

A meta-analysis of the transformer manufacturing industry in Gauteng Province

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Abstract: A survey was conducted in Gauteng Province, South Africa by gathering data from 147 employees working in the South African power transformer manufacturing industry. Quantitative and qualitative data was gathered to conduct the survey. The results showed that the ability to complete projects successfully among employees was dependent upon a lengthy period of working experience in the industry, maturity, a lengthy period of employment under the same company, high level of formal education and the availability of an enabling working environment to employees.

Keywords: Gauteng Province, Power industry, Project management, Meta-analysis

Introduction and background to study

Over the last few decades, researchers and practitioners have attempted to identify the causes of project failure and the various factors that lead to project success. Critical success factors (CSFs) are project management inputs that can lead to project success directly or indirectly. It consists of numerous elements that must be coordinated for the project to be completed on time. Many project managers or stakeholders use various metrics to determine project performance (Alderman & Ivory, 2011: 17-30). Cost, quality, time, innovativeness, and contribution to profit are among the metrics described in the literature (Parisi & Rossi, 2015: 322-330). The mission and strategic goals of the corporate organisation are critical success elements (Wainwright & Shaw, 2013: 268-282). According to Allen, Alleyne, Farmer, McRae and Turner (2015: 20-29), external influence, project management, scope, timeline, and money all play a part in the success or failure of a project. According to Bronius, Bakinaite and Meiliene (2013: 829-836), business executives judge project success based on cost, time, and quality requirements (axiom triangle) and conclude that there is more to be done, particularly incorporating all stakeholders in the project.

According to Jefferies, Brewer and Gajendran (2014: 465-480), good project managers use key performance indicators (KPIs) for assessing the successful accomplishment of projects. According to the authors, key performance indicators are highly valuable for measuring success in projects. Important projects are costly and complicated in nature. Thus, each aspect must be measured based on measurable KPIs. According to Bronius, Bakinaite and Meiliene (2013: 829-836), the integrated performance index (IPI) is a flexible means of quantifying project success. One of the IPI's drawbacks is the practical complexity of its use at various stages of the project cycle (Todorovic, Mitrovic & Bjelica, 2013: 41-48).

Good project management skills are essential for alleviating the manpower and skills related needs of sovereign nations. Good project management skills allow managers to acquire and improve their capacity to learn new techniques and innovation. According to Allen, Alleyne, Farmer, McRae and Turner (2015: 20-29), good project management skills are essential for reducing the cost of service delivery. This is because such skills enable managers to acquire new innovative methods and skills. Good project management skills are highly valued by the United States Coast Guard in the USA. The American Coast Guard's 123-Foot Patrol Boat project is a prime example of a project that failed due to failure to utilise time, money and skills effectively. Kujala, Brady and Putila (2014: 48-58) have found that lack of project management skills often lead to the loss of money and scarce resources. The underlying causes of failure are inability to control projects, inability to draw up good project plans, deviation from approved plans of actions, failure to solicit valuable comments and suggestions from well-experienced people, poor communication, failure to consult stakeholders on a regular basis, and inability to learn valuable lessons from industry, business and commerce. The authors have shown that 4.5 billion euros and the valuable skills and manpower of 15, 000 workers were put to waste due to poor project management skills.

In high-stakes projects, it is essential to take valuable lessons and advise from well-experienced people. The scale, complexity, and uncertainty of the project has an impact on the cost management process. Kujala, Brady and Putila (2014: 48-58) have identified various issues in cost management, including (a) cost estimation, (b) cost control and monitoring, (c) revenue recognition, (d) profitability analysis, and (e) cost control and monitoring. The project manager's behavior and actions significantly impact the project's results. According to Nedohe (2020), any positive outcomes or consequences can be traced back to the steps taken by the project

manager on purpose. Each project's success criteria are measured differently. For example, cost savings, on-time deliverables, or total added value to stakeholders are all aspects that can be measured. Although each project will have specific, measurable success elements at the outset, the principles of aiming for and achieving overall project success will include the application of some fundamental leadership abilities.

Current project management practices in the transformer manufacturing industry do not always ensure project success. Projects that are carried out in transformer manufacturing enterprises (TMEs) require the ability to manage resources optimally. The success of such projects heavily depends on how well the projects are managed and controlled. The main issue with project management practices has always been identified as planning, project implementation, cost and time overruns, and quality non-attainment. Alinaitwe and Ayesiga (2013) define critical success factors as essential factors that must be maintained for teamwork to act effectively and efficiently. Critical success factors are essential to achieving and maintaining successful objectives and targets in business. According to Garbharran, Govender and Msani (2013: 90-108), critical success factors are those variables in any project management system that increase the chances of a project's success. The study of factors influencing project success and the criteria used to measure it has drawn many researchers.

