CASH FLOW MANAGEMENT IN CONSTRUCTION FIRMS

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The level of insolvencies in the construction industry is high, when compared to other industry sectors. Given the management expertise and experience that is available to the construction industry, it seems strange that, according to the literature, the major causes of failure are lack of financial control and poor management. This indicates that with a good cash flow management, companies could be kept operating and financially healthy. It is possible to prevent failure. Although there are financial models that can be used to predict failure, they are based on company accounts, which have been shown to be an unreliable source of data. There are models available for cash flow management and forecasting and these could be used as a starting point for managers in rethinking their cash flow management practices. The research reported here has reached the stage of formulating researchable questions for an in-depth study including issues such as how contractors manage their cash flow, how payment practices can be managed without damaging others in the supply chain and the relationships between companies' financial structures and the payment regimes to which they are subjected.

Keywords: cash flow management, company survival, company failure, financial control.

INTRODUCTION

The level of insolvency in the construction industry is high, when compared to other sectors. Failure is undesirable and avoidable and it can be prevented by good cash flow management. Indeed, company failure has been widely researched. Knowledge about business failure can be useful in providing guidance to entrepreneurs who want to start a business. It indicates the risk factors in their industry and provides the benefit of experience in risk management (Arditi, Koksal and Kale 2000).

Since the 1970s, many researchers have applied financial models (such as the Z-score model) to predict failure. Financial ratios, however, reveal only the symptoms, rather than the causes of failure (Argenti 1976). There is some confusion between causes and symptoms of failure, but Argenti (1976) and Slatter (1984) highlight important aspects of the distinction and cite the most important causes and symptoms.

The literature shows that apart from poor management, lack of adequate financial control is the most common characteristic of declining firms (Slatter 1984). In construction, failure studies have focused on explaining failure at the project level, rather than the company level, where there has been comparatively little work (Arditi, Koksal and Kale 2000).

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Several authors have investigated the causes of failure (Argenti 1976, Slatter 1984, Lowe 1997, Arditi, Koksal and Kale 2000). Their results show that cash flow problems and poor management are the main causes. It is known that the levels of insolvency in construction are high (Hughes, Hillebrandt and Murdoch 1998). It ought to be possible to reduce these levels, since the major causes are known. Therefore, research on how to avoid the causes should be encouraged. In other words, the most important step to take is to help construction companies to develop good cash flow management practices.

COMPANY FAILURE

Rates of failure

The number and rate of business failures in the UK is perhaps the highest in the world, especially in the late 1970s and early 1980s, when there were relatively tight monetary policy and recession. Altman (1984) presented statistical data on failure rate in the UK and in the USA from 1971 to 1980. The data show that the UK had averaged 0.76%, over twice that of the USA (0.35%). Based on earlier comparisons, this was significantly higher than Japan, West Germany and Australia.

Lowe (1997) presented insolvency statistics for England and Wales from 1969 to 1995, and gave numbers for companies in receivership (company liquidations), and numbers for individual bankruptcy (receiving orders). Industries were aggregated into six broad categories (agriculture and horticulture; manufacturing; construction; distribution, transports and communication; other industries; services). These statistics show that insolvency in construction is not far below that registered in the much larger manufacturing and distribution sectors, a point also made by Hughes, Hillebrandt and Murdoch (1998).

Age and size: influence upon failure

Some studies on company failure investigated different patterns of behaviour, such as the influence of company size and age on the incidence of failure.

Argenti (1976) showed statistics on failure in the USA, until 1976. The data showed that 2% of failed companies were one year old, more than 50% were less than 5 years old, and about 20% were more than 10 years old. Knight (1979) analysed records of a large number of small business failures and conducted interviews with the key personnel involved. He found that a firm usually fails early in its life (50% of all failed firms do so within 4 years and 70% within 6 years) and that managerial incompetence is the major cause. Kale and Arditi (1999) developed a study of the influence of age on business failures. They found an age-dependent business failure pattern in the USA construction industry. The risk of failure increases initially with increasing age, reaches a peak point and decreases, as companies grow older. The lack of organizational learning and lack of legitimacy, characteristic of new firms, explains this pattern.

