

## CRITICAL SUCCESS FACTORS IN CONSTRUCTION INDUSTRY IN SUDAN

**Salma Abdalrahman<sup>1</sup>, Dr. Abdul Hamid Kadir Pakir<sup>1</sup> & Dr. Abdelnaser Omran<sup>2</sup>**  
<sup>1,2</sup> Universiti Sains Malaysia, Pulau Pinang, Malaysia

[salmahagag83@hotmail.com](mailto:salmahagag83@hotmail.com)

**ABSTRACT:** Always, the organizations are recognizing the corporate strategic into actions requires projects. Hence, it is vital that projects are successful. Critical success factors are very important cause influence that to project success. This paper seeks to identify the major factors influencing the success of the project, particularly in Sudan. A questionnaire survey was used and this survey into critical success factors for projects is based on a considerable sample of 35 participants. As results, this survey revealed that, project understanding and communication, are ranked as higher critical success factors in Sudan.

**Keywords:** Critical success factors, Construction Industry, Survey, Sudan

### 1. PREAMBLE ON INDUSTRIAL SECTOR IN SUDAN

Sudan's industrial sector enjoyed a strong momentum in 2006 and contributed to the overall economic boom the country is witnessing. Industry (oil and non-oil) grew by 9.0% in real terms in 2006 and accounted for a constant 28.3% share of GDP. Non-oil manufacturing, on one hand that makes up some 7% of GDP increased in real terms by 7% year-on-year. The buoyant oil sector, on the other hand, accounting for 15.2% of GDP and growing by 10% in 2006, made available the hard currency to finance basic imports for domestic manufacturing. Economic buoyancy, driven by the oil boom and increased openness, kept trade activity in Sudan on the rise. The total value of imports and exports increased by 18.5% in 2006. Exports grew by 17% to US\$ 5.65 billion in 2006, on account of the rallying oil exports earnings, while imports progressed by a slightly higher 19% to US\$ 7.1 billion last year. Subsequently, a sizeable trade deficit of US\$ 1.45 billion was recorded in 2006 for the second consecutive year, breaking from a trend of more modest deficits or very small surpluses since the turn of the decade. Sudan's fiscal performance in 2006 was weaker than planned, although the country has been doing generally well in adhering to an IMF-set reform agenda, aiming at restoring fiscal discipline and ensuring stability (ASG, 2007). The overall public finance deficit widened to about 4.2% of GDP in 2006, a record high, exceeding by 2% the target projected in the

2006 IMF program and increasing by 1.6% from its 2005 rate. At the level of indebtedness, available figures indicate that the end-2006 stock of external public debt is estimated at over US\$ 28.2 billion, up by 4.4% since 2005. From a high of 160% at the start of the decade, external debt to GDP declined to 81% in 2006. The banking sector in Sudan continued to benefit from the favorable economic conditions and the undergoing reforms commenced by the authorities in recent years, and witnessed an extended surge in all major sector aggregates. Banking activity, measured by total assets, hiked by an outstanding 51.2% to reach SD 2,314.4 billion at year-end 2006, its highest growth in recent years. Such a progression was mainly driven by growing customer deposits and total loans to the private sector. The former rose by a yearly 25.9% to SD 1,230.9 billion. The latter registered an even more remarkable growth over the previous year (+55.8%), standing at a record high of SD 1,058.3 billion at year-end 2006. The severe market price corrections that impacted most of the region's bourses in 2006 had limited consequences on the Sudanese stock market. In fact, while the Arab Monetary Fund (AMF) composite index of MENA stock markets dropped sharply by 42.5% year-on-year in 2006, the AMF Khartoum Stock Exchange index declined by a moderate 4.4%, moving from 205.26 at year-end 2005 to 196.30 at year-end 2006. This suggests that the buoyant economic activity in the country over the past year and the resulting high liquidity could not fully contain the effect of the stock market bubble burst.