Multiple studies have shown that the project leader is the most important factor in the success of a project (Hwang & Ng, 2013: 272-284). The project manager is responsible for developing an effective project strategy that will increase the project's chances of success. According to Alaskari, Ahmad and Pinedo-Cuenca (2014: 183-199), project managers must have essential leadership and managerial knowledge, skills, competencies, and characteristics that ensure successful project completion by making the right decisions at the right time and involving the right people in the right places. Well-integrated teams are the result of successful projects. Meng (2012: 75-102) has identified 15 key practical indicators for team integration in transformer manufacturing projects. Meng (2012: 75-102) has highlighted the significance of effective relationship management in the success of any project. Effective planning and management are critical to project success in the transformer manufacturing industry. Ribeiro (2013) has conducted extensive research on critical success factors in project management. Yang and Maxwell (2011) have pointed out that the quality of relationship among team members affects the success of a project. Ismail (2014) has pointed out that the most influential success factors include safety and effective communication. The survey resulted in the identification of the most influential safety factor, namely personal safety. It was immediately followed by communication.

Objective of study

The study aims to assess and evaluate determinants of successful project management in the power transformer industry of Gauteng Province in South Africa. Since 2010, the South African power utility company ESKOM has suffered lack of capacity to generate enough electrical power to the South African economy due to lack of capacity to manufacture enough number of power transformers. The study aims to identify and quantify predictors of efficiency in the power transformer-manufacturing sector of Gauteng Province.

Literature review

Aksorn and Hadikusumo (2018) have identified 16 critical success factors for safety programme mes. The level of managerial support was the most influential factor. Implementing a safety programme is one factor that governs a project's success. They identified the seven most important CSFs as follows: (1) management support, (2) clear and reasonable objectives, (3) personal attitude, (4) teamwork, (5) effective enforcement, (6) safety training, and (7) appropriate supervision. According to the study, the top three factors contributing to schedule performance for public housing projects are site management, coordination among various parties, and availability of laborers on-site. The basic criterion for measuring the success of any project is cost performance. A variety of resource-related factors heavily influence the cost of construction. Analysing critical causes of failure and success in construction projects is a useful method of identifying risk factors (Gohar, 2012). Tan and Ghazali (2011) have identified 40 CSFs for contractors and seven major categories: (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 worked environment-related factors. According to Hwang and Ng (2013), the construction contractor significantly influences a project's success. As a result, it is critical to select a contractor who is qualified and capable of construction management.

There is empirical evidence that the project sphere has not been appropriately valued in many organisations because it appears certain that the company's projects are not unified and thus spread across several other spheres. However, to achieve the organisational goals themselves, it is necessary to understand how the concept of project and project management is made manifest in increasingly project-oriented organisations. Although many studies have investigated project success/failure factors, a few of them are comprised of the perception of to what extent project success/failure factors are significant, as well as what exactly is a successful project and a failed project (Taherdoost & Keshavarzsaleh, 2016: 1066-1075).

As it is perceived, in today's competitive project-oriented world, most organisations are committed to capturing the market and doing projects profitably. However, the reality is that organisations should focus more on successfully finishing the projects because the importance of project completion in a profitable manner outweighs its beginning. In the context of project management, success can mean a variety of things; thus, we define success as long-term project performance in terms of time and cost. Various studies have been conducted on detecting project management's critical success factors (CSFs) recently (Yalegama, Chileshe & Tony, 2016: 643-659). As more businesses become project-oriented and use project management principles to build their strategic business models, there is a growing interest in project management studies. Project management is a broad subject with various knowledge areas that encompass many issues that a project manager, a team, organisations, and experts must deal with to implement a project successfully. When discussing the concept of project success, there are primarily two concepts to consider: project success and project management success. Many researchers and professionals attempt to define the correct definition of project success and project management success, but it is difficult to distinguish between them due to their mutual nature. It is fascinating to see how the concept of project success has evolved, what models have emerged, and what methods researchers have used to identify the factors that contribute to project success.

Almost every project manager hopes for successful project implementation. Typically, the literature distinguishes between project and project management success. Because these two concepts are mutual, there are some similarities and differences. In general, project success delivers on the project's established goals or objectives. In contrast, project management success is measured using the traditional approach of the project triangle, namely cost, time, and budget (PMI, 2021). Several extensions to the traditional understanding have been introduced over the years of studying the success concept and project performance. Success criteria evolved and developed in response to key stakeholders' perceptions and perspectives on the project. Previous works on project success or project management success did not confine themselves to a traditional approach. Instead, they investigated various aspects of success such as human factors, knowledge transfer, stakeholders and perception concept, communication, and advanced considerations. Several extensions to the traditional understanding have been introduced over the years of studying the success concept and project performance. Success criteria evolved and developed in response to key stakeholders' perceptions and perspectives on the project. Previous works on project success or project management success did not confine themselves to a traditional approach. Instead, they investigated various aspects of success such as human factors, knowledge transfer, stakeholders and perception concept, communication, and advanced considerations.

