A Theoretical Harmonization of the Factors Affecting the Performance of Construction Projects

Sibiya M., Aigbavboa C.O., and Thwala W.D.

Abstract—This study observes previous literature on the factors affecting the performance of construction projects in the construction industry, with the aim of identifying all possible factors that affect construction projects in South Africa, as well as identifying the critical success factors of construction projects. This is because the construction industry is a vital part of any economy and the failure of its construction projects affects the economy as a whole. The South African construction industry, like most construction industries worldwide, faces several problems and challenges that directly affect the performance of their construction projects and the development and growth of the South African industry. However, there are many factors that affect the overall performance of a construction project. Therefore this study will explore these factors, by examining previous literature on the factors affecting the performance of construction projects in relation to the South Africa construction industry.

Keywords—Construction projects, critical success factors, key performance indicators, performance.

I. INTRODUCTION

The construction industry plays an indispensable role in the South African economy, and is a significant contributor to economic growth [1] [2]. The construction industry in South Africa is diverse and involved in projects ranging from the development of civil infrastructure such as roads, bridges, ports and dams, the development of residential and non-residential buildings such as houses, retail facilities and offices as well as small private projects for individual home owners. The construction industry operates in a uniquely project-specific and complex environment, combining different investors, clients, contractual arrangements and consulting professions. It impacts directly on communities and the South African public at large, and its improved efficiency and effectiveness will enhance quality, productivity, health, safety, environmental outcomes and value for money [3].

A project can therefore be defined as a sequence of unique, complex, and connected activities having one goal or purpose and that must be completed by a specific time, within budget, and according to specification. The PMBOK [4] further defines a project as a temporary endeavour undertaken to create a unique product. Although repetitive elements may be present in some project deliverables and activities, this repetition does not change the fundamental, unique characteristics of the project work. For example, office buildings can be constructed with the same or similar materials and by the same or different teams. However, each building project remains unique with a different location, different design, different circumstances and situations, different stakeholders, and so on [5]. However, Construction Projects have no fixed definition; “construction work” is what actually comprises a construction project. According to the Safety, Health and Welfare at Work (Construction) Regulations [6]: ‘construction work’ means the carrying out of any building, civil engineering or engineering work, other than drilling and extraction in the extractive industries, and includes but is not limited to each of the following: alteration, conversion, fitting out, commissioning, renovation, repair, upkeep etc.

Projects have clearly become a central activity in most organizations and companies and they are rapidly increasing their investment resources in projects such as new product development, process improvement, or building new services [7]. Construction project development involves numerous parties, various processes, phases and stages of work and a great deal of inputs from both the public and private sectors with the major aim of bringing the project to a successful conclusion [8] [9]. However many studies have indicated that most projects do not meet time and budget goals, or fail to satisfy customer and company expectation [10] [7]. Notwithstanding, other factors also contributing to the failure of projects such as weaknesses in project mission and planning, lack of project knowledge, communications breakdown, lack of resources, political issue, control issues, lack of top management support, lack of technical expertise, etc. [7].
II. PROBLEMS OF PERFORMANCE IN THE CONSTRUCTION INDUSTRY

The South African construction industry, like most construction industries worldwide, faces several problems and challenges that directly affect the performance of their construction projects and the development and growth of the South African industry. Several challenges and problems have been identified by different organisations, institutions and researchers. The CIDB [1] report indicated that the major contributors to poor quality of construction in South Africa are likely to be procurement related barriers. Such procurement related barriers include: fraud and corruption, or 'political interference' (including cronyism and nepotism); the procurement and delivery model (such as the 'design by employer 'model); the use of procurement systems based on price and preference only, and not taking into account functionality (or quality); and/or insufficient information to be able to select professional services and/or contractors based on quality criteria [1]. Further, Windapo & Cattell [2] revealed the following twelve challenges said to influence the performance, growth and development of the South African construction industry: (1) Public-sector capacity, (2) Mismatches between available skills and required skills, (3) Globalisation/critical global issues, (4) Procurement practices and the capacity for sustainable empowerment, (5) Access to affordable mortgage/credit and interest rates, (6) Poverty, (7) Technology, (8) Availability of suitable land for construction, (9) Availability of Infrastructure, (10) High rate of failure of enterprises, (11) Increases in the costs of building materials, (12) Statutes and regulations. The construction industry master plan (CIMP) states that that challenges facing the industry today include enhancing quality and productivity besides high labour and material prices, inefficient and ineffective methods and practices, inability to attract and develop local workforce, inability to provide total integrated solutions and difficulty in securing timely and adequate funding [11].

Construction industries in all countries face many difficulties and challenges [12] [13]. However, the problems facing the construction industry in developing countries, South Africa is considered to be a developing country, are significantly more fundamental, more serious and more complex. In developing countries, these difficulties and challenges sit alongside the general situation of socio-economic stress, chronic resource shortage and general inability to deal with key issues [12] [13]. The construction industry faces conditions of uncertainties and risk, these risks include: Instability, Scarcities resources, relatively unskilled labour, low level of productivity, overruns and excessive wastage, poor infrastructure, Fraudulent practices and the inability to adopt best practice [13].

