An Analytical Study on the Application of Project Management Techniques among Medium-sized Construction Firms in China and the Extent of their Efficacy on Successful Project Implementation

**Introduction**

Project management is essential for the successful implementation of any project, whether large or small. Especially for small-scale family owned businesses, the effect of successfully carrying out even these projects can be of great significance to the future of any venture. Project management emerged from large scale defense projects in the 50s (Morris, 1997, p. 5). Since then the diffusion of techniques across the construction industry has been fundamental to the operations of business throughout the years. Small scale businesses have been known to implement a project management technique in some form or the other.

**Project Management in the Chinese Construction Industry**

Project management involves detection and avoiding problems, managing resources and achieving mission objectives in an effective and concise manner (Reiss, 1995, p. 8). China is largely viewed as the construction market of the 21st century; many a large construction companies in China embark on critical infrastructure projects around the whole world (Sridharan, 2007, p. 4). While this might be a wide and complex scope to examine it can be quite interesting to study what project management techniques small-scale construction firms implement. It is equally important to theorise at this point that the level by which project management is applied by these firms differs from one company to another; this difference
An Analytical Study on the Application of Project Management Techniques consequently affects the outcomes and eventual survival of any construction company in the Chinese market.

Since China reformed and opened up its construction industry to the global market; it has witnessed phenomenal growth over the last 30 years. China’s construction industry output is now more than CNY 13 billion a year. This value has increased consistently at an annual rate of 22.6%. Nonetheless, the profit accrued from investments in the construction industry has increased by 24.4%. Cumulatively, China’s construction industry has gained over CNY 4 trillion over the last decade. (Statista, 2015, n.p.) Its contribution to the country’s economy has risen from 3.8% in 1978 to 6.6% by the year 2011 (China State Council, 2012; Qi & Chen, 2014, p. 322). More than 22% of all global construction contractors in the world are from China. The changing fortunes of both the domestic and international markets in China’s construction industry are attributed to China’s combination of indigenous and assimilated project management model and methods.

Over the three decades of defining change, China has undergone three paradigm shifts in construction project management. The first paradigm relied on internal contact management and social subdivision of labor in order to increase productivity. The second paradigm merged marketing principles with traditional project management techniques. The current phase enjoys a lot of innovation; China’s construction industry are using more of their own project techniques rather than relying on the expertise they obtain from the Western construction industry(Qi & Chen, 2014, p.323). However, the extent to which small-scale and medium-level construction firms have been affected by this change has not been widely studied.
The strength of the Chinese construction industry lies in its sheer size. Investments in the construction market have more than doubled over the last four years. Business opportunities are ripe for small or big construction firms that want to tap in the big ‘urbanization boom’ in the country. As of 2007, there were 15,545 design firms and 104,297 construction firms in China. A combination of these companies employed over 40 million people. Additionally, the construction industry in China consumes a lot of raw materials for internal projects; China cumulatively uses 25% percent of the world’s produced steel. While a lot of urbanization is focused on major cities such as Shanghai, Guangzhou and Beijing, smaller cities and towns have not been left untouched by an ominous growth in construction development (both civil and private). Therefore, based on the outstanding performance of China’s construction industry it is quite logical and in fact exciting to study out how small scale enterprises manage their projects for effective outcomes. This implies a critical study of the techniques they use, and whether such techniques play a part in its persistent growth. It is good to note that the partial liberation of the Chinese economy has brought with it new trends including public-private partnership in the construction industry.

Figure 1: Investments in the Chinese Construction Industry: Blue Stands for Fixed Asset, Red Stands for GDP of the Construction Industry and White Stands for the Value the Construction Industry Gained from 2001-2006 (Figures in Millions of Renmbi)
Chapter 2: Literature Review

2.1 A Concise History of Project Management Techniques

The emergence of project management techniques can be traced back to the 1950s. The US was carrying out large defense project that called for a new approach to handling complex project whose time limits were unknown. Project Evaluation Review (PERT) was invented to cater for this class of projects, which had a high level of uncertainty and unique project needs (Azzorpardi, 2010, para 5). On the other hand, industrial projects carried out by E.I du Point de Nemours, an industrial conglomerate had fixed time schedules, and their needs were known. The Project Planning and Scheduling technique (PPS) was developed for this purpose. PPS unlike
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the PERT approach, required realistic estimates of time and costs. The PPS method was later reworked into the critical path method (CRM). CRM has been very popular in the construction industry during the 1960s and 1970s. Large companies implemented both the CPM and PERT method for their project. This intense growth was characterized by the development of computer software systems dedicated for project management. However, the adoption of these tools into the industry was not widely adopted due to computing and developments costs. It was only in the 80s and the 90s when the full integration of project management software begun in the construction industry (Azzorpardi, 2010, para 6-7). Since the end of the Cold War in 1991, project management techniques have changed in a majority of Socialist countries to embrace capitalistic principles of cost effectiveness and profit.