*Table 1. GDP (purchasing power parity): \$97.47 billion (2006 est.)*

<b>Year</b>	<b>GDP (purchasing power parity)</b>	<b>Rank</b>	<b>%</b>	<b>Date of Information</b>
2003	\$52,900,000,000	68	-	2002 est.
2004	\$70,950,000,000	61	34.12 %	2003 est.
2005	\$76,190,000,000	60	7.39 %	2004 est.
2006	\$85,890,000,000	62	12.73 %	2005 est.
2007	\$97,470,000,000	60	13.48 %	2006 est.

*Source: CIA World Fact book -, information in this page is accurate as of April 17, 2007*

## **2. INVESTMENT IN SUDAN**

Economic buoyancy, driven by the oil boom and increased openness, kept trade activity in Sudan on the rise. The total value of imports and exports increased by 18.5% in 2006. Exports grew by 17% to US\$ 5.65 billion in 2006, on account of the rallying oil exports earnings, while imports progressed by a slightly higher 19% to

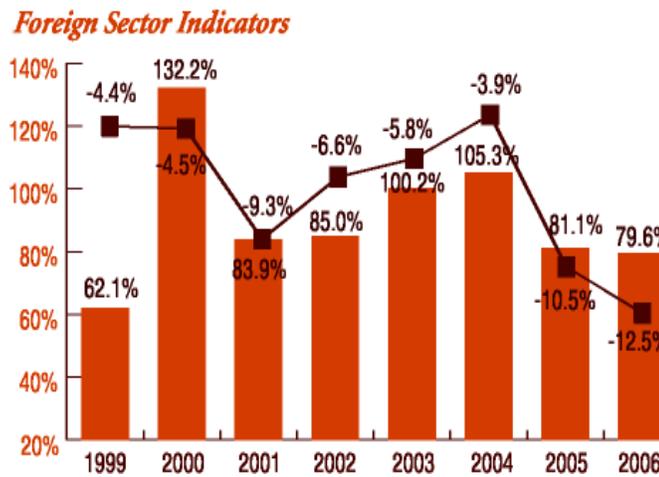
US\$ 7.1 million last year (ASG,2007). Subsequently, a sizeable trade deficit of US\$ 1.45 million was recorded in 2006 for the second consecutive year, breaking from a trend of more modest deficits or very small surpluses since the turn of the decade ,(ASG,2007). The trade deficit was 30% larger in 2006 than in 2005.

*Table 2. GDP - Real Growth Rate: 9.6% (2006 est.)*

Year	GDP - real growth rate	Rank	Percent Change	Date of Information
2003	5.10 %	35		2002 est.
2004	5.90 %	38	15.69 %	2003 est.
2005	6.40 %	41	8.47 %	2004 est.
2006	8.00 %	30	25.00 %	2005 est.
2007	9.60 %	20	20.00 %	2006 est.

**Source:** *CIA World Factbook - information in this page is accurate as of April 17, 2007*

Sudan's main trading partner is China, capturing an enormous share of exports and imports. In 2006, it accounted for 75.0% of total exports, up from 71% the previous year, followed by Japan with 9.2%, and the United Arab Emirates with 4.0%. China is also the main import source with 20.8% of total imports, followed by the European Union with 13.4%, Saudi Arabia with 8.0%, and the United Arab Emirates with 5.5%,(ASG,2007). In addition to a structural trade deficit, Sudan has been incurring a historically growing current account deficit, due to the negative invisibles' account. In 2006, the current account deficit reached US\$ 4.3 million (12.5% of GDP), up by a bout 57% since 2005. Most invisibles' receipts are aid and remittances, which are minimal, compared to the much higher payments, made for transport and travel as the country is being flooded with foreign businessmen, not to mention the repatriations of profits of foreign companies. On the positive side, Sudan is witnessing a steady increase in its capital account, that jumped by 85% in 2006 to reach close to US\$ 4.5 million and almost offset the current account deficit. The official figure estimate net Foreign Direct Investment (FDI), in 2006, at US\$ 3.5 million rising by 53% year-on-year. With increased liberalization, net FDI has not been limited to the oil industrial but targeted many other sectors, such as construction, industry, transport and banking.



