Project management best practices for the developing construction industry

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ABSTRACT

The construction industry is a significant part of economic in each country and makes an important contribution to gross domestic product, employment and capital formation. There are various problems encountering the construction industry and these hardships run rather deeper in developing countries.

Purpose/methodology: In an effort to investigate and develop the construction industry in developing countries in Asia, especially in Iran, this study aims to examine the understanding, profitability and public satisfaction about the construction project and focuses on nine areas of distinct project management knowledge in order to verify their level of implementation these factors into the construction context. The large number of professionals of construction industry of Iran was chosen for this research, the research was conducted through a structured questionnaire. The analysis method in this research is quantitative. SPSS version 19 was used to analysis the data.

Findings: This study finds out that public satisfaction have direct effect on profitability of the constructions project and, also a majority of respondents believe that project managers have an effective role to develop construction industry. In addition, the level of implementation project management knowledge areas in current construction industry in Iran is less than average.

Introduction

The construction industry is a significant part of economic in each century, it makes an important contribution to Gross Domestic Product (GDP), employment and capital formation (Hillebrandt, 2000); and has forward and backward linkage impacts along with several other sections (World Bank, 1984). One of the other contributions of the industry is capital formation, and thus a remarkable proportion of each nation's savings are represented by its products. Since it gives birth to the nation's physical infrastructure and other productive assets, the industry is of crucial significance in the national development of developing countries.

The construction industry of Iran has been experiencing a turnaround since 2005 and is thought to grow 6.86% year-on-year (y-o-y) in 2007. In spite of the United Nation (UN) sanctions on Iran, foreign investments in the country have not reduced, contemplating well on its business potential. Industrial construction displays powerful growth potential. This report predicts that the industry is probably to be valued at $13.10 billion in 2008, and it registers an average growth of 4.40% over 2008-2012. Urged by its necessity to enhance its infrastructure in order to reach the fundamental global standards, and the necessity to provide housing for its burgeoning population, the construction industry of Iran will go on to enhance in the medium term. BMI foretells the industry to be valued at $ 26.40 billion by 2012 (Iran Construction Reports, 2008).

But serious matters such as poor building standards and systemic corruption are essential to be introduced to upgrade the nature of construction in Iran. In addition, construction costs which are provoked by very high land prices have resulted in a disinclination to combine modern technology. Uncertainty in politics, largely as a result of the continuous international stalemate over the nuclear ambitions of Iran, may also confirm to be a serious obstacle (Iran Construction Reports, 2008).

The lack of appropriate housing is a big concern for a huge section of the population, which is already worn out by the high rate of inflation and unemployment. Iran is, at least, in need of 5 million new housing units. Industry analysts express that modern technologies can be helpful in accelerating construction work and increasing safety standards. Now, the half of the construction costs are due to inflated land prices and the builders are unwilling to spend money on new technologies. The prices of housing and property increased, because of a rise in market liquidity and an increase in the cost of raw materials in the ending March 2007. In the second half of the year, although there was an increase of over 50% in some parts of the country, in Tehran the Housing Unit Price Index increased by over 21% (Iran Construction Reports, 2008).

Construction Industry Development

There are various problems encountering the construction industry and these hardships run rather deeper in developing countries. The adverse effects of these hardships are also more serious. Simultaneously, there are scarce resources and expertise for addressing them; therefore, the necessity for action is even more critical. The industries of nations at all levels of economic advancement are related the concept of construction industry development. However, the essential measures will be different from countries' various categories.

Construction industry development can be described as research and practical effort in order to improve the construction industry (Ofory, 2000). Generally, construction industry development includes:

- Institution building
- Materials development

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- Human resource development
- Technology development
- Improvement of the business environment
- Corporate development

Development and research in each of the areas stated above should be integrated in right way, in order to develop construction industry.