2.2 Project Management by Chinese Construction Companies

Current literature reveals that they are many studies on project management practices in the Chinese construction industry. A number of this studies focus on the management of general projects in China. Ling et al. discusses fundamental management practices of Singapore firms operations in China (2007, p. 987). Additionally the authors try to develop models that can predict project performance in China (2007, p. 987). Nonetheless, these studies do not show a clear distinction between big and small scale constructions firms nor do they have a clear differentiation of large and small scale projects. Assaf et al. shows that large projects in China are characterized by systematic delays due to delayed financial provision, contractual issues and bureaucracy in state-private partnerships (2006, p. 352).
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Chan et al, on the other hand argues that project management in China involves a lot of cooperation with the local authorities if it is to become successful (199, p. 273). Additionally, it is useful to note that there are significant differences in project management strategies when China is compared to other countries. Indeed there is a quite different professional system in China; therefore international construction companies wishing to engage in Chinese construction companies will find a number of PM practices that are unique to the Chinese mega construction industry (Chan & Chan, 2002, p. 273). According to an empirical study made by Temitope and Ying, five critical Project management techniques were used by international construction firms managing mega-sized projects in mainland China (2012, p. 326). These practices include; (1) preparing high-quality schedule, (2) establishing prior working relationship with clients/owners and project team members, and (3) directly choosing project partners and engaging with local partners. Temitope and Yean urge other companies to consider the experience of existing international construction companies in China when making project management decisions for their own projects in the country (2012, p. 329).

The Chinese construction industry is centrally governed through the Ministry of Construction and the National Development and Reform Commission (NDRC). This centralized administration of the construction industry is further mirrored onto the provinces. Zhou and Ma, argue that these bureaus both at the ministerial level and the provincial level handle a huge chunk of construction-related administrative duties in China. Additionally, NDRC in collaboration with MoC are charged with the long-term construction plans for urban districts. Moreover, the State Council has the duty of approving all major ministerial and municipal projects in line with macro-
An Analytical Study on the Application of Project Management Techniques sets economic reforms which it sets. The authors go ton to add, that a proper understanding of this institutions might eventually affect the project management technique a local construction firm implements for its projects (Zuo & Ma, 2016, p. 2).

Moreover, Zhou and Ma identify a distinction between the way project management was carried out in the past and the way it is implemented now.

Traditionally, project management was carried out through a central Project Headquarter which is established on behalf of the client. This headquarter has in-house staff from various departments who manage the project from inception to eventual completion. However, a client retains the right to hire external experts who looks after the technical issues. Usually, these managers have professional management background though skills in contract law are not necessarily (n.d. p. 4). This rule does not apply to explicitly apply to government-mandated projects.

Government funded projects through its parent organization is responsible for all aspects of the project including project managements. Zhou and Ma admit that I such cases the processes are not necessarily transparent; therefore they can lead to unnecessary wastage of resources and considerable delays (n.d. 4).

However, the new project management practices encourage the industry to adopt the Engineering-Procurement-Construction (EPC) method to promote the engage Project Management Consultants (PMC). PMCs are directly employed by the client to manage the entire project from beginning to end. Even in government-funded construction projects, projects management tasks are delegated to the PMC. In this way, costs can be significantly reduced, since the government also offers an income incentives for considerable savings made on the project (time and money).
Florence et al categorizes factors that contribute to project success into five main categories: project-related factors, project procedures, international construction management, project management actions and the external environment (2007, p. 3; Chan et al, 2004 p. 154). Additionally, the authors suggest a ninth project management function which is the management of externalities. Ling et al studies how the nature of the project, clients, consultants and contractors alike affect the efficacy of project management structures (2004, p. 518). Ling argument is extended by Chen and Partington to include a study on the uniformity of project management techniques in China. Both authors agree that project management is not uniform across the country but it is a cultural sensitive issue (2004, p.398). Chen and Partington agree that a study of project management techniques in China should take into account cultural differences, people’s beliefs and understanding of project management theories and practices (2004, p. 403). It is fundamentally true because business relations in China or any venture for that matter is dependent on the level of social relationships contractors build with clients; unlike in the UK, where most business is done purely on professional grounds (Chua, 2012, para, 1-4).

