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The Risk of Contractor Default

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Abstract
One of the most important risks in the construction process is the risk of contractor default. It is in the interest of contractors to understand failure patterns and why construction companies fail, and to predict company decline and prevent failure. It is in the interest of construction owners to protect themselves against contractor default, and to identify contractors that are likely to default. It was found that company failure is age dependent; that there are liabilities of newness, adolescence and smallness; that most causes of failure can be prevented by short-term management action; that it is possible to predict the state of decline of a company by using non-financial data; that the owner can use intelligent/economic protection against contractor default; and that subcontractor default may be an important part of the equation.

Keywords
Risk management, Contractor default, Business failure, Company decline, Predictive models

1. Introduction

The research literature focuses on company success factors. Yet, lessons must be learned from business failures too. One of the most important risks in the construction process is the risk of contractor default (Arditi *et al*., 2000). The owner normally transfers this risk to the contractor who protects himself by transferring it to surety companies. The fact of the matter is that the fees paid by the contractor to purchase surety bonds are factored in the contractor's overhead expenses and are therefore reflected in the contractor's final offer. The owner who accepts this offer is actually paying for the transfer of the risk to a third party. Whether it is worthwhile to retain this risk or to transfer it at some expense is a rather difficult question especially for public agencies where public officials are bound by existing laws of accountability.

"Business failure" refers to a business that ceases operations following bankruptcy, ceases operations with losses to the creditors after such actions as foreclosure, voluntarily withdraws leaving unpaid debts, is involved in court actions such as reorganization, or has voluntarily compromised creditors. According to Dun and Bradstreet's 1997 data, the total value of failure liability in the construction industry was $2,021,220,115, which constituted 5% of the total value of failure liabilities in the U.S. in that year. Furthermore, the failure rate per 10,000 firms was 88 for all industries whereas it was 116 for the construction industry in 1997. The same pattern of higher numbers of business failures in the construction industry is observed consistently in the previous years as well (Dun and Bradstreet, 1989-1993). Given the severity of the implications in terms of liabilities created by failures and the shear numbers of business failures in the construction industry, it is believed that at least as much research into business failures is justified in the construction industry as research into success recipes.

The objectives of the set of studies that were conducted at IIT over a period of ten years (1995-2005) were set as follows:

- Understanding contractor failure patterns
- Finding why construction companies fail
- Predicting decline and preventing failure
- Protecting owner against general contractor default
- Protecting general contractor against subcontractor default

2. Contractor Failure Patterns

The contextual factors of a company, particularly age and size, are commonly argued to have important implications on its survival chances. These implications were explored by Kale and Arditi (1998) in the context of the construction industry by analyzing the age distribution of failed construction companies and computing age-specific failure probabilities over a ten-year period 1985-94.

Organizational ecology which builds on environmental selection arguments postulates that as an organization ages its chances of failure decrease as a result of subtle processes which influence organizations (Hannan and Freeman, 1977, 1984). Therefore failures among newly established organizations are more common compared to older ones. The objective of Kale and Arditi's (1998) study was to explore the liabilities of newness, adolescence, and smallness on business failures in construction organizations by building on environmental selection arguments advocated by organizational ecologists. By doing so, the objective was not to reject the adaptationist perspective (Child, 1972; Bourgeous, 1984) which supports the view that companies' strategic leaders can influence their companies' performance and hence generate failure or success, but to gain insights into the extent of the influence of primary subtle processes underlying environmental selection forces.

There are several important conclusions of Kale and Arditi's (1998, 1999) research. Firstly, the study reveals an age-dependent pattern of failure in the U.S. construction industry in which the risk of business failure increases in the first few years of a company's life, reaches a peak point and decreases thereafter as the company ages (see Figure 1). However it should be noted that organizational learning and gaining of legitimacy can fend off the risk of failure only to a certain extent and certainly not all potential risks a company can face through its entire organizational life.