In 2002, Loo conducted a study in order to investigate to find factors for developing construction industry in Canada. Based on the results, He separated the factors in two categories, "people'' and "technical''. The technical factors needs were:

- Integrate project management system (PMS)
- Efficient contract management
- Efficient scope management
- Efficient project planning
- Efficient scheduling
- Efficient controls

The people factors were:

- High coordination among team members of project
- Stakeholder participation
- Efficient communication between internal teams and external team
- Customer satisfaction

Quality management is a significant factor for developing construction industry (Jawaharnesan *et al.* 1997; Orwig *et al.* 2000; Stamatis *et al.* 1994). In 1997, Jawaharnesan investigated project management best practices in the UK construction industry and showed that "preparing and organizing'' and "developing project definition" were the most important ranked among the other tasks.

Best practices cannot emerge from a vacuum, an organizational culture is important to the existence of those values and nurtures of best practices (Cooper, 1998; Kerzner, 1998). In 1997 McLagan and Mirabilein said that, one fundamental element is the existence of competencies where competencies can be considered as a set of:

- Knowledge
- Abilities
- Skills
- Competencies
- Output competency
- Task competency
- Activity of competency
- Result of competency

In terms of leadership, three different types of competencies are needed: leadership competencies such as the capability of leading change; personal skills such as high achievement motivation and persistence; and functional competencies such as technical and human resource management skills (Thite, l999).

In addition to competency, there is a remarkable focus specifically on project leadership. For instance, Zimmerer *et al.* (1998), mentioned that in their study of American project managers, the highest rated features for effective project managers and for project success were team building, communicating, demonstrating trust, and focus on results among others. Likewise, the central project tools for success were execution planning, budgeting, and project scheduling, among other tools.

Their profile: "reveals a leader who recognizes that it is absolutely essential to build a project team, reinforce positive behavior, communicate, demonstrate trust and respect, develop team members and empower them to perform and set goals

while remaining flexible to respond to the inevitable changes'' (Zimmerer *et al.* 1998: 127).

Project Management

The business dictionary (Longman, 2007) defines the word 'project management 'as the body of knowledge concerned with principles, techniques, and tools used in planning, control, monitoring, and review of projects. McGraw-Hill dictionary (Hill, 2003) defines the Project management as the art of directing and coordinating human and material resources throughout the life of a project by using modern management techniques to achieve predetermined objectives of scope, cost, time, quality and participation satisfaction. In addition to project management institute (2004) define it as: skills, tools and management processes required to undertake a project successfully"

Six stages of project management in life cycle of construction project:

- **Project Definition:** clarifying the objectives and factors of the project in order to make the project successful.
- **Project Initiation:** determining project requirements such as resources, equipment, Project teams and in addition planning before the project starts.
- **Project Planning:** establishing plans to show time line of the project in order to control and measuring time, cost and scope of the project.
- **Project Execution:** starting project to achieve the goal of the project.
- **Project Monitoring & Control:** Monitoring operation of the project in order to move in the right way and runs smoothly.
- **Project Closure:** finishing project according to the data (contract) in budget, time and quality.

The important role of project manager in construction industries is to balance time, cost and scope in the life cycle of the project. Time is an important factor, as uncontrollable items in construction projects and a major reason to finish the projects with delay. Generally, the main reasons for Construction Company to fail in terms of time are due to lack of cost, construction materials, and human resources. Project manager estimated cost before starting the project in order to improve productivity and allocate costs for each activity. Successful project managers consider the extra cost for additional activities and manage any changes in the scope of the project with regards time and cost, therefore they can control risk. The aim of the project management triangle (time, cost, scope) is to finish the project on desired project quality.