Western project management may not necessarily be supported in China nor do many Chinese companies adopt western project management techniques. Wang and Liu identify three major traits of the Chinese traditional culture that might inhibit the adoption of western project management techniques. This includes a strong hierarchy in Chinese enterprises, inherent family consciousness and strict subordination (Wand & Liu, 2007, p. 67). It is a significant advantage to know for western investors to understand the Chinese culture before engaging in any construction business in China.
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It is widely acceptable that some form of project culture might have positive ramifications to project performance than other cultures. A quantitative analysis made by Zuo and Zilante show that an integrated, cooperative and people-oriented culture is necessary for positive performance in any construction project (2012, p.25). However, the construction industry is fragmented, the design part is different from the construction part. However, an integrated construction culture can reduce the redundancies that affect any project management and consequently its delivery. According to Walker et al. cooperation, mutual trust team work and open communication are necessary ingredients for a successful construction company (2002, p. 7).

The Chinese culture mainly concentrates on the creation of social harmony and trust among people. It is a fact that extends in the business world and especially in the construction industry (Batonda& Perry, 2003, p. 1552). In the Chinese business culture embarrassment and honor is taken with high regard this means that employees strive to retain their respect to their senior and not necessarily on the project objectives. Consequently, there is virtue in one’s social positioning even at work places (Frank, 2000, p. 880). Essentially, junior members of any construction project in China will try to evade any avoid any verbal confrontation with their seniors. Hence, open communication as applied in Western forms of project management is hampered in Chinese project cultures.

Zuo and Zilante argue that Chinese construction firms place more emphasis on building and maintaining interpersonal relationships between workers. This kind of relationship is referred to as Gaunxi and it is the preferred information exchange protocol between employees in all indigenous companies in China. It is clear from
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Zuo and Zilante’s research that the success of any construction project in China is dependent on a good relationship with the client more than the relationship with workers or team members (2010, p. 25). Construction clients in China have complete power over the construction process hence project management see the need to appease at the expense of fellow workers.

Nonetheless, collectivism and a general avoidance to high risk situation defines most of the Chinese project culture (Brockner et al, 2001, p. 310). Nationally a lot of Chinese people do not tolerate high risk scenarios nor do they have a good opinion about ambiguous situations. They fear unstructured an unpredictable situations and prefer stable and predictable scenarios. It implies that the Chinese firms usually prefer predictable events than a flexible working environment. Therefore, there is an in-group/outsider mentality that pervades Chinese project culture and it might as well affect the outcomes of project. Especially, if a project incorporates multiple firms; their willingness to cooperate may not be as strong as in the Western project culture (Zuo and Zilante 2012, p. 26). While Western project management techniques are focused on achieving the target in a precise amount of time. Chinese construction firms might be interested in the process apart from the final outcome of the project. Consequently, there might be delays in completing large projects that involves multiple sub contracts and routines.

The conception that project management consultants or even the firms might have in China is different from that conceived in the western world. Chen et al classifies the Chinese conception of projection management work into three main areas: (1) planning and controlling, (2) coordinating relationships and (3) developing relationships. It is evident that Gaunxi plays an important role in how Chinese
An Analytical Study on the Application of Project Management Techniques perceive project management (Chen et al, 2008, p. 658). Different attributes of project management have different meanings and application in Chinese business and hence it might affect the efficacy of certain project management techniques. However, China has become a large economic power and the forces of globalization act upon her. This interaction has driven the country into higher levels of standardization in project methodology and practice. However, this phenomenon is mainly observed in major cities where there is a greater level of globalization than other cities or towns (Zoninsen, 2011, p. 46). By doing this China seeks to compete at a global level with other professional project managers who eye the same contracts in the interior urban developments.

Qiang cites the liberalization of the Chinese economy as the advent of Western project management practices in the country (2011, p. 1017). He notes that the Lubuge Hydropower Project in China’s Yun Yan province was the first to adopt western project management techniques due to conditions set by the World Bank. The use of international competitive bidding (ICB) and the success it brought to the Lubuge Hydropower Project convinced the Chinese those adopting Western project management techniques would ultimately reduce costs and the project deliverables would be done in time. As history as it, the Lubuge project was 43% cheaper than the most Chinese contractors had bid for. Additionally, due to efficient project management the project was completed five months ahead of time (Yang, 1987, p. 1).

The Lubuge impact shocked the industry at large and the government began to implement new project management practices in light of this event. The Chinese State Council investigated the feasibility of adopting modern project management practices and concluded in favor of the ‘Lubuge effect’. Gradually, the Chinese government has
An Analytical Study on the Application of Project Management Techniques decentralized the management and scheduling of projects; it has adopted a commercial approach to project management. Policies and laws have also continuously changed in order to cope with Western project management practices. Moreover, project management has not only been applied to the construction industry; but it is initiated in other issues such as health and safety, environmental protection and other administrative units. The first project management standard to be published in China was back in 2002, which was then revised in 2006 (Qiang, et al, 2009, p. 1017). Currently, construction companies are even creating their own project management techniques and developing organizational capabilities to successfully implement them in small, medium and large projects.