According to Altman (1984), in Japan bankruptcies are concentrated in the small and medium-sized firms. Lowe (1997) argues that, when the case is fluctuating demand, the larger general builders and civil engineering contractors, and the speculative specialists are less prone to insolvency. Insolvency, with a few exceptions, appears to affect the smaller contractors and subcontractors. One of the reasons for this pattern, according to Arditi, Koksal and Kale (2000), is that large firms have an accounting department that publishes financial reports on a regular basis and, therefore, financial

ratios are easier to monitor whereas small firms hire private accountants. Furthermore, because of the dominance of the chief executive in small firms, financial data may be more easily manipulated.

By contrast, the analysis by Hughes, Hillebrandt and Murdoch (1998) of data from Dun and Bradstreet showed no relationship between insolvency and size of company, type of business, age of firm or region.

Insolvency in construction

The distribution of company liquidations between industries is probably mainly due to the numbers of firms in each industry and differences in their degrees of risk. These factors could be responsible for the high proportion of liquidations in the construction industry (Department of Trade 1975).

Of all company liquidations and receiving orders for the self-employed, the construction industry accounts for a very big percentage. In the case of self-employed, over the past 25 years, the share of bankruptcy in the construction industry varied from 21% to 30%. Similarly for company liquidations, over the same period, construction varied from 12% to 22% (Lowe 1997). The construction industry is responsible for between 5% and 7.5% of Gross Domestic Product. Data from Dun and Bradstreet show that 7% of construction companies went out of business between 1994 and 1997 (Hughes, Hillebrandt and Murdoch 1998).

The absolute level of insolvency in the construction industry is high. Analysing the period from 1984 to 1995, it can be seen that the lowest annual insolvency figure was 1471 companies at the peak of the boom but over three times that number in 1992 (Hughes, Hillebrandt and Murdoch 1998). The percentage of construction insolvencies in comparison to total insolvencies was over 13% in the late 1980s. It was 17% in 1994. If we compare construction insolvencies with total of companies in the industry, it can be said that in good times construction insolvencies are about 12.5% above the general level but in bad times may be about 60% higher. One of the reasons that construction has a large number of insolvencies is that it has a large number of companies (Hughes, Hillebrandt and Murdoch 1998). In fact, the more firms involved in a particular sector, the greater the likelihood of high failure rates Lowe (1997).

CAUSES, SYMPTOMS AND PREDICTION OF FAILURE

Causes and symptoms

Slatter (1984) makes a clear distinction between causes and symptoms of failure. He describes symptoms as danger signals, which indicate what might be wrong with the firm. Symptoms, however, do not provide a guideline for management action.

Failure is the outcome of a complex process and it is rarely dependent on a single factor (Arditi, Koksal and Kale 2000). In a study of forty UK turnaround situations, Slatter (1984) identified the principal causes of corporate decline. The factors identified are similar to the factors identified by Argenti (1976). For these two authors, lack of financial control or accounting information figure as one of the major causes of failure, after inadequate management. Lack of financial control means the absence of inadequate application of one of the following: cash flow forecasts; costing systems; budgetary control. There are still many smaller firms in which all of them are absent (Slatter 1984).

Argenti (1976), in summarizing the work of several authors and professionals, identified a big variety in opinions, and big differences in the lists of causes. Among the most highlighted were poor understanding of cash flow and lack of capital. Poor financial management is also viewed as a significant cause of failure by Boussabaine and Kaka (1998) and by Kenley (1999).

In the context of the construction industry the failure of a firm may be considered to be dependent on the failure of one or more of its projects. It is difficult, however to determine both the critical success and the failure factors in projects (e.g. Russell and Jaselskis 1992, Bellasi and Tukel 1996).

Some authors described the financial values as symptoms, rather than causes of failure (Argenti 1976, Slatter 1984). 'Financial ratios may not be very reliable because of the 'creative accounting' practices used by a failing company's management when attempting to hide the poor financial condition of the company from outside investors and creditors' (Argenti 1976). Symptoms of failure, for Slatter (1984) are easier to detect than the causes. He describes the financial indicators as the most commonly used symptoms, although there are also non-financial factors, which are taken in account by bankers, receivers and consultants.

Prediction

A number of attempts have been made to predict company failure based on financial ratios. The first attempt to predict bankruptcy was made by Beaver (1966). He used seventy-nine failed firms and seventy-nine non-failed firms of the same asset size in the same industry, and calculated six ratios for each firm for a one-year period. He found that not all ratios predicted equally well and that cash flow to total debt was the best predictor. Altman (1968) generated a Z-score discriminate model, and Edminster (1972) used multiple discriminant analysis to predict the failure of business. Knight (1979) also attempted to classify failure using a discriminant analysis model. He concluded that the discriminant analysis procedure was not successful. A form of linear discriminant analysis has also been used on UK data for the period from1972 to 1978 at the London Business School, with the result that cash flow to total debt (Beaver's best predictor) and the number of negative cash flow periods in the last seven years proved to be the most reliable predictors of problem firms (Slatter 1984). Until the work of Storey *et al.*. (1989), the prediction literature was almost entirely based on data relating to large firms (an exception being Edminster 1972).