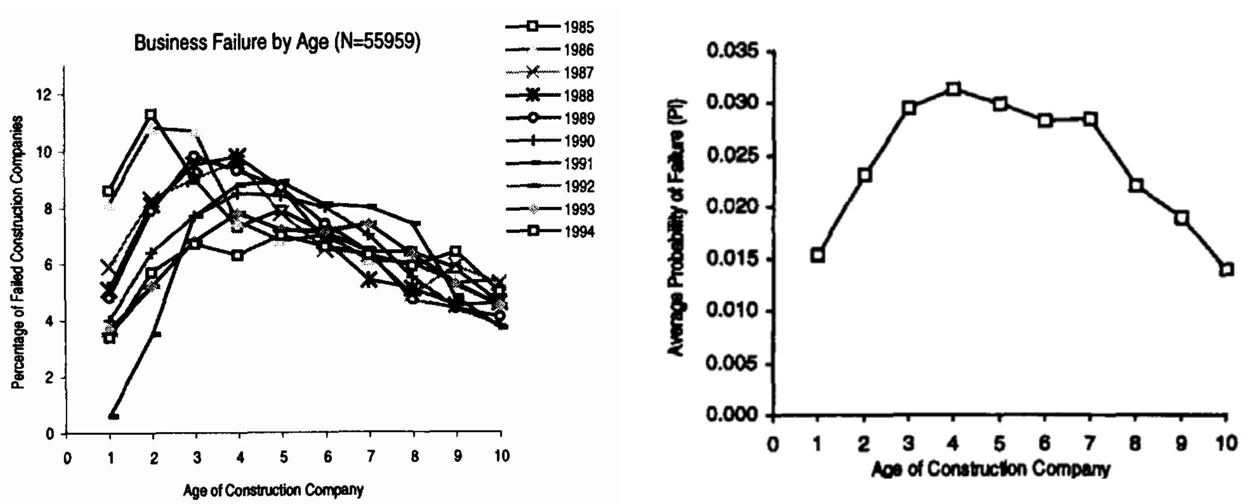

Figure 1: Failure Probabilities by Age

Secondly, the increasing risk of failure in the early life of construction companies can be attributed to the possible existence of an initial assessment period also referred to as the *adolescence* period. During this period, the performance achieved by the company is assessed and a decision is made either to continue with the construction business or to exit from the industry. The heterogeneity of the companies' resources and differences in the decision-makers' time horizon and performance criteria suggest that this assessment period may be different for each individual company.

Thirdly, newness which implies lack of organizational learning and legitimacy coupled with smallness appear to be the primary factors underlying the high probability of failure of construction companies. Organizational learning and gaining of legitimacy increase the survival chances of a construction company. The scarcity of resources, particularly of financial resources, increases the impact of the selection forces that act negatively on small companies. Lack of legitimacy and lack of financial resources constitute the major obstacles against the survival of newly established construction companies. It is evident from the research that overcoming the liability of adolescence is not as easy as entering the construction industry.

Fourthly, in a new era of increasing turbulence, the survival and success of construction companies will not only be depending on improving their learning capabilities. In order to make the shift from an efficiency driven orientation to a market driven orientation, companies must be aware of the limitations of organizational learning and must avoid the trap of organizational myopia.

Finally, the research findings provide some support to the environmental selection arguments in the context of the construction industry but should not be considered as the rejection of the adaptationist perspective. Indeed, it is quite possible that the individual characteristics of organizational leaders do have an impact on the success/failure of an organization.

3. Why Do Construction Companies Fail?

3.1 The Environment/Response Model

Failure is the outcome of a complex process and rarely depends upon a single factor. Organization theorists from one school to another define the fate of the firm with different paradigms. Organizational ecologists (Hannan and Freeman, 1977, 1984) favor environmental determinism and claim that the fate of a firm is determined by environmental selection forces. On the other hand, the strategic management school which is grounded in the strategic choice model (Child, 1972) emphasizes the importance of managerial decisions and actions in affecting the fate of firms. Hrebiniak and Joyce (1985) reconcile these views by acknowledging the importance of the interaction between the environment and managerial decisions. In general, it is possible to summarize the phenomenon of failure as a function of two factors: environment dependent factors and strategic leadership dependent factors.

To explore the factors associated with company failures in the context of the construction industry, the four quadrants of an "environment/response" matrix developed by Boyle and Desai (1991) were populated with Dun and Bradstreet's U.S. business failure data for the construction industry by Arditi *et al*., (2000) (see Figure 2). The "environment" is represented on the vertical axis and is divided into two categories, namely the internal environment that represents the events that are under management's control and the external environment that corresponds to the events that are beyond management's control. "Response" is represented on the horizontal axis and is divided into two categories, namely administrative responses that represent the short-term operational activities, and the strategic responses that represent the long-term planning of the firm. This four-cell matrix was adapted to the construction industry by using the factors used in Dun and Bradstreet's annual *Business Failure Reports* (1989-1993). Dun and Bradstreet provide historical data on business activities in the U.S.

It was found that the most important reasons for business failures in the construction industry in the five-year period (1989-1993) were to be found in the internal-administrative and external-strategic quadrants. These two quadrants represented 68% and 26%, respectively, of all reasons for failure. Whereas internal-administrative issues (budgetary issues and human capital issues) are short-term issues that can be handled by the management, external-strategic issues (macroeconomic issues and natural disasters) are long-term planning issues that are beyond the control of management.

Over 80% of the failures were caused by five factors, namely "insufficient profits" (27%), "industry weakness" (23%), "heavy operating expenses" (18%), "insufficient capital" (8%), and "burdensome institutional debt" (6%). All these factors, except "industry weakness", are budgetary issues and can therefore be handled by companies that are cognizant of the effects of these factors on their survivability. It appears that, in addition to the strategic leadership factors such as budgetary issues, environmental factors, particularly "industry weakness" (23%), that are beyond a company's sphere of immediate action, are among the most important determinants of business failure in the construction industry. This finding should however be interpreted in the light of the fact that the cause/effect relationship between environmental and strategic leadership factors is not well established.