In a case study conducted by Qiang et al, it is evident that there is a high level of implementation of project management practices in the construction industry. Six out of six large companies had some form of project management technique or the other. Additionally, the study’s entire respondents had their own unique project management methods, and measures to assess their effectiveness. Moreover, the organization identified 11 crucial aspects of project management that had the most effect on the efficiency of a program. This includes well defined project management techniques, procedures, templates and guidelines. Senior management support, clearly defined project manager’s roles and attention to stakeholder management were other attributes of good project management. Nevertheless, effective resource planning and contract management were considered as highly vital elements of effective project management practices in the country. Yet a majority of respondents agreed that 11 aspects were equally important.
Qiang et al goes on to expound on the advantages construction companies get when they use project management techniques. Even though his study largely draws respondents from large construction companies in China, he classifies these advantages into themes that might be observed in a similar study but for medium-sized construction companies. Companies cite better project control, increased organizational reputation and increased profitability as advantages they have witnessed since they implemented their own project management techniques. Nonetheless, the companies have also experience greater project transparent, gotten better client ratings and increased the number of projects they were handling. Yet they also claim that there has been proper utilization of resources and increased innovation for cheaper solutions. Collaboration has also been made easy in multiorganizational projects and communication has been greatly enhanced (2009, p. 1023). Though, according to Qiang, the advantages witnessed by large companies varied with the industry. While, huge project such as hydroelectric power plants enjoyed increased profit management, road construction companies did not specifically have that kind of advantage due to external market parameters.

As construction project management techniques become widely applied in large construction companies so does it lose China lose its appeal of low labor costs. Due to globalization, China’s construction industry has witnessed three project management paradigm changes. Through these changes, the meaning and practice of project management have incurred considerable costs on clients and investors as medium-sized and large companies get outside the country for better opportunities (Qi & Chen, 2014, p. 327).
While much of China’s project management techniques are borrowed from the Western project management culture there is a thing or two companies in the West can learn from the Oriental project management practices. In collaborative project that engage multiple companies, it is not easy to transfer risky ventures to Chinese companies. There techniques are weaved around the fact that they can handle less risk than other companies would actually do. This means, agile project management techniques cannot bring good result in a large part of the Chinese market. In fact, even the Chinese defense industry do not undertake such risk ventures in developing new technology, instead they outsource technical capability from global defense contractors from Russia. Conversely, expats managing project construction project in China must be adept in Risk management (Briggs & Dodyk, 2010, p. 3).

Various researchers, use specific parameters to measure the efficacy of project management techniques. Qiang, measures the efficacy of project management techniques using costs and time parameters (2009, p. 1020). Additionally, he references the satisfaction of clients as a measure or efficient project management techniques. However, the success of project management techniques might be assessed through other indirect factors, the level of communication and the efficiency of organizational culture. Although, the difference in measurability of these parameters and their correlation varies from one project to the other.

Nonetheless, Chinese usually take more time than other project management teams would, this implies that they pay more attention to the details than on the end goal. Chinese project managers usually use ‘backward planning’. The dates are inflexible; therefore, they have to optimize on time than on the project deliverables. Usually in construction projects that have limited resources, this practice would save
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However, the reality is that there are no substantial studies on the application and consequences of project management for small-scale companies. Even in large companies the scope is not wide enough to obtain a general pattern of project management in major segments in the industry. Additionally, project management in China is at a young stage, not many studies have drawn on the adoption of Western project management practices in the Orient. Additionally, studies that have been conducted have largely focused on projects that make international headlines or Chinese companies with outside investors. Therefore, in light of this review, a close use of project scrutiny of project management techniques becomes important in understanding how it can possibly improve the efficiency of small-scale contractors.

2.3 Objectives of the Research
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In light of the impending shortage of research on project management techniques in the Chinese construction industry, the following objectives of this research shall be:

1. To identify project management techniques (either western or indigenous) used by smalls-scale construction firms in China.
2. To determine if there is a correlation between the use of project management techniques and the efficiency & productivity of small-scale construction firms in China.
3. To determine the level of efficacy that can be attributed to the use of project management techniques in small scale Chinese companies.

2.4 Formulation of Research Question

**Central Research Question** Does the use of project management techniques by small-scale Chinese construction companies enhance their level of efficiency and productivity?

**Hypothesis (h1)** there is a positive correlation between the frequent use of western/indigenous project management techniques in China and their levels of productivity and efficiency.

**Null Hypothesis (h0)** there is no correlation between the frequent use of western/indigenous project management techniques in China and their levels of productivity and efficiency.
References


Chan, A. P. C., Scott, D. and Chan, A. P. L. 2004. Factors Affecting the Success of a


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