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How to Sustain the Construction Market in Uncertain Economic Conditions? A Study and Analysis of Financial Risk Management Techniques and the Comparative Effectiveness of Different Project Delivery Systems

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Abstract: Price stability as an economic goal plays a significant role in any economy. Throughout recent history, the construction industry has suffered major recessions and high rates of inflation. Inflation is a serious problem which often affects the entire construction industry. Owners tend not to pay for the increased costs due to inflation, and contractors are faced with severe uncertainty when bidding for projects and are not able to accurately forecast returns on their investments. This situation adversely affects the construction market. It is essential for both owners and contractors to look for ways to manage effectively the risks involved in uncertain economic conditions. Among several areas of consideration are risk management approaches and project delivery methods. Proper assignment of financial risks in contracting would minimize the cost of risks. Through literature review and interviews with experts, this research will investigate if/how financial risk management and the choice of project delivery contracting strategies could play a role in sustaining the construction market in uncertain economic conditions.

1. Introduction

The current global economic crisis has stressed the market and left a heavy debt that makes it challenging to recover quickly. Recession and high inflation rates are two indicators of the economic crisis. Price stability for goods and services is one of the primary economic targets. During recent years, various markets have been threatened by the risk of inflation, and the economic crisis continues to be a major concern in the near future.

Although inflation might be limited to some certain parts of the economy with varying density, it is impossible to completely insulate them from other sectors of the economy for long. Its impact transmits to other sectors of the economy and affects them. As a project-based industry, construction has a tight relationship with the overall economy and is highly affected by investment intensity. High interest rates following a recession result in less investment, which in turn leads to intense competition in the construction market and reduced job opportunity (Oyediran, 2006; Ren and Lin, 1996). Furthermore, the unstable economic condition and the risk of price escalation impose additional risks on the contractors involved in or considering a fixed-price contract. As a result, the participation of contractors in the industry would also drop down.

To survive recession and strategically manage the risk associated with uncertain economic conditions, developers and managers of construction projects must look into strategies which would maximize project

value through exploiting opportunities and minimizing risks. The aim of this paper is to investigate such financial risk management strategies leading to a more sustained construction market.

2. Methodology

This research conducts a thorough literature review and interviews general contractors to investigate risk management strategies for mitigating the risks associated with a high rate of inflation and price escalation. The authors analyzed the information collected through the literature review using a *theme-coding analysis* technique and developed several open-ended questions based on the information gathered and the gaps identified in the literature. Phone interviews were conducted with several successful and well-known general contractors. The conversations were recorded, transcribed, and analyzed. Based on the collective data developed through literature review and expert interviews, a list of financial risk management techniques for uncertain economic conditions was outlined and discussed. Finally, a comparative analysis of different project delivery systems was conducted to identify the relative effectiveness of different delivery systems for financial risk management.

3. Inflation

Long term economic imbalances lead to a complex set of phenomena, which is known as inflation. Although it is difficult to define in precise terms, inflation is broadly accepted as the rate of increase in the general price level in an economy. Under the influence of inflation, goods cost more, wages go up, and those who have undertaken to supply goods or services under fixed-price contracts have corresponding disadvantages (Bromilow, 1981; Oyediran, 2006).

3.1. Inflation in Construction Industry

The construction industry is one of the most dynamic and risky fields. As a project-based field, construction industry performance is measured by the performance of all individual projects, which in turn are influenced by macroeconomic and local conditions. Recession as a macroeconomic phenomenon directly affects the critical aspects of each individual project, such as investment, cost, profit, time, and market value (Ren et al., 1996).

Economic crises such as recession and inflation negatively affect the service providers' profit margin. The owners/developers may benefit from inflation if involved in a fixed price contract with a contractor because inflation increases the project value/price in the market. The contractors, however, may be in the most disadvantageous position as they have to deliver the project within the fixed price according to their contract while having to pay more for the increased cost of materials, equipment, and labor due to cost escalation. Most of the time, contractors shift this risk to subcontractors. Such circumstances put great pressure on the contractors and decrease their profit margin as their cost is increased and they are not paid more. Figure 1 illustrates the impact of economic conditions on the project cost.