The study indicated that budgetary and macroeconomic issues represent 83% of the reasons for construction company failures implying that firms that take vigorous administrative measures to address budgeting issues, and that react promptly to economic conditions by implementing appropriate strategic policies should be able to avoid failure. On the other hand, issues of adaptability to market conditions and business issues appear to have limited effect on company survivability (6% of the reasons), implying that administrative measures to fend off internal conflicts that originate from reasons beyond management's control, and long-term strategic decisions to regulate the firm's adaptation to market conditions can also help prevent failure.

3.2 The Input/Output Model

Systems theory views an organization as a complex set of dynamically intertwined and interconnected elements, including its inputs, processes, outputs, feedback loops, and the environment in which it operates and with which it continuously interacts. The input/output relationship is a dynamic process where the system tends to find a balance between its units and the external environment. In this system, the input is processed, generates the output, and the output feeds the input. These shifting states of the dynamic equilibrium are crucial for survival.

The input/output model postulates that an organization is continuously involved in transforming inputs into outputs. Koksal and Arditi (2004a) proposed an input/output model that assumes that "business failure" is the output of long and involved processes composed of three components: *determinants*, *symptoms*, and *outcomes* (see Figure 3). In this model, it is argued that organizational and environmental factors are the *determinants* of failure, which solely or jointly affect the performance of the organization. For example, any decline in demand, an economic crisis or recession is conducive to industry weakness, which may in turn affect an organization's profits. Lack of business knowledge and inadequate managerial experience may increase operational expenses, create conflict within the organization, and also hurt the competitiveness of the organization. The input/output model enables managers to modify the organizational characteristics of the company and to adjust to environmental conditions by monitoring the positive or negative changes in the performance of the organization. On the other hand, *symptoms* such as "insufficient profits," "heavy operating expenses" and "burdensome institutional debt" are indicators of failure. The *symptoms* are driven by *determinants*, while *outcomes* (survival or failure) are driven by *symptoms*. The *symptoms* provide an opportunity for managers to detect the early stages of failure and to improve the performance of the organization by making use of the feedback loop.

Environment		Administrative systems and procedures (Response)	Strategic long term planning (Response)
Environment	Internal: events under management control	**CELL I** **Weighted (%) Occurrence** BUDGETARY ISSUES Insufficient profits .... 26.71 Heavy operating expenses ..... 17.80 Insufficient capital .... 8.29 Burdensome institutional debt 5.93 Receivable difficulties .... 1.46 HUMAN/ ORGANIZATIONAL CAPITAL ISSUES Lack of business knowledge ... 3.89 Lack of managerial experience 0.91 Fraud ..…............................... 0.85 Lack of line experience ....… 0.68 Lack of commitment ....…. 0.62 Poor working habits ....…. 0.59 **TOTAL: 67.73**	**CELL II** **Weighted (%) Occurrence** ISSUES OF ADAPTATION TO MARKET CONDITIONS Inadequate sales ....… 2.20 Not competitive ....… 0.29 Overexpansion …............… 0.15 **TOTAL: 2.64**
	External: events not under management control	**CELL III** **Weighted (%) Occurrence** BUSINESS ISSUES Business conflicts .... 2.43 Family problems ....….. 1.16 **TOTAL: 3.59**	**CELL IV** **Weighted (%) Occurrence** MACROECONOMIC ISSUES Industry weakness .... 22.73 Poor growth prospect .....…. 0.28 High interest rates .... 0.06 NATURAL FACTORS Disaster .... 2.94 **TOTAL: 26.01**
		Administrative systems and procedures	Strategic long term planning
		Response	

Figure 2: Environment/Response Matrix Distribution

The *determinants* and *symptoms* of the input/output model proposed in this study were formulated by making use of Dun and Bradstreet's failure factors, as seen in Figure 3.

It was found that environmental factors have a major influence on performance-related factors with 61% compared to organizational factors that have an effect of 39%. Furthermore, "industry weakness" accounted for 83% of environmental factors and constituted the major contributor in this category. On the other hand, "insufficient capital" appeared to be the leading factor with 47% followed by "lack of business knowledge" with 21% of organizational factors. It is important to emphasize that organizational factors that account for only 39% of the determinants of failure carry special significance as these factors can be adjusted by company managers -feedback loop- whereas the managers have no control over environmental factors that constitute the remaining 61% of the determinants.

Symptoms of failure on the other hand are composed of performance-related factors and are the direct driving forces of failure. As expected, "insufficient profits" (46%), "heavy operating expenses" (33%), and "burdensome institutional debt" (10%) appear to be the major factors in this category.