CASH FLOW: A MAJOR ISSUE

In recent years, in Britain, around 250,000 new businesses have been created every year. Many are destined to fail within the first two years. One key reason is the lack of a viable business plan for their operation (Cole 1997). Argenti's research (1976) identified four main deficiencies that are characteristic of failed companies: cash flow forecasts, costing system, budgetary control, and asset valuation. Cash flow problems and shortage of working capital can, in extreme circumstances, push efficient and profitable firms into insolvency. It is also possible that a firm is pulled into insolvency by the failure of another firm. This "domino theory" may apply if a client becomes insolvent owing large sums of money to the contractor, or if a main contractor fails owing cash to one or more regular subcontractors (Lowe 1997).

Arditi, Koksal and Kale (2000) explored the factors associated with company failures in the USA construction industry. They populated an environment/response matrix with Dun & Bradstreet's USA business failure data for the construction industry (for

the period from 1989 to 1993). Table 1 shows the calculation of weighted average values of failure factors. The findings indicate that budgetary and macroeconomic issues represent 83% of the reasons for construction company failures. On the other hand, issues of adaptability to market conditions and business issues appear to have limited effects on company survivability (6% of the reasons for failure). According to Arditi, Koksal and Kale (2000), budgetary issues can be handled by companies that are cognizant of the effects of these factors on their survivability. Budgetary and macroeconomic issues include the cash flow related items.

Table 1: Calculation of weighted average values of failure factors (Arditi, Koksal and Kale 2000).

Failure factors	**Weighted % occurrence**
Budgetary issues	60 (cash flow factors)
Human/organization capital issues	8
Issues of adaptation to market conditions	3
Business issues	4
Macroeconomic issues	23 (cash flow factors)
Natural factors	3
Total	100

Lowe (1997) identified the most important causal factors through a multiple regression model of construction insolvency in the UK. Six broad areas were identified by the general literature review and the analysis of the construction sector: profitability (return on capital invested); cash flow (working capital requirements, borrowing, domino theory); credit (cost of credit, availability of credit); fluctuating demand (changes in demand); competitive tendering (tendering and pricing strategies); management problems. The first four areas were tested, but it was not possible to test the last two from the statistics he had available. Cash flow related variables were found to have a big impact on construction insolvency. Higher requirements for both, working capital and borrowing, as well as lagged general insolvency were found to have the effect of increasing insolvency. For the other tested variables it was shown that higher profitability leads to lower levels of insolvency. Higher interest rates and tighter monetary policy have the effect of reducing construction insolvency. Also, the greater the fluctuation in construction output, the lower construction insolvency will become.

DEVELOPMENTS IN CASH FLOW MANAGEMENT

Management

The study of construction project cash flow became increasingly popular in the 1970s and 1980s (Kenley and Wilson 1986). While the importance of financial or cash flow management is normally discussed with reference to the company level, most of the models for cash flow forecasting are individually developed for specific project types (Navon 1995).

Some developments applied logit transformation regression procedures in attempts to understand cash flow (Kenley 1986, Kenley and Wilson 1986, 1989). Kenley and Wilson (1986) concluded that forecasts of individual cash flows are invalid when derived from analysis of grouped data. Kenley (1986) investigated the cumulative gross cash flow profiles (S curves) and the cumulative net cash flow profiles of construction project cash flows. Kenley and Wilson (1989) proposed a construction project net cash flow model to provide a measure of a project's net cash flow trend

over time. In further developments, a stochastic model was used to simulate the levels of working capital available within a building firm, utilizing specific techniques for the management of cash flow on a large and systematic scale (Kenley 1999). He concluded that careful management of cash flow through operations can yield a significant contribution to working capital.

Forecast

There are numerous techniques for cash flow forecasting, differing in their levels of accuracy and detail, the degree of automation in compiling them, the method they use to integrate the time and the money elements, etc. Some of the techniques are probabilistic, but most are deterministic (Navon 1995). The majority of models developed to assist in cash flow forecasts have been based on standard cost flow S-curves, developed using past construction projects (Boussabaine and Kaka 1998, Boussabaine and Elhag 1999). The accuracy of a cash flow forecast generated from standard cost curves depends on whether the adopted S-curve accurately represents the project to be constructed (Boussabaine and Kaka 1998).