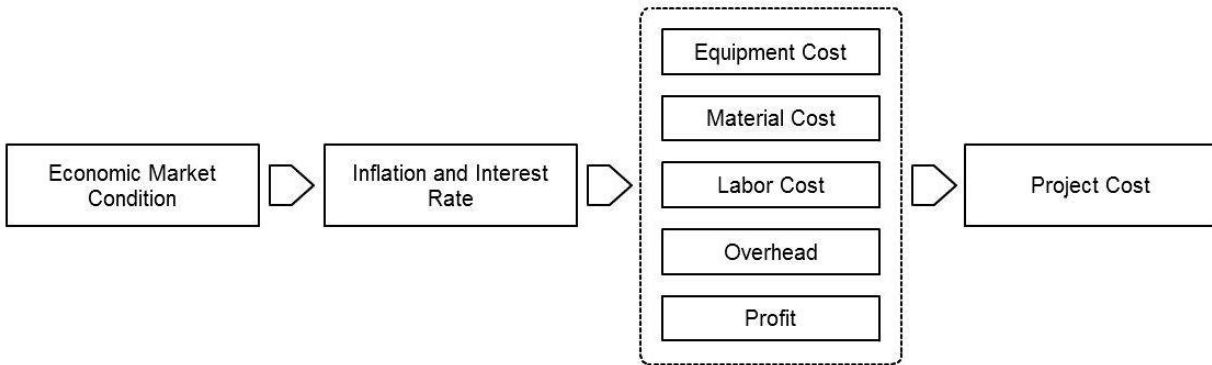


Figure 1: Impact of Economic Conditions on Construction Projects

Construction price includes several major components, such as equipment, plant, materials, wage, overhead, and profit, which are largely influenced by global economy. Although modern construction equipment performs most of the construction activities, the construction industry still remains relatively a labour-intensive industry, and the labour costs dominate construction costs. The key reasons for rises in wages are wage agreements determined by social and institutional factors as well as labor force demand and supply.

The economy plays a determining role in construction-related costs. The main sources of funds for investment in the construction industry as well as other industries are the banking system or other types of financial organizations. On the other hand, excessive borrowing for investment increases the amount of money within the market, which results in inflation. This fact reveals the close relation between borrowing and inflation and indicates the importance of the balance between them. In other words, to operate a large-scale project, a large amount of money should be dedicated, which is mostly provided through the banking system. The banking system transfers the burden of high inflation rate to individuals who run big industries such as the construction industry through the application of large loans. So the interest rate directly affects the project costs, including materials, equipment, and wages. The high interest rate causes the industry to suffer from two effects: shrinkage in market demand and increases in cost (Ren et al., 1996).

“As projects increase in size the consequences of price rises increase at a compound rate. This occurs not only because more money is involved but because they take longer to complete” (Bromilow, 1981, p.189). Inflation has a considerable impact on time-dependent costs of construction. This group of construction activities worsens by the extension of time which is inherent in construction.

On the other hand, local conditions also have a great influence on the construction industry. Contractors’ pricing attitude is largely determined by their ability to access resources. In order to strengthen the local economy, the government should follow a policy of encouraging local firms to perform these projects. Strategies which ease obtaining resources and reduce transportation and overhead cost positively affect the local economy (www.davislangdon.com, 2012).

4. Inflation Management Techniques

Project managers are required to pay more attention to the impacts of some macroeconomic factors concerning inflation in order to make sensible decisions. There are some strategies which can help project managers to mitigate the risk of inflation and cost escalation during uncertain economic conditions. By applying proactive risk management techniques, project managers would be able to forecast and model some possible future conditions based on macroeconomic indicators and thus be prepared to act sensibly. The following sections describe different risk management techniques that can be used to mitigate the risk associated with inflation and cost escalation in the construction industry.

4.1. Risk Analysis

“The term risk analysis is used to denote a method that aims at developing the understanding and awareness of the uncertainties associated with a particular variable of interest” (Han and Diekmann, 2004, p.172). The recent economic recession has resulted in several business failures, which has forced companies to follow certain attitudes toward risk and exert risk analysis methods to model the financial risk of construction projects in uncertain economic situations. Risk analysis enables the contractors to predict the impact of unstable prices on the project cost and apply the result of their analysis to making go/no go business decisions, preparing bidding packages ahead of the bidding process, and adding considerations to contracts to secure their profit (Han et al., 2004; Kangari, 1995).

4.2. Contract

“In any certain project, the owner’s goal can best be achieved by selecting the contract type that will most effectively motivate the contractor to the desired end” (Zaghlool and Hartman, p.420). There are various formats of risk management techniques which can be applied. Some of these formats are partnering/alliances, risk/ reward sharing systems, and incentive-based contracts.

The contract type determines the degree of the inflationary burden borne by each contracting party. For instance when the contract is of the fluctuating type, the contractor relies heavily on inflationary indexing in order to claim the increase in price levels of the resource inputs. “When the duration of the contract is short, such claims may not be tenable except in cases where there is rapid change in the price level” (Oyediran, 2006, p.5). As a result, the contract can enable the contractor to re-negotiate the price in the case of price escalation. Contract type and contractual risk management approaches must be negotiated. Often contractors hire a lawyer to engage in negotiation on their behalf. Public-private partnership is working on improving engagement and reducing time and cost constraints associated with the procurement process (Percival, 2013).

