

Exploring the Challenges of Attaining the Required Competencies for Sustainable Construction Projects: A Case of Built Environment Professionals in South Africa

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Abstract

The purpose of this study was to explore the challenges that the built environment professionals encounter in pursuit of attaining the required competencies to enable them to successfully execute sustainable construction projects (SCPs) in the South African construction industry. The dearth of research in this area motivated the researchers to explore the aim of this study. Evidence in the previous literature suggest the focus has been on the challenges encountered in the construction industry in adopting sustainable construction methods, of which lack of competencies for SCPs has been a key factor. To achieve the purpose of this study, constructivism philosophy was adopted and data was collected using semi-structured interviews with 21 built environment professionals, who were purposively sampled. Atlas.ti version 7 was used to organize the data and interpret the themes and the sub-themes. Data saturation was achieved after the 21st interview was analyzed. The findings on the challenges encountered by the built environment professionals in acquiring the competencies for sustainable construction projects were: limited awareness of the required competencies, lack of finance, lack of training/education, no or little experience (technical skills) and corruption. The recommendations to the construction industry are that: awareness of the competencies required should be improved, financial support is required, motivate their professionals to go for training and improve their technical skills. Furthermore, any form of corruption relating to who should be upskilled regarding sustainable construction projects should be avoided entirely in the construction industry. These recommendations will ensure to some extent that the professionals' competencies are improved in order for them to deliver SCPs satisfactorily to the clients.

Keywords:

Built environment, challenges, construction, competencies, professionals, sustainable.

1. Introduction

Construction industry is an important sector that plays a vital role in a nation's economic growth. The construction industry is known as an investment-oriented sector, which receives immense attention from the government. The industry is responsible for sustainable development of facilities such as healthcare, education facilities, workplaces i.e. offices, homes, shopping centres, transport and, religious and recreational facilities. According to Berk & Bicen (2017) the importance of the construction industry renders the prosperity of any nation. Seely (2016) further asserted that this sector creates numerous job opportunities for unskilled, semi-skilled, and skilled workforce. To support the aforementioned assertions. In South Africa StatsSA, (2021) indicated that the construction industry employed around 476 185 persons in the formal sector at the end of second quarter of 2021. Furthermore, the construction industry contributed R83 billion towards the country's gross domestic product (GDP) (Construction Industry Development Board, (CIDB, 2021).

Despite the importance of construction industry in the economy of South Africa, it is faced with numerous challenges. Renault, Agumba & Ansary (2018) indicated one of the challenges was poor delivery of construction projects. Which according to Agumba & Haupt (2018) was caused by poor health and safety performance. Apart from the poor performance, the construction activities affect the environment throughout the life cycle of the development,

(Ametepey et al., 2015). It can be inferred that the construction industry wreaks havoc on the delicate environment due to its negative effects. Buildings account for around 40 percent of the total carbon dioxide (CO₂) emissions (de Lasso et al., 2016). In addition, the impacts of construction activities across the globe accounts for 25 percent of water use, 30 percent of raw materials use, and 42 percent of total energy consumption, 25 percent of waste generation, 25 percent of timber and 70 percent of electricity consumption (Serpell et al., 2013; Zolfani et al., 2018; Holowka, 2007). As a result, it is clear that steps must be taken to ensure the built environment and construction activities are more sustainable, bearing in mind the three pillars of sustainable development. To embrace the three pillars of sustainable development in the life cycle of a construction project i.e. economic, social and environmental the construction industry professionals must be competent. However, previous studies of, Ametepey et al., (2015), Häkkinen & Belloni (2011) and Aghimien et al., (2018) have indicated the challenges that are experienced in the adoption of sustainable construction practices of which one of the factors according to Aghimien et al., (2018) is the lack of competencies of the workers involved in SCPs. Few of the previous studies have tried to identify some of the challenges inhibiting the acquiring of the required SCPs competencies. The identified challenges were lack of training (Higham & Thomson, 2015; Idris et al., 2015). Expensive training and lack of time for training, (Bwanga, 2020) Furthermore, Greenblat (2008) indicated a deficient education and training system was also an obstacle. Furthermore, these challenges were generic and not tailored for specific stakeholders in the construction industry. Therefore, the dearth of research to identify the challenges the built environment professionals' encounter in attaining competencies to enable them to execute sustainable construction projects successfully is evident.