Kaka and Price (1991) tested the reliability of a net cash flow model based on cost commitment curves. Skitmore (1992) attempted to predict the best parameter values of the models for cash flow forecasting. Navon (1995) discussed different approaches and models for project level cash flow forecasting. Kaka (1996) demonstrated that by merging further variables, the flexibility and reliability of cash flow forecasting are enhanced. Boussabaine and Kaka (1998) investigated the feasibility of using neural networks to predict the cost flow of construction projects. Boussabaine and Elhag (1999) presented an alternative approach to cash flow analysis for construction projects (fuzzy cash flow analysis). These developments prove the importance of cash flow forecasting, and show that companies should pay more attention to this issue.

PROBLEMS WITH RATIO ANALYSIS

When observing failing companies, financial ratios, while widely used, may not be very reliable. Creative accounting practices are used by managers when attempting to hide the poor financial condition of the company from outside investors and creditors (Argenti 1976). Even under normal operating conditions, ratio analysis can be problematic, and not transparent enough. An important point is that company accounts are at least a year old and subject to revision. Sometimes, figures can be mistaken, as occurred recently in the UK with Morgan Sindall plc and Amey plc. These companies' accounts problems were announced by the Construction News (2002) and Financial Times (2002a, 2002b, 2002c). This kind of incident only adds to the negative image that construction firms have with City analysts.

Amey Plc

Support services group Amey unveiled unexpected accounting changes that turned an underlying profit of £55m into a pre-tax loss of £18.3m. The shift took the market by surprise and Amey's share values fell. The group said it has changed its accounting policy to reflect a shift in its strategic focus towards bidding for major contracts and will more fully recognise the costs involved (Construction News 2002, Financial Times 2002a). These account changes, however, do not impress the City analysts, who said that accounting changes could have implications for the way other groups involved in private finance initiative and public private partnership projects account for bid costs. Amey is now setting a benchmark, which is way beyond what anyone else has ever imagined (Financial Times 2002a).

Amey has applied the strictest interpretation to draft rules on contract accounting from a UK Accounting Standards Board task force. Principle one is to write off bidding costs for contracts when they occur, rather than capitalising them. The surprise was that Amey had so much on its balance sheet. Principle two is to defer recognising fee income from government-related private finance initiative contracts until projects are up and running. The effect is to shift profits from the past to the future (Financial Times 2002c). As it happened, Amey did not loose its credibility. It continues to be awarded with contracts and its share price is up again.

Morgan Sindall

Morgan Sindall also mistook figures. It had overestimated revenues from its regional construction business. John Morgan, Morgan Sindall's co-founder and executive chairman said that future revenue from contracts was overestimated at three of the 25 regional offices. They were unaware of these problems. £4m of the change in profit estimate arose from 15 contracts, although he declined to give details on how such a large overestimate has been made. Shares in Morgan Sindall fell 23% after that (Financial Times 2002b).

Some time before (20 days) their published annual turnover had reached £99m in 2001, as a result of its string of acquisitions. The estimate turnover from 2002 was £1bn. They showed their annual results (12 months to 31/12/01) having a turnover of £909m, and a pre-tax profit of £21m. Their segmental analysis has shown high turnover and profit from 2001 and 2002 (Contract Journal 2002).

CASH FLOW AND PAYMENT SYSTEM

It is clearly important to have a clear picture of a company's cash flow position. It is easy to mistake financial ratios, and common not to have control over the cash flow in a company. The discussion so far has shown the importance of cash flow. There are many aspects that have to be analysed carefully when dealing with company cash flow. Given the contribution to their working capital, the key issue for contractors is to hold the maximum amount of money for the maximum period of time.

Contractors usually sub-contract labour, plant, equipment and services as a way to avoid the investment of capital on it. The main objective of a contractor is to recover a specific amount of money within a specific period (Tah, Thorpe and Mccaffer 1994). They need return for the capital invested. Sub-contracting is often used as a technique to create longer payment periods. If the company has its own workforce they need the money available to pay the workforce weekly. In contrast, if the company makes use of sub-contractors, the money can be held for much longer, awaiting a monthly invoice and paying one or two months after receiving it. It should be remembered, however, that a contractor's pay out is a sub-contractor's pay in.