Figure1.Effectivenecy of project management roles and responsibilities

The role of the project manager encompasses many activities including:

- Planning and defining scope
- Activity planning and sequencing
- Resource planning
- Developing schedules
- Time estimating
- Cost estimating
- Developing a budget

- Documentation
- Creating charts and schedules

- Risk analysis
- Monitoring and reporting progress
- Team leadership
- Strategic influencing
- Business partnering
- Working with vendors
- Scalability, interoperability and portability analysis
- Controlling quality
- Benefits realization

The Project Management Institute focuses on nine distinct areas requiring project management knowledge and attention:

1. Project integration management to ensure that the various project elements are effectively coordinated.
2. Project scope management to ensure that all the work required (and only the required work) is included.
3. Project time management to provide an effective project schedule.
4. Project cost management to identify needed resources and maintain budget control.
5. Project quality management to ensure functional requirements are met.
6. Project human resource management to develop and effectively employ project personnel.
7. Project communications management to ensure effective internal and external communications.
8. Project risk management to analyze and mitigate potential risks.
9. Project procurement management to obtain necessary resources from external sources.

Professional project management is the art of managing the entities (production, resources and management) through the processes fragmented into different phases of construction. Therefore the proficiency of managing organizations and processes will go to successful projects.

Methodology

In an effort to investigate and develop the construction industry, this study aims to investigate, profitability and public satisfaction in the construction project based on the present practice in Iran to explore their performance level. In addition, it focuses on nine areas of distinct project management knowledge (procurement management, scope management, time management, cost management, quality management, human resource management, communication management risk management and integration management) in order to verify their level of implementation into Iranian construction context.

However on the basis of information presented so far, the study tries to answer the following questions:

1. What is the public satisfaction about the current construction project?
2. What is the profitability of the construction project?
3. What is the role of project manager in developing construction industry?
4. What is the level of implementing project management knowledge areas in the current construction industry?

A large number of professionals of construction industry of Iran were chosen for this research (312), and difficult to face to face interviews, the research was conducted through structured questionnaires. The questionnaire was structured in the following three sections:

In the first section (background of the respondents) the following 6 items were presented in order to ask the respondents for the basic specifications: gender, age, work experience in housing development projects, the education level of respondents, respondent level in the construction field and

involvement in the housing project. In the second section of the questionnaire used in the present study consisted of 3 items aimed to investigate the level of public satisfaction, the profitability of projects and the importance of project manager in the construction industry of Iran.

The last section of the questionnaire which is in fact the main section consisted of 27 items in order to investigate the project manager knowledge areas, namely: procurement management, scope management, time management, cost management, quality management, human resource management, communication management risk management and integration management that are necessary to be taken into consideration during construction. In addition, it should be said that a 5 item Likert scale was used in the second and the third sections of the questionnaire for which the respondents were asked to circle or check their level of agreement with each item.

Having finished developing the questionnaire, it was randomly given out to 312 subjects working in Iranian construction industries. Due to the low level of participation among Iranians, unfortunately 145 subjects did not participate in the research and the researcher collected back only 167 questioners. To start analyzing the data, the collected responses were turned into numbers in order to be entered into the analyzing program. The analysis method in this research is mainly descriptive and SPSS 19.0 software was used.

Data analysis

312 sets of questionnaires were hand delivered and mailed, then 167 responses were received. The response rate of 53.52% is good. It is concluded from the present research that most respondents who were male engineers, between 35 to 45 years old, and having at least 5 to 10 years of experience involving in 10-15 projects and most of them had bachelor education (Table 1).

Reliability statistics used in this research is Cronbach alpha. It is defined as determining the internal consistency or average correlation of items in a survey instrument to gauge its reliability (Cronbach, 1951). Cronbach alpha can be able written as a function of the number of test items and the average inter-correlation between the items (Bruin, 2006). The formula of Cronbach alpha:

$$\alpha = \frac{N.\bar{C}}{\bar{V} + (N-1).\bar{C}}$$

N = number of items
$\bar{C}$ = average inter-item covariance among the items
$\bar{V}$ = average variance

According to the result (Table 2), Cronbach alpha for the 30 questions of the questionnaire is 0.997; mention that the questions have relatively high internal consistency.