This study is therefore aimed at exploring the challenges experienced by the built environment professionals in South Africa in attaining the required competencies for sustainable construction projects (SCPs).

2. Materials and Methods

Constructivist philosophy was adopted for this research to determine the purpose of the study. The essence of a constructive philosophy of research is to develop theories rather than testing them. The aim of this study was to identify the challenges faced by built environment professionals in attaining the required competencies for SCPs in South Africa. Purposive sampling method which is a non-probability method was used to sample the respondents. In order for the respondents to be included in the study a number of factors were considered: The respondents were supposed to chiefly undertake their work/business in Gauteng and North-West provinces of South Africa, they should have experience in SCPs and registered with a recognized profession council/body in South Africa. In order to achieve credible sample size for semi-structured interviews a minimum sample size of between 5 and 25 is required according (Saunders et al., 2016). This is also supported in the study by Tshele & Agumba, (2014).

Therefore, a total number of 21 built environment professionals participated in the interviews, in which semi-structured interview was used and the interviews were recorded. The interviews took approximately 30mins. The interviews were conducted telephonically due to the lockdown rules and regulation. The data was managed using the Atlas.ti version 7. The thematic analysis was done to attain the themes and sub-themes of the challenges experienced. The data saturation was attained after the 21 interviews were analyzed. The trustworthiness i.e. validity and reliability of the research was achieved by ensuring it was credible, dependable, transferable, hence conforming that the study achieved the requirements that is was credible, dependable and transferable.

3. Results

3.1 Socio-demographics data of the respondents

Table 1 shows the socio-demographic characteristics of the participants. Fifteen (71.4%) of the participants have a BSc Degree as their highest academic qualification, five (23.8%) have a Master's degree while only one (4.8%) participant had a diploma. Nine of these degrees include engineering, five from project and construction management, four quantity surveying, three from architecture. Seven (33%) of the study participants were registered with the Engineering Council of South Africa (ECSA); seven (33%) with the South African Council for the Project and Construction Management Professions (SACPCMP), two (9.5%) with South African Council of Architectural Profession (SACAP), one (4.8%) with the South African Council for the Landscape Architectural Professions (SACLAP) and four (19%) with The South African Council for the Quantity Surveying Profession (SACQSP). Seventeen (81%) of participants have over ten years of experience in the construction industry, while three (14.3%) participants have more than ten years of experience in sustainable construction projects. Only five (23.8%) participants have been involved in over ten sustainable development projects while others have been involved in less than ten of

such projects. Concerning the size of company worked for, fourteen (66.7%) participants work for small companies, two (9.5%) work for medium sized companies while 5 (23.8%) identified working with big companies.

Table1. Socio-demographic characteristics of the participants

Participants' Characteristics		N=21 (100%)
Highest Academic Qualification	Diploma	1 (4.8)
	BSc	15 (71.4)
	MSc	5(23.8)
Professional Council	SACPCMP	7 (33)
	SACQSP	4 (19)
	ECSA	7 (33)
	SACAP	2 (9.5)
	SACLAP	1 (4.8)
Years of Experience in the construction industry	0-10 Years	4 (19)
	More than 10 Years	17 (81)
Years of experience sustainable development projects	0-5 Years	9 (42.9)
	6-10 Years	9 (42.9)
	More than 10 Years	3 (14.3)
Company size participants worked for	Large	5 (23.8)
	Medium	2 (9.5)
	Small	14 (66.7)
Number of sustainable construction projects involved in	1-10	15 (71.4)
	More than 10	5 (23.8)

Source: Field data, 2021

3.2 Results

Figure 1 indicates the main and the sub-themes of challenges that were established from the Atlas.ti version 7. The participants identified the challenges the industry is facing with regards in empowering the professionals in the built environment with knowledge, skills and the good attitude to undertake sustainable construction projects. The challenges identified by the participants are summarized under the following main themes: Limited awareness of sustainable construction projects competencies, lack of training or education on sustainable construction projects, (iii) corruption, and lack of finance.