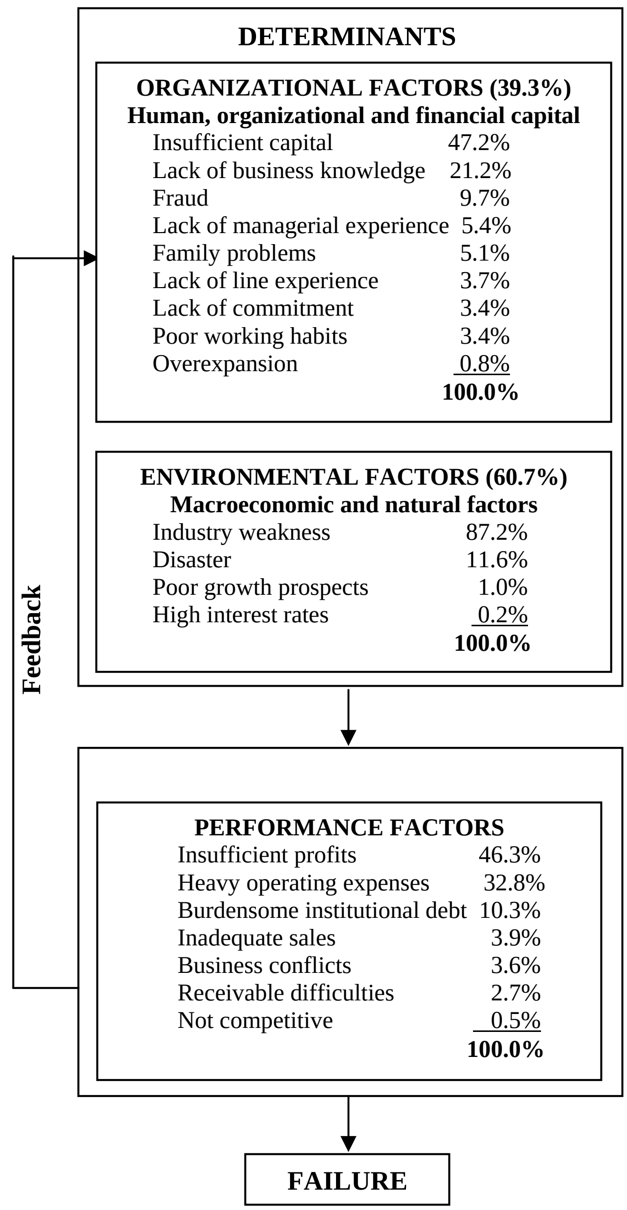

Figure 3: Input/Output Model Distribution

Research studies (e.g., McKinley 1993, Weitzel and Jonsson 1989, Greenhalgh, 1983) indicate that chances of survival increase if decline trends are observed at their early stages. The input/output model enables the company executive to watch for the most common symptoms of failure and to make the necessary modifications in the related organizational determinants in the light of the prevailing environmental conditions. The feedback loop allows the construction executive to take action against the early signs of failure.

4. Predicting Company Decline

Encouraged by the input/output model that promises construction company executives the possibility of turning around their company in case they are able to detect symptoms of failure, a more sophisticated model was developed by Koksal and Arditi (2004b) to determine whether a company is healthy, whether decline is setting in, or whether decline has reached an advanced stage (see Figure 4). This was a statistical model that was developed by making use of non-financial data collected from construction companies that have filed bankruptcy under Chapter 11 and construction companies that have been functioning without bankruptcy protection.