In terms of public satisfaction in the current construction project, the results show that, the 35.9% of respondents believe that , public satisfaction about the construction it is not satisfactory (low) and the mean score is 2.2 on a 5-point scale (5= Very high). It can be concluded that the quality of the existing building is not suitable for public. In order to attain customer satisfaction, companies must realize what their clients need and how construction companies meet those needs. Gronroos (2000) emphasizes that clients also have specific demands concerning how they want to be treated; additionally, he believes that, "physical product or service purchased has to fit the customer's internal value-generating processes". So, for improving public satisfaction should be designed and built the project from the customer's perspective.

In terms of profitability of the construction project, Mean score is 2.56 on a 5-point scale (5= very high). In addition according table 4, low public satisfaction has a direct effect on the profitability of the project. It can be concluded that one of the important factors in the low profitability in the construction industry is not based on public comments.

According to the results, the majority of respondents believe that, the project manager has a major role to develop construction in Iran. In addition project manager's role is critical for mutual, customer satisfaction and trusting relationship as well. Project managers have a direct role to successful project according to the customer's comments (Ireland, 1992).

Based on the results in tables 5, it was revolved that, some activities in the project management knowledge are paid less attention compared to other activities in Iranian construction context. In the scope management (quality of project's contract document),in the time management (speed in responding to changes), in the cost management (quality of project's financial management),in the quality management (extent of project conforming to contract requirements),in the risk management (ability to control force resource supply or availability),in the human resource management (adequacy of workmen level to execute the work),in the communication management (likelihood of being engaged by client or project team members in future),in the procurement management (extent of being allowed to choose partners to work with) and in the integration management (quality of your project's coordination and integration among project elements).

In terms of scope management, the average mean is 2.50. This knowledge area consists of two parts, defining scope and controlling project in the right way to achieve the desired goal. The scope management is "plan to plan" (PMI, 2000). To improve scope management, the scope of the project should be defined and clarified for stockholders in order manage the project to reduce unnecessary changes. It is suggested that high quality contract document should be prepared. Time is money, according to the table 5, there exists direct effect between time management and profitability of the project, so to achieve high profit in the project, time should be controlled and managed. The most of time construction projects are finished with delay. Thus changed activities must be meticulously updated with the schedule. The project manager can use several software such as Microsoft Project, Primavera and Excel to determine tasks, (Gantt views of the project, critical paths, task dependencies or relationships and resources assigned to tasks) in order to estimate the essential time and resources needed for each activity.

In terms of cost management, average mean is 2.48; cost estimator should improve the accuracy of estimate cost of equipment, information, tooling, waste materials, services, supplies, energy, purchased components, labor and raw materials in the project in order to prepare high quality financial data. Average means in quality management are 2.68; therefore the quality plan must be created before others plans, because this plan has a direct effect on other areas including scope plan, time plan, cost plan and risk plan. Average means in risk management are 2.45. Identifying the possible risks that could have an effect on the project and ranking those risks in order to avoid them is the central task of risk management. Hence, project managers and team members should analyze project to find possible risk and solve it. Human resource management had the lowest means; 2.14. Labor issue is one of the big problems in Iranian construction industry, because workers have low levels

of education, low income, lack of motivation and family problems (Tabassi, Abu Bakr, 2009). So it needs to use trained workers to improve the quality of projects and reduce time and cost.

Based on the results, project management knowledge has direct effects on profitability and public satisfaction in the project; it means that, by using effective project managers, profitability and public satisfaction will Increase in Iranian construction industry.

Conclusion

Regarding to results, public satisfactions about construction among professionals are less than average. That arises from the lack of skilled labor, attention to customer needs and traditional management.

The construction projects should still conform strictly to contract requirements and must be according to the quality demands. In order to accomplish, it is proposed that:
- ✓ High quality management plans are adopted
- ✓ The schedule be controlled
- ✓ Adequate equipment be provided
- ✓ Adequate workmen be employed
- ✓ Resource supply is effectively controlled
- ✓ Labor issues are effectively controlled

Project managers with controlling financial and physical resources that make to project successful completion in terms of time, cost, and stakeholder satisfaction.