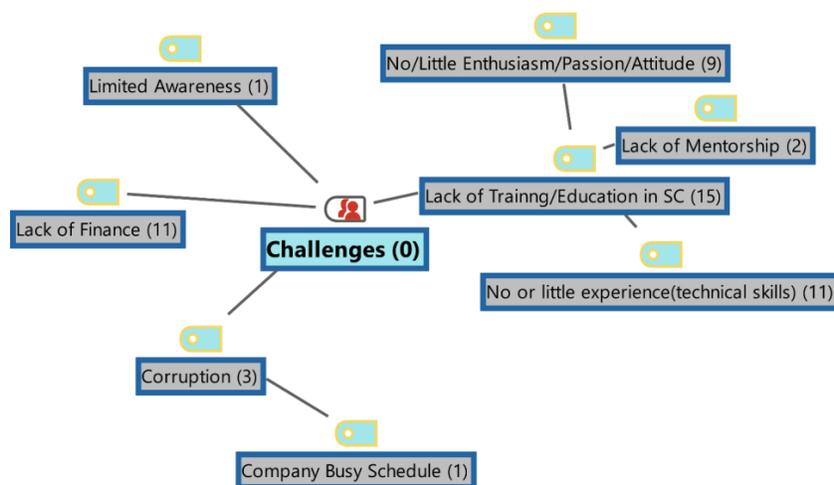


Fig.1 Challenges encountered, Source: Atlas.ti 7

(i) Limited awareness of the competencies required for SCPs

Participants identified that many built professionals do not know about sustainable construction projects and what it entails. Limited awareness of SCPs is a great challenge to undertaking such projects because the knowledge of the concept and process of executing SC projects is missing. One participant said “...people are not too familiar with sustainability when it comes to these projects, so I'd say it's just a lack of awareness from the teams' perspective, (P21)”. While discussing on the concept of SCPs, another participant mentioned, “Not a lot of people really understand the whole concept of sustainable building (P16)”, and that could be with the fact that “it's still a very new concept, (P14)”.

(ii) Lack of training/education to acquire competencies in SCPs

Participants identified limited training opportunities, highlighting that there are not so many training programs available to the built environment professionals on sustainable construction. One of the participants particularly emphasised that “There's not a lot of education programs that you can study, ones that focuses on sustainable construction (P4)”. Lack of good technical trainings available to the professionals is a major challenge in understanding sustainable construction. This was articulated by the participants, one of them said “We are totally under skilled in this country, in terms of good technical training (P24)”, a critical point that was rephrased by another participant saying “Professionals in South Africa find it increasingly difficult to get equipped with knowledge for sustainable construction (P5)”.

Some of the participants however, highlighted the lack of practical trainings and learning on the job as a setback in the transfer of knowledge from one professional to another. Participants expressed this using different words such as “Lack of practical training (P20)”, “Lack of Mentoring (P2)”, and “Lack of apprenticeships (P20)”; all of these expressing the need for mentoring for the built environment professionals to be adequately equipped for sustainable construction. The following subthemes emanated from described this theme.

No or little experience (technical skills): The lack of highly skilled workers with knowledge of sustainable construction was mentioned by the participants as challenging to the sector. Many of the built environment professionals were reported to “lack experience (P5)”. The challenge in the skillset of the professionals made the participants believe that there is “lack of professionalism (P8)” and that “there's not a lot of skills out there when it comes to sustainability P14)” which results in problems such as having “...incompetent engineers (P20)”.

No/ little enthusiasm/ passion/ attitude: While describing the attitude towards sustainable construction projects, the participants strongly emphasised that built environment professionals and organizations have a negative attitude toward it, which is demonstrated by their diminished interests as participants have rightly said- “Lack of interest (P11)”, “the attitude is not right there towards it (P16)”. This lack of enthusiasm by built environment professionals could be a result of the absence of regulation attached to sustainability of projects as one participant had mentioned - “it's not normally a requirement that you have all these qualifications....that's why most professional

team members don't invest a lot of time and money into obtaining these skill sets of sustainability (P21)". Organizations expressed their negative attitudes by not investing resources to training their staff on it. "Companies do not have the time and lack of investment in training.