**Figure 1.** Investment (gross fixed): 25.3% of GDP (2006 est.)

*Source: Central Bank of Sudan, Bank Audi's Research Department*

### 3. OVERVIEW ON CONSTRUCTION INDUSTRY IN SUDAN

The construction sector has been thriving in Sudan lately. Although it accounted for only 4% of GDP in 2006, it continued to drive economic activity, growing by a healthy 10% (in real terms) last year. The sector is benefiting from the revamping of the urban infrastructure estimated to cost some US\$ 7 billion. The Merowe Dam is one of the major infrastructure projects estimated to cost some US\$ 2 billion, with China heavily investing in it. Another example is the US\$ 500 million airport expected to open in 2011. In addition, a number of new projects targeting businesses and foreign investors are coming into the country. These consist of multibillion dollar investments in impressive retail outlets, office blocks, top-class hotels and a huge residential hinterland. Production to 2022 thousand metric tons, since factories were shut down for renovation. The current capacity of cement plants in Sudan is only about 500,000 tons, whereas the overall demand is projected to rise up to 4 million tons over the next few years. The promising outlook of the sector and the weak capacities available attracted Arab investors to join the Sudanese private sector and set a new cement company (Berber Cement) in 2005 to build a new factory with a production capacity of 1.5 million tons/year and to become operational in 2008. The construction industry has limited health, safety and environment policy. The construction industry is changing land use. They are cutting the green areas in Khartoum and creating residential areas. It is not very well

planned, and is already having a negative impact on the quality of water and soil. The long term danger is that it will lead to water scarcity and other socio-economic and health impacts,(Mohamed,2006).In the absence of guideline to regulate which building products can be imported, certain contractors are using hazardous materials. He adds, these materials will introduce chemicals that can harm the environment and the health of residents. Furthermore, construction trends currently allow for too much space between buildings. If buildings are built closer to each other they could conserve cool air better. But they are not and that means we need more electricity to keep air-conditioning running to keep building cool that also creates more pollution (Ahmad, 2007).

These views are echoed by Bannaga. A research by Bannaga (2007) stated that contractors have the freedom to do what they want. They are not thinking about how they are endangering the environment. The government runs everything. Once you have its approval nobody cares, and nobody's supervising the government. Agrees that government's control over construction needs to improve. There's gap between legislation and the monitoring of projects. We have legislation that is out of date. We need new legislation that can be applied and enforced, (Ahmad, 2007). It must be remembered that environmental management is still in its infancy in this country. Bannaga (2007) points out that that disregard of the construction industry is part of a broader tendency to sideline the environment in a country that is grappling with widespread poverty as the shantytowns of Khartoum can attest. He said we have difficulty in treating water and waste water. Most households provide their own means of discharging waste water into sub-surface soil and water. There are no waste water networks.

*"We also do not have systems for refuse collection in many areas. Most of our solid waste is burnt on the ground. We are dependant on mechanical air-conditioning and there is no eco-building"* (Bannaga, 2007).

Table 3. GDP - per capita (PPP): \$2,400 (2006 est.)

Year	GDP - per capita (PPP)	Rank	Percent Change	Date of Information
2003	\$1,420	189	-	2002 est.
2004	\$1,900	172	33.80 %	2003 est.
2005	\$1,900	179	0.00 %	2004 est.
2006	\$2,100	178	10.53 %	2005 est.
2007	\$2,400	171	14.29 %	2006 est.

*Source: CIA World Factbook - information in this page is accurate as of April 17, 2007*

#### 4. PROJECT SUCCESS

Success is an interesting word and a word that is so general and wide in nature that it is difficult to define and obtain mutual agreement when asked from different individual. Judgev and Muller, (2005) in their article mentioned that in order to define what success means in the project context is like gaining consensus from a group of people on the definition of “good art”. Project success is a core concept of project management to a project manager, but its definition appears to remain elusive. The traditional definition of project success, which revolves around time, cost and quality proved to be inadequate. In recent years, more comprehensive definitions have been coined. The purpose of modern project more than just management is to conduct a successful project. A success is on time, on budget and conformance to requirements. Success means gaining advantage, superiority, victory, accomplishment, and added value. Project success is a complex and often illusory contract, but nonetheless it is of crucial importance to effective project implementation. Project success can be achieved through the good performance of project managers in the project. Possessing the core project management competence would help to define the ability of project managers to deliver good performance towards the attainment of project success (Pheng and Chuan, 2006). Successful project delivery requires the concerted effort of the project team to carry out the various project activities, but it is the project manager who, at the center of the project network, is responsible for orchestrating the whole construction process (Bayliss, 2002). The success of a construction project depends on a number of factors, such as project complexity, contractual arrangements, and relationships between project participants, the competency of project managers, and the abilities of key project members (Chua *et al.*, 1999; Mohsini and Davidson, 1992).