III. FACTORS AFFECT THE PERFORMANCE OF CONSTRUCTION PROJECTS

A construction project is completed as a result of a combination of many events and interactions, planned or unplanned, over the life of a facility, with changing participants and processes in a constantly changing environment [14]. Project success changes from project to project depending on participants, scope of services, project size, sophistication of the owner related to the design of facilities, technological implications, and a variety of other factors [15]. Construction projects are time consuming undertakings which are considered to be successful if delivered on time, to an appropriate budget and to a quality desired by the owner. Previous studies have shown that several factors influence the success of traditional construction projects [16].

A. Management in the construction industry

Management in the construction industry is considered as one of the most important factors affecting performance of works [17]. Management in the project context means to plan, organize, execute, monitor against the plan and then control by taking corrective action [18]. Successful construction project performance is achieved, when stakeholders meet their requirements, individually and collectively. The level of success in carrying out construction project development activities will depend heavily on the quality of the managerial, financial, technical and organizational performance of the respective parties, while taking into consideration the associated risk management, the business environment, and economic and political stability.

Project management is vital aspect of any project and its successful completion. The lack of sound Project Management by owner or contractors on projects leads to construction delay and extra cost for both parties. In addition to the problems that occur during construction, poor project management can also result in a completed facility that fails to meet the specified quality and suitability of material, fails to produce the intended product, or cannot be operated for its intended life [19].

There is a strong relation between project management and project performance. Management in construction industry is considered as one of the most important factors affecting performance of works [17]. Successful construction project performance is achieved, when stakeholders meet their requirements, individually and collectively. The level of success in carrying out construction project development activities will depend heavily on the quality of the managerial, financial, technical and organizational performance of the respective parties, while taking into consideration the associated risk management, the business environment, and economic and political stability [20]. The finished product in any industry requires satisfying a certain standard to provide customer satisfaction and value for money (VFM) [8]. Further, to ensure the success of a project, every organization needs to adapt good project management practices. Previous research viewed project performance as an intangible thing, especially in case of management performance, so choosing tools for assessing the performance is also a difficult job [7].
B. Risk management

Management of construction projects involves a great deal of managing risks. Managing risks involves: planning, identifying, analysing, developing risk handling strategies, monitoring and control [21]. Compared with many other industries, the construction industry is subject to more risks due to the unique features of construction activities, such as long period, complicated processes, abominable environment, financial intensity and dynamic organization structures. Risk and uncertainty can potentially have damaging consequences for a construction projects. Therefore currently, the risk analysis and management continue to be a major feature of the project management of construction projects in an attempt to deal effectively with uncertainty and unexpected events and to achieve project success [22]. Managing risks in construction projects has been recognised as a very important management process in order to achieve the project objectives in terms of time, cost, quality, safety and environmental sustainability [23]. Risk management can be described as a systematic way of looking at areas of risk and consciously determining how each should be treated. It is a management tool that aims at identifying sources of risk and uncertainty, determining their impact, and developing appropriate management responses [23].

C. Productivity

Another factor that is considered as one of the important factors is productivity; productivity affects the overall performance of any small or medium or large construction project [24]. There are a number of factors that directly affect the productivity of labour and consequently the overall project, these factors are; Lack of material, Delay in arrival of materials, Unclear instruction to labourer, Labour strikes, Financial difficulties of the owner, High absenteeism of labours, No supervision method, Supervisors absenteeism, Lack of equipment and design changes, no definite schedule, Poor management, Unproductive time (internal delay, extra break, waiting & relaxation), Lack of skill, Supervision delay, Lack of tools & equipment, Poor instructions, Poor quality of labour, Supervision factor, Material factor, Execution plan factor, Health & safety factors, Labour shortages, Working time factor, Accidents, Organization factors, Improper training, Bad weather, Use of alcohol & drug [24].

D. Non-value adding activities

Non-value adding activities also affect or influence the performance of construction projects. The term non value-adding activity is used to differentiate between physical construction waste found on-site, and other waste which occurs during the construction process. Non value-adding activities known as waste, detrimentally affect the performance of construction projects. Productivity in the construction industry is not only influenced by labour, but also by other factors such as equipment, materials, construction methods, and site management. (Alwi & Mohamed, 2002:1).

E. Critical success factors (CSF’s)

Several empirical studies into identifying the critical factors influencing the performance of construction contract were reviewed by Warazi [16]; they proposed 10 factors influencing project performance. Among these factors are project mission, top management support, project schedule plans, client’s consultations, project personnel, technical task, client’s acceptance, monitoring and feedback, communication and trouble shooting.

Saqid et al [14] Further elaborates that there are a number of variables influencing the success of project implementation they were identified following a thorough literature review. A careful study of previous literature suggests that CSFs can be grouped under seven main categories. These include: (1) Project Management Factors; (2) Procurement-related Factors; (3) Client-related Factors; (4) Design team-related Factors; (5) Contractor-related factors; (6) Project Manager-related Factors; and (7) Business and Work Environment-related Factors.