Lack of mentorship: Participants mentioned a lack of mentorship or coaching from built environment professionals that are competent for SCPs to less experienced professionals as another challenge and further said that this mentorship can be achieved by *"learning from other professionals (P5) and "equipping each other internally (P7)"*

(iii) Corruption in providing training on competencies for SCPs

System failure (corruption) is another big issue in the construction sector that discourages professionals from investing in training. *"Corruption is problem....Favoritism, they just take somebody that has political connections and then put them in their system (P10)".*

(iv) Lack of finance for training on competencies for SCPs

The other challenge identified by the participants is the lack of finance. Financing professional trainings are quite expensive. While a participant stated that *"It costs money. It is in general more expensive, (P24)"*, another participant decided to take the challenge to the organizational level saying, *"Lack of money, companies don't want to spend money on training because it is too expensive, (P8)".*

4. Discussion

The results of the socio-economic demographics established that the built environment professionals who were interviewed had the relevant qualification and professional registration in the built environment. Furthermore, they had participated in a number of sustainable construction projects which justifies, that they could identify the challenges inhibiting them from acquiring the required competencies for SCPs execution in South Africa.

Based on the aforementioned sentiments the challenges that were identified by these professionals were: lack of awareness of the competencies required for SCPs. It can be noted that this challenge is critical as lack of awareness of the competencies required could cripple the delivery of any project not to mention SCPs. The finding is in line with previous authors such as William & Dair (2007), who established that the main impediments to the delivery of sustainable structures, are a lack of knowledge, understanding, and information. Furthermore, Whang and Kim (2015) asserted that built environment professionals' awareness of sustainability, as well as their performance, is critical to the successful implementation of SC. Alabi (2012) discovered that construction participants had a limited awareness of the notion of sustainability. Likewise, Aghimien, Aigbavboa, Oke, & Musenga (2018) discovered that the second most important barrier to SC is a lack of sustainability awareness and knowledge. According to Adejumo & Adejumo (2014) sustainability is a problem that affects all aspects of life, and there is a significant need to raise as much awareness about it as possible.

Lack of training/education to acquire competencies on SCPs was also identified as an impediment in acquiring the relevant competencies for SCPs. This was affected by the lack of mentorship in sustainable construction projects, the professionals having, no/ little enthusiasm/ passion/ attitude towards training. To overcome this challenge Osuizugbo et al. (2020) asserted that the government should play a key role in ensuring that sustainable construction is embraced in the construction industry. Bowen et al.'s (2012) finding suggested that professional ethics should be strengthened in course syllabi and reinforced through career development seminars. Therefore, to this challenge career development through seminars is critical. Furthermore, limited to no experience relating to technical skills in SCPs in South Africa also contributed to lack of training/education. In support of the findings of lack of highly qualified skilled workers, Durdyev et al. (2018) said that most construction professionals are ignorant or untrained in SC techniques. The importance of training cannot be understated, Kazaz & Ackara, (2015) suggested that skilled professionals have the greatest influence on labour productivity and are thus considered as a real representation of the performance and success of building operations. Skilled workers in the construction business are mostly tradespeople who have obtained education and training, which adds substantial economic value to the activity at hand (Jarkas et al., 2012).

From the foregoing, training is critical to ensure the professionals become competent in their area of speciality (Oladotun & Edosa, 2017).

Corruption was also identified as an inhibiting factor for acquiring competencies for SCPs. It can be suggested from the sub-theme, when the company undertaking sustainable construction projects are having a busy schedule corruption could inhibit the training of its professionals. Hussein (2005) stated that bribes are given in the construction business to win lucrative contracts and tenders. This can lead to poor performance of delivering construction projects. Finally, the lack of finance for training in SCPs was also established as an impediment to acquiring the required competencies among the built environment professionals in South Africa. It can be suggested that having finance is critical in ensuring the achievement of training or other delivery objectives of a project. To buttress this point Osuizugbo et al. (2020) indicated the importance of financial support to train and educate built environment professionals about SC.

5. Conclusions

In conclusion this research has identified the challenges that the built environment professionals encounter in the endeavor to attain the required competencies for sustainable construction projects. These challenges are: lack of awareness of competencies required for SCPs, corruption in providing training for SCPs, lack of finance and lack of training/education in SCPs. The recommendations to the construction industry in line with these findings are: the awareness of the competencies required for SCPs should be improved within the professional councils, financial support should be provided, the councils should motivate their professionals to go for training and improve their technical skills in SCPs. This can also be achieved using mentorship programs. Furthermore, any form of corruption relating to who should be upskilled regarding sustainable construction projects should be avoided entirely in the construction industry. Finally, a country wide quantitative research is recommended to validate these challenges in order to generalize the findings.