## **5. FACTORS EFFECTING OF THE PROJECT SUCCESS**

Project success factors are those input to the project management system that lead directly or indirectly to the success of the project or business (Cooke and Davies, 2002). Belassi and Tukel, (1996), categorized success factors into four main group. These are factors relating to the project managers, factors relating to the project, factors relating to the organization and factors relating to the external environment. (Chan *et al.*, 2002) Identify a set of project success factors; project team commitment, contractor's competencies, risk and liability assessment, client's competencies, end-users' needs, and constraints imposed by end-user. Shenhar *et al.*, (2002), used multivariate analysis method to identify project success factors. They found that project success factors vary with project type, they depend on high uncertainty or low uncertainty, and that project managers must carefully identify the factors that are critical to their particular projects. High – uncertainty projects demand a specific focus on project definition, milestones, design, documentation, and policy and customer participation. Low–uncertainty projects need to focus more on formal and structured selection of contractors, budget monitoring, quality and managerial autonomy.

## **6. METHODOLOGY**

This study was carried out using structured questionnaire. As stated by (Sekaran, 2003) questionnaire is a popular method of collecting data because researchers can gather information fairly easily and the questionnaire responses are easily coded. The dependent variable for this study is successful project management in construction industry. This dependent variable is measured using 13 items. These items were rated using a 5- point Liker scale with 1 representing strongly disagree to 5 representing strongly agree.

### **6.1 Population and sampling size**

The respondents were contractors, project manager, consultant, developers, engineers and architects who were involved in construction projects in Sudan (please refer to Table 4). A total of 45 questionnaires was selected randomly and distributed by post and 35 samples were returned and analyzed with response rate (78%).

Table 4. Respondents Background

Type of respondents	Frequency (percentage)
<b><u>Type of respondents position</u></b>	
1. Project Manager	6 (17.1%)
2. Architecture	8 (22.9%)
3. Engineer	9 (20%)
4. Contractor	8 (22.9%)
5. Consultant	6 (17.1%)
<b><u>Working area</u></b>	
1. Contractor organization	14 (40%)
2. Engineering firm	17 (48.5%)
3. Project Management firm	-
4. Client organization	-
5. Others	4 (11.4%)
<b><u>Working experience</u></b>	
1 – 5 years	7 (20%)
6-10 years	8 (22.9%)
11-15 years	3 (8.6%)
16-20 years	6 (17.1%)
Above 20 years	11 (31.4%)
<b><u>Type of project that are develop</u></b>	
Building	21 (60%)
Heavy engineering infrastructure	8 (22.9%)
Others	6 (17.1%)

## 6.2 Data processing and analysis

All the collected information from the survey were checked and verified for their correctness. Data cleaning was carried out by checking the frequency and descriptive statistics as well as coding and data entry. The cleaned data were then analyzed to the Mean and Standard deviation in order to rank the factors. The returned questionnaires were then analyzed using Statistical Package for Social Science (SPSS); Version 11.5 for windows software.

## 7. RESULTS AND DISCUSSION: CRITICAL SUCCESS FACTORS

A critical success factors is something that the organization must do well to succeed. In terms of information system projects, a critical success factors is what a

system must do to accomplish what it was designed to do. This study has obtained nine CSFs which are described in more details as below:

Based on the mean value criterion, the first ranking by the respondents' as CSFs was Project understanding that is the major Critical success factor in construction projects in Sudan (Table 5). It is important that the project team understand the project, particularly with respect to project goals and objectives. Understanding the project mission is the most important factors related to project success (Pinto, 1988). The factors "Effective communication", "Authority of the project manager" and "Competent project team" seem to be the second-ranked factors that are as CSFs in construction projects in Sudan. Whereas, effective communication is vital in creating an atmosphere for achieving project success (Hartman, 1996). Communication is not only essential within the project team, but also between the team and the rest of the organization and the client, (Pinto, 1988). And, the competence of the project manager and project team members is a critical factor for project success, (Belassi, 1996). It is important that the project manager and project team be selected wisely to ensure they have the necessary skills and commitment to perform their functions affectively. Further, in successful project the project manager is not only strongly committed to meeting project objectives, but also has the authority to have control over developing plans, making changes as required ,and fulfilling them (Chua, 1999). Consequently, a factor such as "Realistic cost and time estimates" was ranked third. However, realistic and accurate cost and time estimates are critical to project success (Chua, 1999; Pinto, 1989). The next factor that considered as important CSFs in construction projects in Sudan was "Problem solving ability" and ranked as factor number fourth. Regardless of carefully a project is planned, it is impossible to foresee every problem that could arise. It is vital that the project team is responsive and capable of taking appropriate action when problems develop (Jiangand, 1996, Pinto, 1989). Followed by, 'resources" factor which is ranked as fifth. Factor like "Top management support" and "Adequate project control" are ranked as sixth factor respectively. However, management support for has long been considered of great importance indistinguishing between success and failure (Belassi, 1996) and (Pinto, 1989). Project management is dependent on top management for authority, direction and support. Top management should make it clear that the project is worthwhile and that they support it, (Belassi, 1996) and (Nicholas, 1989). Interestingly, many upper managers are unaware of how their behavior influences project success, (Graham, 1997). Additionally, successful projects have good control and reporting systems that

provide adequate monitoring and feedback that enables comparison of team performance and project goals (Gioia, 1996, Jian, 1996, Jaselskis, 1988). Adequate monitoring and feedback mechanisms give the project manager the ability to anticipate problems, oversee corrective measures, and ensure that no deficiencies are overlooked (Pinto, 1998). The seventh CSFs appeared in our results was the external factors. This is an important factor that project manager, engineer etc should take into consideration. In fact, the external factors which meant here are lack of materials on the market; lack of equipment and tools on the market; poor weather conditions; poor site conditions (location, ground, etc.); poor economic conditions (currency, inflation rate, etc.); changes in laws and regulations; transportation delays; and external work due to public agencies (roads, utilities and public services) and etc. Another Critical success factors were observed by the respondents was that project characteristics and it is ranked the eighth (see Table 5). The last CSFs are Client involvement and it is ranked as number ninth. However, in the project delivery is important to project success, but this study has shown that this kind of factors is ranked by the respondents as the latest factor that might be as an critical factor in construction project in Sudan. However, a research by Jiang, (1996) proved that such factor can be considered as one of the priorities factor to be making the project a success. For successful project the user must be strongly committed to the project goals and be involved in the project management process (Kharbanda, 1996).

*Table 5. Ranking the most important Critical Success Factors in Sudan*

<b>Factors</b>	<b>Mean</b>	<b>SD</b>	<b>Ranking</b>
1. Project understanding	4.7	0.6	1
2. Competent project team	4.6	0.7	2
3. Communication	4.6	0.7	2
8. Project manager authority	4.6	0.6	2
4. Realistic time and cost estimates	4.5	0.6	3
9. Problem solving	4.3	0.7	4
10. Project planning	4.3	0.7	4
11. Resources	4.2	0.9	5
5. Adequate project control	4.0	1.0	6
7. Top management support	4.0	0.8	6
12. External factors	3.7	0.7	7
13. Project characteristics	3.5	0.9	8
6. Client involvement	3.4	1.3	9

## 8. CONCLUSION

The project management process is complex, usually required extensive and collective attention to a broad aspect of human, budgetary and technical variables. In addition, projects often possess a specialized set of critical success factors in which if addressed and attention given will improve the likelihood of successful implementation. On other hand if these factors were not taken seriously might lead to the failure of the project management. As projects are used widely in the construction industry, therefore, vital to identify factors that contribute to the successful implementation of a project and to identify the factors' relative importance as the project journeyed throughout the life cycle. This paper, therefore, identified the major factors influencing the success of the project, particularly in Sudan.

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