Muriana and Vizzini (2017: 320-340) have identified the most common reasons for project failure. Projects fail when top-level management, who are supposed to provide oversight functions to the project team, fail to provide adequate support or commitment to people who are required to implement the projects. Projects can also fail if risk identification and risk management are not prioritized. In a previous post on project management risk assessment, the need for proper risk assessment was identified as a prerequisite for reducing the likelihood of an adverse event occurring and helping to minimise the scale on which it occurs. Uncertainties are present in initiating, planning, executing, and closing project management, and a good risk management plan can help mitigate the effects of a negative outcome.

Implications of research

The study findings are in agreement with results reported by Taan and Raju (2020), Ateba, Prinsloo and Gawlik (2019: 1328), Zoogah, Wright and Hastak (2014), Abu-Siada, Budiri and Abdou (2018: 23) and Daniel (2020: 69). The authors have shown that there is a severe shortage of adequately skilled and experienced specialists in the power transformer manufacturing industry of South Africa, and that the shortage needs to be addressed by creating an enabling working environment and by providing tangible incentives to highly skilled engineers, designers and technicians. The authors have shown the dire need for expanding the capacity for manufacturing power transformers that are required by Eskom for generating and distributing electricity.

Cowan (2022), Ateba, Prinsloo and Gawlik (2019: 1328) and Daniel (2020: 69) have pointed out that the failure of Eskom to meet the growing demand for power from industry, business, commerce and households is attributed to active sabotage, political interference, inability to retain the services of highly skilled and well-experienced engineers, designers and technicians, lack of internal capacity, difficulty in finding suitably qualified young local graduates who could perform technical and specialised duties adequately, the acute shortage of specialised skills, difficulty in producing enough number of power transformers, the theft of power cables, the use of old technology, the high cost of maintenance, the high cost of fuel, difficulty in securing high grade coal, difficulties in wage negotiations with trade unions, political interference, and the appointment of politicians into purely technical positions.

Mondi (2017:176-185) has argued that Eskom needs to be privatised in order to save the power utility company from imminent death. According to the author, only the private sector has enough commitment, the

necessary skills, capital and self-interest to invest massively in Eskom so that the power utility company can be salvaged. According to the author, from among all known constraints, the most significant constraint faced by Eskom is the acute shortage of adequately skilled and well-experienced technicians who possess adequate skills that are essential for generating enough electrical power for the grid. This shortcoming has been pointed out repeatedly by several experts on energy. The dire need for successful project managers with a proven track record has been highlighted by Flepisi and Mlambo (2021: 57-66). According to the authors, suitably qualified experts must be employed irrespective of their background in order to ensure adequate capacity for power generation and distribution.

Adequately skilled and experienced engineers need to be motivated and provided with incentives for remaining loyal and productive at the workplace. The field of engineering is highly competitive and dynamic. In order to retain loyal and productive employees, managers need to use appropriate managerial skills and qualities. The needs and aspirations of engineers working for Zest Weg Transformers Africa and Eskom are the same. They need to be given enough motivation and purpose for remaining committed and loyal. Training opportunities on the latest up-to-date methods and applications must be provided to them on a regular basis. Rewards and incentives should be given to employees who work hard to mentor poorly skilled employees, and lead others by example.

Building capacity for manufacturing a much larger number of power transformers at Zest Weg Transformers Africa is essential to meet the growing demand for power transformers at Eskom. Failure to increase the capacity to manufacture a much larger number of power transformers at Zest Weg Transformers Africa has the potential for minimising productivity and output at Eskom. This will result in frequent incidents of power outages throughout South Africa. Lack of efficiency in manufacturing power transformers is a crucial cause of power outages in the South African state-owned power utility company Eskom (Flepisi & Mlambo, 2021: 57-66). The study conducted by Silva Parada (2021:29-67) in India shows that there is a significant benefit in privatising dysfunctional state-owned power utility companies that do not meet the operational needs and requirements of industry and business. An increased project success rate in the Transformer Manufacturing Industry will result in a better living standard for South Africa's communities, where power transformers will supply electricity without interruptions or failure. Eskom is a significant economic driver not only because it is the primary electricity provider but also because of the economic stimulus provided by its operations and significant capital expenditure. Eskom generates more than 90% of all electricity in South Africa, which is a critical input for most major industries (DTI: 2020). Eskom makes a significant contribution to increasing power availability and reliability. Electricity is essential to daily life, influencing people's economy, safety, health, productivity, and comfort. Power utilities continue to prioritize the continuity of electricity supply to consumers.

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