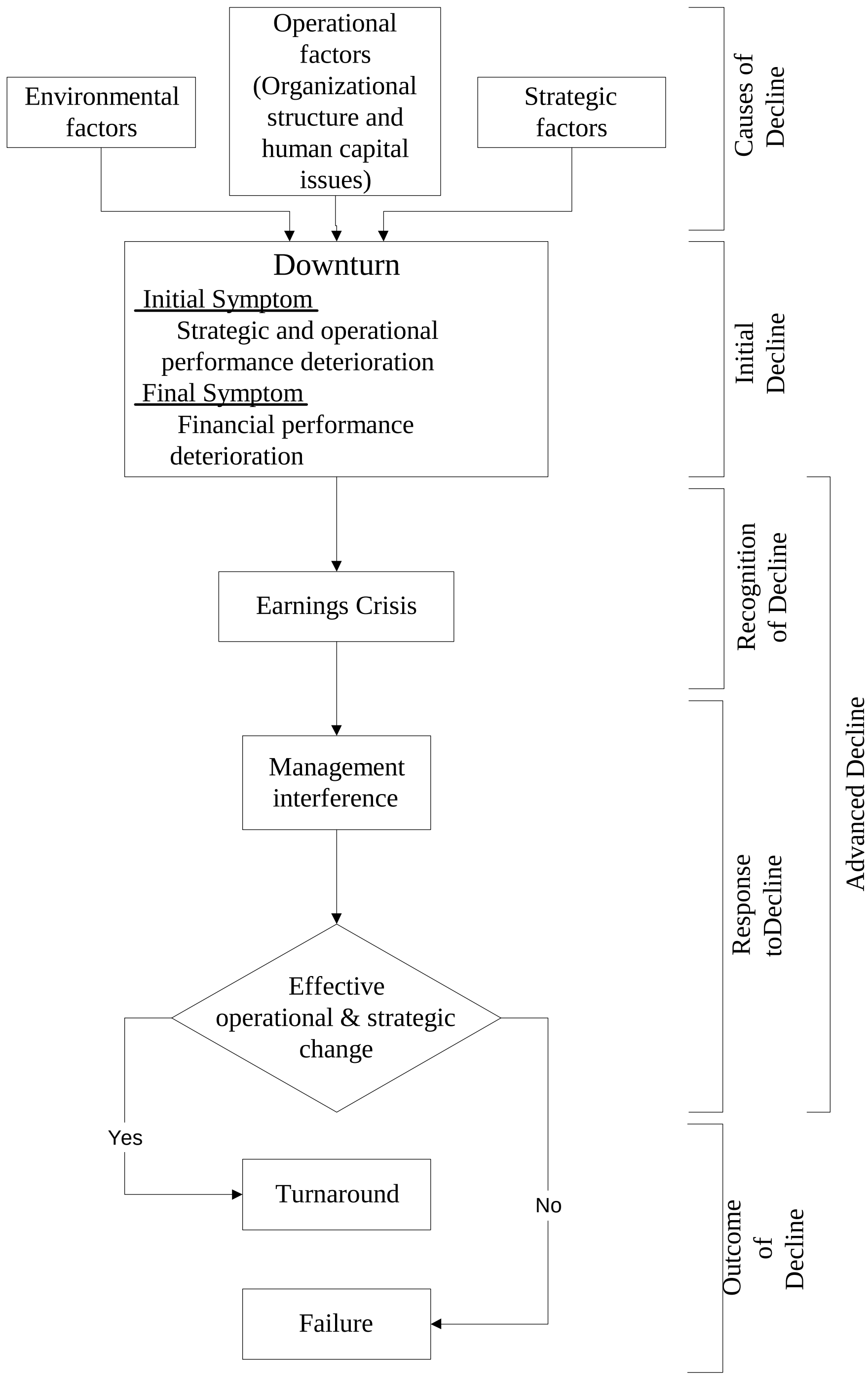

Figure 4: Construction Company Decline Model

A company profile survey administered to 11 bankrupt and 41 non-bankrupt companies provided information about 21 organizational, human capital, and strategic posture characteristics of construction companies. Factor analysis was used to reduce the number of variables. Factor analysis reduced the original 21 characteristics into three factors that make use of only 11 characteristics.

- Competition based on innovation
  - Activating competitive strategy
  - Defining competitive advantage
  - Adaptation to advanced management practices
  - Adaptation to advanced construction technologies

- Organizational strategy
  - Absence of standardization
  - Defining the scope of the company
  - Diversification of the production markets
  - Absence of specialization

- Managers' qualifications
  - Level of business knowledge
  - Level of work experience
  - Level of managerial expertise

The factors obtained by performing factor analysis were regressed against decline ratings using Multinomial Logistic Regression (MLR). This research demonstrated that non-financial aspects, i.e., organization structure, human capital issues, and strategic posture are important in assessing the condition of a company vis-à-vis decline/failure. If a company executive wishes to assess the condition of his/her company, this assessment can be done by simply rating the strength of as few as 11 characteristics associated with the company. These 11 ratings can then be plugged into the logit functions which in turn yield the probabilities of the company being in any one of the three states of "no-decline", "initial decline", and "advanced decline".

The research study showed that it is extremely difficult to collect information from bankrupt companies as these companies are mostly "inactive." Also, the executives of the "active" bankrupt companies found it unpleasant and were reluctant to talk about their failure.

This study into detecting the onset of business decline/failure is of relevance to industry practitioners because by making use of this model, construction company executives who detect signs of decline before the advent of a financial crisis should be able to take the necessary measures in good time to initiate a successful turnaround.

5. Protecting Owner against General Contractor Default

Given the research presented in the preceding sections, it is clear that contractor default may be a serious problem in the construction industry. Even though some of the research is able to explain the reasons for the decline and eventual failure of a construction company, and even though measures can be taken to turn around companies that are on the verge of failure, it looks like this problem is not generally recognized by the parties early enough. Consequently, measures to generate a turnaround cannot be taken, forcing construction owners to seek protection against this kind of event.

The objective of the study reported here was to provide owners with a decision-making mechanism that will free them from automatically taking the typical "transfer the risk to a surety" option and will allow them to make intelligent and economical decisions that include retaining or avoiding the risk of contractor default (Al-Sobiei *et al.*, 2004, 2005). An artificial neural network (ANN) model was trained by using a neural strategy and a genetic strategy to predict the risk of contractor default.

Data were extracted from files stored by a major surety company in the U.S. The files contained information about bonded contractors, some of which had defaulted while others had not in a period of eight years. The data collected represented 78 "defaulted" and 102 "non-defaulted" contractors.

The variables used in this model were extracted from the reports that underwriters in the surety company utilize in their decision of the limit of the bond. Some of the inputs are expressed either in dollar amounts or financial rates provided by Dun and Bradstreet.

Once the nets were trained to predict contractor default by using the neural and genetic training strategies, they were then tested by means of data collected from 4 defaulted and 4 non-defaulted contractors that had been put aside for this purpose. According to the results, the predictions coincided with the actual occurrences in six out of eight cases (75%) when the neural training strategy was used to predict default, and seven out of eight cases (88%) when the genetic training strategy was used.