4.3. Indexation

In a fixed-price contract, the most common form of project procurement method, the inflation risks may pose serious problems to the contractor. In such cases, owners are completely protected from cost escalation, while the contractor would be in a disadvantageous position. One of the effective ways to protect the contractors from inflation risk is indexing. Indexing is a practice of making adjustments to current prices based on inflation forecasting (Oyediran, 2006). In some cases, contractors consider the indexation in their contracts directly with the owner. In some other cases, the government defines the rate of quarterly or annual indexing based on economists’ predictions, and contractors should be compensated based on it (GC 1, 2013).

4.4. Contingency

“Contingency is the budget that set aside to cope with uncertainties during construction” (Touran, 2003, p.135). Depending on the contract, the risk of inflation is either allocated to the contractor, the owner, or shared by both. A fixed-price contract shifts the risk of inflation to the contractor. To manage and finance the risk, the contractors utilize various means. For instance, they often add an escalation contingency to their bid price. In uncertain economic conditions or when inflation is high, contractors include higher contingency which dramatically increases the final project cost. A number of factors such as economic situation, available work, risk taking, and expected return affect contingency selection (GC 1, 2013; Ranasinghe, 1994).

4.5. Trust

The level of trust established among contracting parties determines the mechanism for contractual risk allocation and risk mitigation in a project. Likewise, the contractual relationship reflects the level of trust among the contracting parties and impacts several aspects of the management process such as project execution, project cost, and time (Zaghlooul et al., 2003). Trust-based relationships is reflected in a transparent communication among project participants and an equitable, shared risks and rewards system for mitigating the increased cost. By establishing open-accounting and sharing the inflation risk with the contractors, the owners would benefit from lower contingency rate that contractors may add otherwise to final costs to protect their profit in case of potential inflation and cost escalation.

On the other hand, in competitive bidding and a fixed-price contracting scenario, when the owners transfer the risk of price escalation completely to their contractors, the owners are charged with higher contingency. The owner is also at a higher risk for potential change orders, disputes, and litigation cost, as some contractors may not include much contingency for potential cost escalation in their bidding price in order to win the job. However, once awarded the contract the contractors may look for opportunities to file change orders and claims to recoup their lost profit especially if the market price increases as a result of inflation.

The contractor will be at the risk of bankruptcy and lost profit when the risk of price escalation is completely transferred to the contractors and they do not include enough contingency for that risk in their bid, cannot re-negotiate the price with the owners, and cannot find a way to re-coup their lost profit.

The healthiest way to deal with uncertain economic conditions and the risk of price escalation for contracting parties would be to establish trust-based relationships, have open accounting, and to mitigate the risk of inflation collaboratively. This approach, which is based on the trust-based relationship, would offer owner increased value for the money invested, as there will be reduced contingency and waste associated with litigation, claims, and disputes.

4.6. Non-governmental Contractors

In most countries, the construction industry is one of the largest non-governmental employers. In order to provide a safe and attractive environment for contractors to get involved actively in projects, the governmental organizations, with in-house construction services and governmental supports, should be limited in the degree to which they get involved in projects. So the private parties compete to win the bid based on the real market prices for different services. This way the industry would be able to remain competitive in the market to absorb investment (GC 3, 2013).

4.7. Joint-ventures Organizations (Risk sharing)

One approach for addressing financial risks in construction projects is sharing risks between the project parties. As for profit rates with respect to organizational types, the projects performed by sole general contractors have suffered more losses with a higher potential for severe failures, whereas those of joint-ventured organizations have acquired more stable returns. Typical design-bid-build projects take on an extensive variance, while most design-build and CM at-Risk projects with open book contracts have yielded modest profits (Han, Park, Kim, Kim, and Kang, 2007; Nassar, 2002). This way, contractors have been more willing to assume risks that accompany contractual and legal problems in the form of risk sharing with the owner (Kangari, 1995). Risk sharing in compared to risk allocation puts reduced profit at risk and often provides more stable return.

4.8. Shorten the Project Cycle

Another effective strategy to reduce the impact of inflation on project costs and get the investment return faster is the acceleration of the project process (Ren et al., 1996). Contractors can reduce the project duration by applying various management methods (Kartam and Kartam, 2001):

- Increase manpower and equipment
- Increase the working hours
- Change the construction method
- Change the sequence of work by overlapping activities
- Coordinate closely with subcontractors

4.9. Wage Restraints

A pressure for higher income is often supported by increased productivity unless it reflects an inflationary trend. In construction industry, in order to survive the market in bad economy, the work force should accept the wage restraints (Ren et al., 1996). Fixed-price wages can be negotiated with subcontractors in exchange for certain amount of contingency in the case of unexpected inflation. This way the owner can keep the final price under control.