When the aim is to win a contract, or to get more money for a project, overheads and risk margins are subject to manipulation. The estimating of indirect costs is a sensitive and confidential issue for construction companies. General overheads, risk margins and profits can be considered as indirect costs. There are not specific rules about how to calculate site overheads. The general overhead amount is generally determined by expressing the budgeted annual overheads as a percentage of budgeted turnovers and applied as a proportion of the cost of individual contracts. If the company is competing satisfactorily, the overheads percentage can be kept as it is. It may be reduced to win the contract, or may be increased if failure to win the contract will not affect the company (Tah, Thorpe and Mccaffer 1994). Risks can be

quantifiable and unquantifiable. For quantifiable risks, the appropriate costs are included. The costs depend on what is exposed to risk. For unquantifiable risks, the amount added is based on the management perception of the situation (Tah, Thorpe and Mccaffer 1994).

Sometimes, contractors overvalue the initial phases of their projects, so that they can have more money at the beginning of the project (referred to as "front-loading" the rates or bills). But to keep the overall value of the project unaltered, the final stages are undervalued. In order to get sufficient money to finish the contract, they have to get another contract. The cycle is repeated: overestimate the initial phases, to have more money, to use for completion of the former project. This might not be a serious problem in cases in which the company is operating and growing constantly. It may, however, be a serious problem if the company doesn't get another project soon. The payment systems, in this case would have to be very flexible.

The UK's Housing Grants, Construction and Regeneration Act 1996 regulates the way that construction contract payments should be made. The existence of the law is, by itself, evidence that the practice of manipulating payments is widespread and unacceptable. The fact that the financial structures of construction companies are so dependant on the characteristic cash flow patterns indicates a need to understand better the relationship between financial structures and payment regimes.

What are the techniques available for manipulating cash? Is there any correlation between the amount of subcontractors and the flexibility of payments? To what extent can contractors borrow based on their project contract cash flows? This paper forms the theoretical basis for research that is in the initial phase. The research will seek to answer these questions.

RESEARCH METHODS

The research will be based on an international survey of payment and cash flow in contracting firms. Initially, interviews will be conducted with contractors, sub-contractors and consultants in the UK, Italy, Portugal and Brazil.

The purpose of these interviews is to provide sufficient information for the design of a questionnaire survey (sampling) that will use sampling techniques to discover trends and patterns. Some of the issues to be covered on the interviews regard the nature of the business, annual turnover, extension of subcontracting, usual procurement methods. It will also include questions about financial control, and how (if any) it is developed within the company. The way payment systems work in different countries will be, initially the main focus of the interviews (certification period, retention, and payment after final completion).

The interview questions are designed to get qualitative answers. Responses should be recorded so that, in designing the questionnaire survey, the difficulty of explaining or recalling certain kinds of information can be taken into account. The interviews will also help to reveal the diversity of responses to these issues, so that, where appropriate, lists of options can be used in the questionnaire survey. The recordings will be studied also for linguistic difficulties and differences, so ensure that the questions have similar meanings and relevance in a variety of different countries and languages. The questionnaire will be applied to contractors in different countries. The results will be analysed and compared, to form an overall picture of payment systems and cash flow management in construction.

CONCLUSIONS

Construction represents a big share of the industry. It also presents high levels of insolvency. Failure, for this sector, is a serious problem. Most of the failure, however, can be avoided. For this to be possible, the causes have to be known. And the major ones are already known. The major causes of failure are poor management and bad cash flow management. From the evidence of the impact of cash flow on failure, it is clear that the causes of failure, even when they are known, do not appear to be taken seriously. They must be if a company is to survive.

Existing developments and methods in cash flow forecasting and modelling can serve as a starting point for managers to rethink their cash flow management. A detailed study of various construction companies, in terms of how cash flow is managed in each of their projects, would provide interesting lessons about what constitutes financial health for a construction company.

The examples of retrospective revisions to company accounts are a serious challenge to current views on companies accounting practices and cash flow control. These cases show how ratio analysis can be problematic, and not sufficiently transparent.

The issue of cash flow raises questions about how a company could deal with it. If company survival is to do with cash flow, a contractor should be able to manipulate the payouts, in order to hold more money for longer. However, it is clear that this way of raising working capital only passes bigger problems down the supply chain.

This apparent need of a better understanding of the relation of financial structure and payment regimes is what motivates the research, which will follow this paper. Further progress and results will be reported at the conference, and in further papers.

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