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Table1. Background of the respondents

		Valid Percent	Cumulative Percent
Gender	Male	65.3	65.3
	Female	34.7	100.0
Age	X<25 years	16.2	16.2
	25≤X<35 years	25.1	41.3
	35≤X<45 years	38.9	80.2
	X≥45 years	19.8	100.0
Work experience in housing development projects	X<5 years	29.3	29.3
	5≤X<10 years	35.9	65.3
	10≤X<15 years	20.4	85.6
	X≥15 years	14.4	100.0
Education level	Diploma	13.2	13.2
	BS level	47.9	61.1
	MSc level	24.6	85.6
	PhD level	14.4	100.0
Respondent level	Engineers	55.7	55.7
	Project manager	13.8	69.5
	Architecture	30.5	100.0
Involvement in housing project	X<5	14.4	14.4
	5≤X<10	22.8	37.1
	10≤X<15	38.3	75.4
	15≥X	24.6	100.0

Table2. Reliability statistics

Cronbach's Alpha	N of Items
0.997	30

Table3. Question

Question	Minimum	Maximum	Mean
Public satisfaction with the project	1	5	2.20
Profitability of the project	1	5	2.56
Role of project manager in developing construction industry	1	5	3.75

(*Note: Very low: 1, Low: 2, Average: 3, High: 4, Very high: 5)

Table4. Regression

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	181.027	1	181.027	2123.950	.000[a]
a. Predictors: (Constant), Profitability of the project						
b. Dependent Variable: Public satisfaction with the project						

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Table5. Project management knowledge

	Minimum	Maximum	Mean	
Scope Management	Statistic	Statistic	Statistic	Std. Error
Quality of project's contract document	1	5	2.22	.085
The extent of changes to contract	1	5	2.68	.080
Project's scope monitoring to identify changes	1	5	2.80	.085
Time Management				
Quality of schedule control	1	5	2.53	.087
Adequacy of equipment	1	5	3.09	.083
Speed in responding to changes	1	5	2.41	.072
Cost Management				
Quality of your project's cost data	1	5	2.67	.082
Quality of project's financial management	1	5	2.26	.076
Ability of a project to control cost of resources	1	5	2.51	.086
Quality Management				
Standard of the project's quality control and management plans	1	5	2.66	.084
Extent of project practicing health and safety management	1	5	2.90	.076
Extent of client's demand for quality	1	5	2.89	.091
Extent of project conforming to contract requirements	1	5	2.27	.086
Risk Management				
Ability to control financing risks	1	5	2.05	.077
Ability to control force resource supply	1	5	2.02	.076
Ability to control labor issues and managing risks	1	5	2.33	.087
Human Resource Management				
Adequacy of workmen level to execute the work	1	5	2.20	.081
Extent of training foreign workforce	1	5	2.08	.074
Communication Management				
Ability to maintain working relationship with clients and other project team members	1	5	2.97	.085
Likelihood of being engages by client or project team members in the future	1	5	2.51	.088
Quality of project's communication among team members	1	5	2.43	.079
Procurement Management				
Extent of being allowed to choose partners to work with	1	5	3.30	.081
Partner's experience and technical capability	1	5	2.68	.080
Plan contracting (documenting products, services and results)	1	5	2.43	.076
Integration Management				
Flexibility and adaptability of team members to the project	1	5	2.60	.077
Quality of your project coordination and integration between project elements	1	5	2.38	.070
Extent of using a consistent method to guide and control project execution	1	5	2..62	.086

(*Note: Very low: 1, Low: 2, Average: 3, High: 4, Very high: 5)

Table6. ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	191.069	27	7.077	244.614	.000[a]
	Residual	4.021	139	.029		
	Total	195.090	166			

a. Predictors: Public satisfaction with the project

b. Dependent Variable: All project management knowledge

Table7. ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	229.996	27	8.518	227.124	.000[a]
	Residual	5.213	139	.038		
	Total	235.210	166			

a. Predictors: Profitability of the project

b. Dependent Variable: All project management knowledge