Risk allocation is the process of determining how and to what extent the risk should be shared. A flowchart is presented in Figure 4 to illustrate how to find the most suitable method of risk management for situations where contractor default is the risk in question. At the beginning, the likelihood of contractor default is predicted using the genetic training strategy since the genetic training strategy generated a higher rate of prediction than the neural training strategy. A good understanding of the organization's risk taking behavior is also essential for making a sound decision. It has been generally accepted by risk management researchers that the risk behavior of organizations falls into three general classifications (Willenbrock, 1973):

- *Risk seeking* organizations have a preference for risk. For these organizations, even a large loss could not make things much worse than they are now, whereas a large profit could very substantially improve the situation.
- *Risk neutral* organizations are well supplied with working capital, believe in self insurance against moderate risks and base their action on expected profits.
- *Risk averse* organizations are conservative and have a preference for certainty. These organizations do not take chances unless the likelihood that the outcome will be positive is significantly high.

Once the likelihood of contractor default is predicted using the genetic training strategy and the owner's risk behavior is established, the owner can make a decision to retain, transfer, or avoid the risk of contractor default. It should be noted in the highlighted parts of Figure 5 that in addition to the traditionally used alternative of transferring the risk of contractor default to a surety, the owner also has the options of retaining or avoiding this risk, albeit in rare circumstances (i.e., the northeast and southwest corners of the decision matrix).

While avoiding the risk of contractor default entails not engaging the contractor in question, retaining the risk involves a willingness to foot the bill if contractor default occurs. In addition to the usual contingency allowance that the owner generally allocates for risks other than contractor default, the owner should budget an amount equal to the expected loss associated with default. An analysis of the data collected in this study indicated that the losses incurred in the case of contractor default ranged between 0.02% and 15.13% of the contract value with an average of 2.14% weighted for project size. Depending on the characteristics of the project in question, the owner is advised to budget a contingency fund of up to 15% of the contract value.

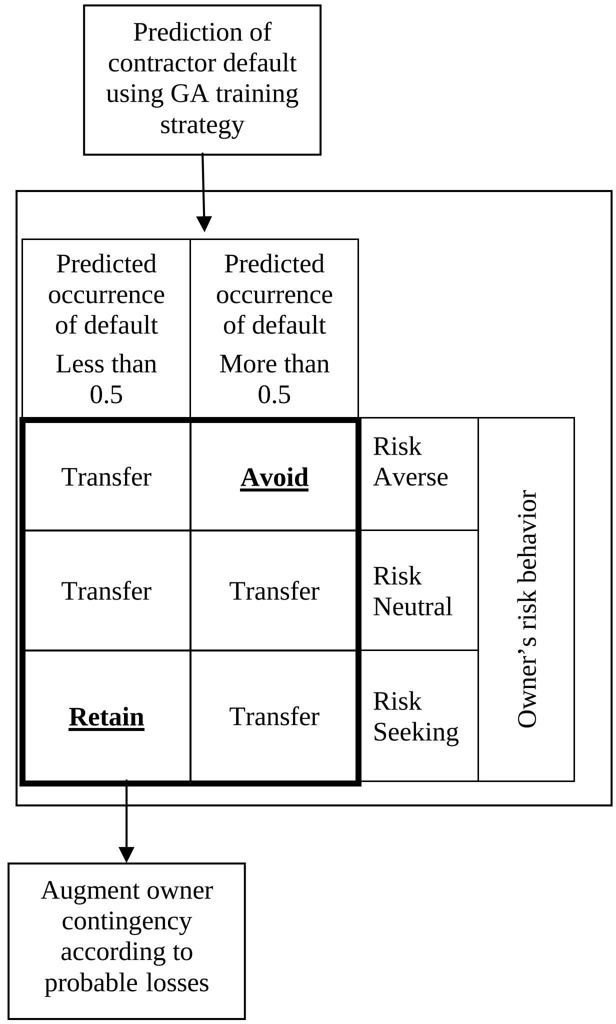

Figure 5: Owner's Risk Allocation Model

6. Protecting General Contractor against Subcontractor Default

A subcontractor is a construction firm that contracts with a general contractor to perform some aspect of the general contractor's work. On many projects, especially building projects, it is common for 80-90% of the work to be performed by subcontractors (Hinze and Tracey, 1994). Regardless of the general contractor's skills, portions of virtually every project will be subcontracted to firms that possess specialized skills because the subcontracting system has been proven to be efficient and economical. However, even though a large portion of a construction project is usually performed by subcontractors, the issues concerning subcontracting practice are seldom acknowledged.

Similar to a construction owner running the risk of general contractor default, a general contractor runs the risk that subcontractors will not be able to complete the project on schedule, within budget and in compliance with plans and specifications. As mentioned in the preceding section, a surety bond is one of the leading financial instruments used to guarantee the completion of an obligation. If the principal fails to perform, the obligee can turn to the bonding company, which must step in and, on behalf of the principal, accomplish the work according to contract terms (Russell, 2000). Retainage is also used as a measure to remedy the actions of the misbehaving subcontractor. Finally, insurance policies are used as a mechanism to manage the financial risks present in the business.

