1 = very limited 2 = limited 3 = good 4 = very good
Company characteristics	
Size of the company	The number of employees
Age of the company	The number of years since the start-up of the company
Management practices	
Equity above minimum level	0 = no 1 = yes
Percentage of time spent administrative affairs	percentage of time spent on purely administrative activities
Use of external professional advice	1 = less than once a year 2 = once a year 3 = 3 to 4 times a year 4 = once a month 5 = more than once a month
Planning horizon	1 = maximum 1 year ahead 2 = maximum 3 years ahead 3 = maximum 5 years ahead
A priori screening of clients	1 = never 2 = occasionally 3 = always
Avoidance of cash credit	Number of times cash credit used last year: 1 = more than 5 times 2 = 2 to 4 times 3 = once used 4 = not used
Gathering of non-financial information	1 score (4-point) obtained by combining these 2 indicators: (1) information kept in record (yes/no (1/0)) (2) four kinds of non-financial information were given (each could be checked or not by the respondent giving either 0 or 1 as a score)
Standard costing	1 score (5-point) obtained by combining these 3 indicators: (1) cost information kept in record (yes/no (1/0)) (2) cost accounting is implemented (yes/no (1/0)) (3) 3 types of applications for the information (e.g. price setting) were given (each could be checked or not by the respondent giving either 0 or 1 as a score)
Actual costing	0 = non existing 1 = existing
Factors used in costing process	1 score (5-point) obtained by combining this composed indicator: 5 types of cost elements that can be used in the costing process were given (each could be checked or not by the respondent giving either 0 or 1 as a score)
Budgeting	0 = non existing 1 = existing
Quality control	1 score (4-point) obtained by combining these 4 indicators (each could be checked or not by the respondent (control or not) giving either 0 or 1 as a score): (1) raw material (2) other material (3) finished parts (4) tools and machines
Supporting use of informatics	1 score (4-point) obtained by combining these 4 indicators (each could be checked or not by the respondent (informatics used or not) giving either 0 or 1 as a score): (1) general administration (2) accountancy and finance (3) purchases (4) HRM
Percentage of jobs as a subcontractor	Percentage of jobs as a subcontractor
Financial performance	
Financial performance	The following 8 ratios (each with scale from 1 to 4 based on internal benchmarking; see earlier) were combined into 1 single scale (10-point): (1) current ratio (2) acid test (3) cash flow over equity ratio (4) profitability of total assets (5) solvency ratio (6) degree of self-financing (7) percentage of labour costs in the total value added (8) value added per employee

Note: For the financial performance we used the following formula to obtain 1 single score: $F = ((S - V) / (V \times W) - V) \times 10$ with S = sum of all old values (before transformation), V = number of variables and W = number of scale points.

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