4.10. Project Mix

“As Private sector investment is more sensitive to inflation than the public sector investment, predicting the inflation can allow a company to alter the public/private ratio of its works to favor the public sector. A more aggressive bidding policy towards the public sector may well allow the company to ride out the recession with this work” (Ren et al., 1996, p.305).

4.11. Insurance

Insurance companies present the escalation insurance to the construction industry that adequately insures contractors from uncontrollable risks. Application of this insurance reduces the certain risks for contractors which makes it more desirable for them to get involved more actively in projects during uncertain economic situations (Kangari, 1995; GC 1, 2013).

5. Comparative Effectiveness of Various Delivery Methods in Sustaining the Construction Market in an Uncertain Economic Condition

Table 1 includes the result of a comparative analysis of various delivery methods and their effectiveness on sustaining the construction market in an uncertain economic condition. Further descriptions are provided below the table.

Table 1: Comparative effectiveness of different Project Delivery methods in sustaining the construction market in an uncertain economic condition

	Design-Bid-Build	CM at-Risk	Design-Build	IPD
Risk Analysis & Go/ no go decision	Easiest to make go/no go decision More predictable Lower risks	Predictable	Less predictable especially in uncertain economic condition	Less predictable especially in uncertain economic condition
Fluctuating Contract	NOT Applicable	✓	✓	✓
Indexation	Low bidders usually do not include much indexation	✓	✓	✓
Contingency	High contingency (Risk shifting)	High contingency (Early pricing)	High contingency (Early pricing)	Less Contingency (Shared risk)
Trust/ Cost plus/ Open accounting	NOT Applicable	✓	✓	Compatible
Joint-Venture Organization	Not Applicable	Not Applicable	✓	✓
Shorten the Project Cycle	Not Applicable	✓	✓	✓

5.1. Risk Analysis

Contractors perform risk analysis during the business development phase in order to evaluate the level of risks and rewards involved in the project and to make a go/no go decision. The earlier in the project, the higher the uncertainties involved. It would be much easier for a contractor to assess and predict the risk of price escalation at the beginning of the construction phase than early in the design phase. Thus, compared to a Design-Bid-Build approach, the Design-Build or Integrated Project Delivery (IPD) involves higher risk of uncertainties when price commitment is made.

5.2. Fluctuating Contract

A fluctuating contract type takes the burden of price escalation away from the contractors. A fluctuating contract, however, cannot be applied in a fixed price contract, like DBB.

5.3. Indexation

While indexation can be applied in any project delivery method, it is more applicable to the cost plus and negotiated type of contract and qualification-based selection procurements. Often time, the low bidders in DBB approach do not include much indexation in their bidding price.

5.4. Contingency

Alternative delivery methods, like CM at-Risk and DB involves a higher percentage of contingency because of the early pricing commitment when design is not complete. IPD contingency is shared and thus it reflects the true project risks.

5.5. Shorten the project life cycle

The shorter the project schedule, the less risk of price escalation would be involved. As a result, the project delivery methods which allow overlapping of the phases and fast track are less risky to pursue in an uncertain economic condition.

6. Conclusion

Price escalation is manifested through the increase in labors' wages and materials/equipment's price. Economic condition affects a capital project from the bottom up, starting at the supplier and subcontractor's level of the supply chain. This research recommends that the owners and contractors enter into a fixed price contract with their suppliers, manufacturers, and subcontractors at the beginning of the construction to secure the construction price and keep it independent of the economic condition.

However, if the owner seeks to sign a contract with a general contractor early in the project during the programming or the design phase, a fair practice would be for the owners and contractors to get into a fluctuating type of contract or a cost plus contract. As the contractors do not have any control over the economic condition and it is not fair if the owners shift this risk to them. Contractors do not accept any risks without including an equivalent contingency. In such case, if the price does not escalate the contractor will earn a higher profit, and the owner ends up paying more than the actual cost of the project.

The most optimum approach for early pricing in an uncertain economic condition is to establish a target price and a cost plus EMP contract, which can be fluctuated if there is a price escalation before construction begins. In such circumstances, open accounting and trust-based relationships is essential to such conducts. In general, it is not fair for the contractors to hold responsible for the market price escalation occurred after the award of their contract and before construction begins. The owner can get more value for their money if they accept the risk of price escalation before construction begins. IPD approach seems to be the most suitable platform for implementing a target price and EMP contract.

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