A study conducted by Arditi and Chotibhongs (2005) investigated issues that included, among other things, the management of the risk of subcontractor default through subcontractor bonding, Retainage and insurance. Three surveys were conducted in order to get information from the top 450 subcontractors, 300 general contractors, and 250 owners in the U.S. The rates of response were 28%, 22% and 13% for specialty contractors, general contractors and owner firms, respectively. Tests of significance were used to determine whether the means of the findings of the samples differ significantly from each other.

6.1 Bonding of the Subcontractor

The general contractor is responsible for the performance of the subcontractors. The general contractor becomes liable if a subcontractor fails to pay for materials, labor, or sub-subcontractors since the general contractor is obligated to complete the project free and clear of all liens. The risk the general contractor shoulders includes the possibility of subcontractor default – something over which the general contractor has limited control. Protection is afforded to the general contractor by requiring the subcontractor to provide the general contractor with a payment and performance bond (Clough *et al*., 2005; Hinze, 1993). Litigation that might arise would then be in the hands of the sureties (Hinze, 1993).

How often subcontractors are required to submit performance and payment bonds before signing an agreement with a general contractor was measured on a 0-3 scoring system where 0 represents “never”, 1 “sometimes” and 2 “often” and 3 “always”. The average frequencies were 1.25, 1.20 and 1.24 for the responding subcontractors, general contractors and owners, respectively. The differences in the average frequencies between the three groups were not statistically significant at $\alpha = 0.05$. The reason why subcontractor bonds are “sometimes” required by general contractors is because subcontractor bonds are normally required only on large construction projects or on projects that involve high default risks particularly in locations where the general contractor is not familiar with local subcontractors and conditions. This result is in agreement with the study conducted by Hinze (1993) that found that 68% of subcontractors were infrequently required to provide bonds.

6.2 Retainage Withheld by General Contractor

Many construction contracts, especially those that involve competitive bidding, provide that the owner will retain a certain percentage of the progress payments to allow for the correction of faulty or missing work. Usually, the accumulated retainage remains in the possession of the owner until the project is completed and final payment is made, with the owner paying the contractor no interest on these funds. In turn, general contractors often withhold retainage from the payments they make to their subcontractors.

How often do general contractors withhold retainage from their subcontractors? The average frequencies were 2.50, 2.56 and 2.30, between “often” and “always” for the responding subcontractors, general contractors and owners, respectively. The differences between the frequencies were not statistically significant when tested at $\alpha = 0.05$. It was also found that the retainage withheld from subcontractor payments by general contractors is not higher than what is withheld by owners from general contractors’ payments as previously reported by Hinze (1993). It appears that general contractors are “often” forced to retain a similar percentage from the progress payments they make to their subcontractors because most contracts allow owners to retain a certain percentage of the progress payments to their general contractors.

Most subcontractors, general contractors and owners do not regard the issue of retainage to be a major problem. But more than half of the subcontractors, general contractors and owners indicated that the magnitude of the retainage is an important factor to be considered before entering into an agreement with the general contractor. These subcontractors indicated that retainage can produce real cash flow problems, resulting in substantial borrowing at sometimes a hefty interest rate. This results in higher construction costs for owners (Clough *et al.*, 2005).

The American Subcontractor Association (ASA) contends that retainage is nothing more than a means for general contractors and owners to pad their cash flow. Some subcontractors and general contractors, but no owners are of the opinion that owners should stop retaining money from general contractors eliminating the need of general contractors to withhold retainage from their subcontractors, presumably because retainage is perceived by owners to be a means to guarantee good quality and timely completion of subcontracted work.

6.3 Risk Transfer through Insurance

In an era when lawsuits are common practice, owners, contractors, subcontractors and design professionals cannot afford to assume risks that could potentially impair the longevity of their business (Russell, 1990). An array of basic insurance policies is needed to cover the different risks that may be encountered. Ideally, the policies fit together to provide a web of coverage protecting both the project and the parties from loss. But while maintaining adequate coverage to protect themselves, the parties involved also have to be prudent when specifying required insurance policies and avoid selecting unnecessary or excessive coverage and consequently increasing the project's cost.

In the construction industry, risk is commonly transferred to the subcontractor. The least balanced approach for a subcontractor is "broad form" indemnity, which entirely relieves the general contractor and/or owner from covering losses related to the subcontractor's performance of work, regardless of the cause or type of risk. Another risk, which is independent of but can have the same effect as indemnity provisions, is the additional insured endorsement. If the subcontractor agrees to an additional insured endorsement, other parties (the owner and/or general contractor) are named as insured under the subcontractor's commercial general liability policy. A third method of risk transfer that makes the subcontractor responsible for losses controlled by other parties is the waiver of subrogation. The general contractor and/or owner may ask the subcontractor to sign this waiver, which protects the subcontractor's insurance carrier from making any claim to recover funds from the general contractor.

What can be done to improve bonding/insurance practice relative to subcontractors? The opinions of the respondents are shown in Figure 6. The percentage of general contractors who stated that the current bonding/insurance practice is acceptable was very high (91%) probably because in the current practice, the general contractor is well protected. On the other hand, only few subcontractors found the current practice acceptable, probably because they felt that most of the risk is generally shifted to subcontractors.