Banaitiene & Banaitis [22] stated that performance by the project management and his team highly influences the success of a construction project. Some of the incidental risks associated with poor project management performance are; Unclear or unattainable project objectives; Poor estimation; Poor scope; Budget based on incomplete data; Contractual problems; Insurance problems; Delays; Quality concerns; Insufficient time for testing.

Time and cost performance is the fundamental criteria for success of any project. Unfortunately the construction industry has been regarded as industry facing poor performance leading to failure in achieving effective time and cost performance. As a consequence most of the project face huge amount of time and cost overrun [25]. However, studies show that rarely projects are complete within stipulated budget [25]. Cost is among the major considerations throughout the project management life cycle and can be regarded as one of the most important parameters of a project and the driving force of project success [25]. Cost performance is the most important indicator of project success used by all parties. It presents not only the firm’s profitability but also the productivity of organizations at any point during the construction processes. Poor cost performance of construction projects has been a major concern for both contractors and clients [20].

F. Benchmarking & Key Performance Indicator’s

Benchmarking is a method of improving performance in a systematic and logical way by measuring and comparing company performance against others, and then using lessons learned from the best to make targeted improvements. Essentially, benchmarking is about looking at the way things are done and seeing why the performance is at a certain level, and using external comparators to improve performance. It uses data as evidence to identify who is performing better and using that understanding to drive improvement. Therefore the best examples of benchmarking are the key performance indicators [26]. KPIs are one of the factors that constitute the
project success criteria. A KPI is the measure of a process that is critical to the success of an organisation and/or project [26]. KPIs are helpful to compare the actual and estimated project performance in terms of effectiveness, efficiency, and quality of workmanship and product. KPIs can be used to measure the performance of project operation and are usually used in construction projects. Moreover, performance measurement can be carried out by establishing KPIs which offer objective criteria to measure project success [27] [7].

‘Benchmarking is the systematic process of measuring one’s performance against recognized leaders for the purpose of determining best practices that lead to superior performance when adapted and utilized’ (CII, 1995, NRC, 2005:22). Benchmarking can be applied during various phases of a project for different purposes. When applied early on, such as at project authorization, it can be used to identify characteristics that may be associated with potential future problems and to identify aspects of project management (e.g., risk management) that need special attention to ensure project success. When applied during project execution, it can serve as a project management tool to guide project decisions. Post project benchmarking is usually used to assess performance of a project delivery system to provide for lessons learned and feedback that can be used to establish benchmarks for future comparisons (NRC, 2005:23).

IV. RESEARCH METHODOLOGY

The research was conducted with reference to existing theoretical literature, published and unpublished literatures. The study is mainly a literature survey/review and looks at the literatures relating to factors affecting the performance of construction projects. This is due to the fact that factors affecting the performance of construction projects has engrossed much attention in recent years and that researchers and research bodies, be it corporate, councils or government that try to assess factors that affect the performance of construction projects, in order to avoid, eliminate or minimize those factors that negatively affect performance and promote those factors that affect projects positively, so as to improve the overall performance of construction projects.

V. LESSONS LEANT FROM LITERATURE REVIEW

Literature revealed that there is a large variety of factors affecting the performance of construction projects. Key Performance indicators are widely used in the construction industry to measure project performance and drive improvement in the overall performance of the construction industry [26]. Thoer & Ogunlana [27], together with Humaidi & Said [7], suggested that KPIs are helpful to compare the actual and estimated project performance in terms of effectiveness, efficiency, and quality of workmanship and product. KPIs can be used to measure the performance of project operation. Ten headline construction KPIs have been identified, by the UK working group, for benchmarking projects in order to achieve good performance, these include: construction cost, construction time, predictability cost, predictability time, client satisfaction (product), client satisfaction (service), defects, productivity, profitability and safety [9]. And these are also said to be key factors that affect the performance of construction projects.

There are also secondary indicators, which are classified into the following categories; a) operational indicators, which bear on specific aspects of a firm’s activities and enable management to identify and focus on specific areas for improvement; and b) diagnostic indicators, which provide information on why certain changes may have occurred in the headline or operational indicators and are useful in analysing areas for improvement in more detail. These secondary indicators therefore play a vital role in improving both project and organisation overall performance.

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Further literature reveals that management in construction industry is considered as one of the most important factors affecting performance Shaban [17] and Omran [20] informs that, the level of success in carrying out construction project development activities will depend heavily on the quality of the managerial, financial, technical and organizational performance of the respective parties, while taking into consideration the associated risk management, the business environment, and economic and political stability.

VI. CONCLUSION

This paper has observed literature relating to the factors affecting the performance of construction projects in the South African construction industry. The literature has revealed that there are a number of problems facing the construction industry that negatively affect the performance of construction projects. Literature also revealed that there are several factors that affect the performance of construction projects positively which can result in successful completion of a construction project.

REFERENCES


[23] Zou, P. X.W., Zhang, G and Wang, J. (2012). Identifying Key Risks in Construction Projects: Life Cycle and Stakeholder Perspectives: Faculty of Built Environment, University of New South Wales, Sydney 2052, Australia: College of Architecture and Civil Engineering, Shenzhen University, Shenzhen, P.R. China