Many owners and subcontractors suggested that educating the subcontractor's staff about the language used in the subcontract was another major way to improve subcontractor bonding/insurance practice. The respondents' contention was that very often, the contract clauses concerning insurance are not well understood by subcontractors at the time the agreement is signed. Subcontractors find out about the consequences of an insurance policy only after it is too late. The review of the contract language thoroughly by a professional before the agreement is signed should prevent future surprises.

Almost none of the respondents believed that subcontractor bonding causes problems. This appears to be an accepted practice in larger projects. The fact that subcontractors, general contractors and owners agree on this issue may be interpreted to mean that subcontractor bonding contributes to a fair distribution of risks in such projects. Indeed, the premiums paid by subcontractors and contractors to surety companies to obtain their respective contract bonds are not a burden to them since these premiums are part of their overhead and are eventually paid by the owner. Similarly, owners do indeed end up paying for the transfer of this risk to the surety company, but in return they get a risk-free project.

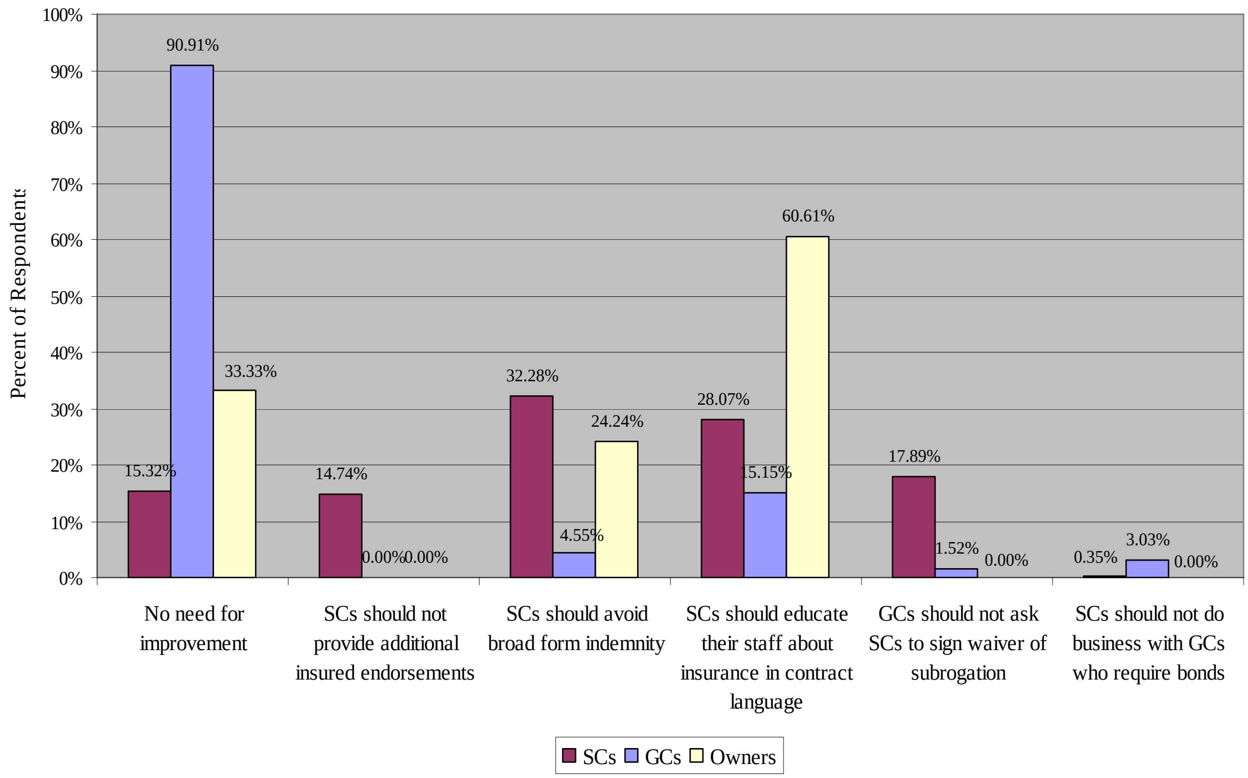

Figure 6: Ways to Improve Subcontractor Bonding/Insurance Practice

7. Conclusion

The construction process involves a large number of risks, one of the most important of which is the risk of contractor default. Contractors need to have a good understanding of why construction companies fail and of typical failure patterns. Contractors need be able to predict the state of their company. If decline is observed, contractors should be able to take corrective action early enough in order to turn the company around. Observing only the usual financial indicators for signs of failure may not allow the contractor enough time to take corrective action.

A series of research studies were undertaken in the ten-year period 1995-2005 to investigate various aspects of this problem. The overall findings indicate that:

- Construction company failure is age-dependent
  - Newness and smallness contribute to failure
  - The risk of failure is greater in the adolescence period (3-4 years into the life a company)
- Most causes of failure can be prevented by management action
- By the time financial symptoms are apparent, it may be too late to turn the company around
- It is possible to predict the state of decline by using non-financial data
- The owner can use intelligent/economic protection against contractor default
- Subcontractor default is an important part of the risk equation

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