References

- Adejumo, A. V., & Adejumo, O. O. (2014). Prospects for Achieving Sustainable Development Through the Millennium Development Goals in Nigeria. *European Journal of Sustainable Development*, 3(1), 33–46. <https://doi.org/10.14207/ejsd.2014.v3n1p33>
- Aghimien, D., Aigbavboa, C., Oke, A. & Musenga, C. (2018, July 26-27). Barriers to Sustainable Construction Practices in the Zambian Construction Industry. In *Proceedings of the International Conference on Industrial Engineering and Operations Management Paris, France*, 2383-2392. <https://www.researchgate.net/publication/326065764>
- Aghimien, D.O, Adegbebo, T.F, Aghimien, E.I, & Awodele, O.A (2018). Challenges of Sustainable Construction: A Study of Educational Buildings in Nigeria. *International Journal Of Built Environment And Sustainability*, 5(1), 33-46. <https://doi.org/10.11113/ijbes.v5.n1.244>
- Agumba, J.N, & Haupt, T.C (2018). The influence of health and safety practices on health and safety performance outcomes in small and medium enterprise projects in the South African construction industry. *Journal of The South African Institution Of Civil Engineering*, 60(3), 61-72. <https://doi.org/10.17159/2309-8775/2018/v60n3a6>
- Alabi, A.A. (2012). Comparative Study of Environmental Sustainability in Building Construction in Nigeria and Malaysia”, *Journal of Emerging Trends in Economics and Management Sciences*, 3(6), 951-961. <https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.300.6542&rep=rep1&type=pdf>
- Ametepey, O., Aigbavboa, C., & Ansah, K. (2015). Barriers to successful implementation of sustainable construction in the Ghanaian construction industry. *6th International Conference on Applied Human Factors and Ergonomics (AHFE) and the Affiliated Conferences, Procedia Manufacturing*, 3, 1682–1689. <https://www.sciencedirect.com/science/article/pii/S2351978915009890>
- Berk, N., & Biçen, S. (2017). Causality between the Construction Sector and GDP Growth in Emerging Countries: The Case of Turkey. *Athens Journal Of Mediterranean Studies*, 4(1), 19-36. <https://doi.org/10.30958/ajms.4-1-2>
- Bowen P.; Edwards P. & Cattell K. (2012) Corruption in the South African construction industry: A mixed methods study In: Smith, S.D (Ed.), In *Proceedings of the 28th Annual ARCOM Conference 2012*, Edinburgh, UK, Association of Researchers in Construction Management, 521-531. <https://www.arcom.ac.uk/-docs/proceedings/ar2012-0521-0531>
- Construction Industry Development Board. (2021). *Annual Report 2020/2021*. <http://www.cidb.org.za/wp-content/uploads/2021/11/Annual-Report-2020-2021.pdf>.

- Bwanga, O. (2020). Barriers to Continuing Professional Development (CPD) in Radiography: A Review of Literature from Africa. *Health Professions Education*, 6(4), 472-480. <https://doi.org/10.1016/j.hpe.2020.09.002>
- Durdyev, S., Zavadskas, E., Thurnell, D., Banaitis, A., & Ihtiyar, A. (2018). Sustainable Construction Industry in Cambodia: Awareness, Drivers and Barriers. *Sustainability*, 10(2), 392. <https://doi.org/10.3390/su10020392>
- Greenblat, E. (2008), Skills shortage puts construction in peril. *The Age: Business Day*. <http://www.theage.com.au/business/skills-shortageputs-construction-in-peril-20080413-25us.html>
- Häkkinen, T. & Belloni, K. (2011). Barriers and drivers for sustainable building. *Building Research & Information*, 39(3), 239-255. <http://doi.org/10.1080/09613218.2011.561948>
- Higham, A & Thomson, C. (2015, September 7-9). An evaluation of construction professionals sustainability literacy in North West England In: Raidén, A B and Aboagye-Nimo, E (Eds.), In *Proceedings of the 31st Annual ARCOM Conference*, Lincoln, UK, Association of Researchers in Construction Management, 417-426. <https://usir.salford.ac.uk/id/eprint/37965/1/An%20evaluation%20of%20construction%20professionals%20sustainability%20literacy%20in%20N.W.%20England.pdf>
- Holowka, T. (2007). USGBC: LEED - Immediate savings and measurable results. *Environmental Design + Construction*, 10(7), S8-S14.
- Hussein, M. (2005). Combating Corruption in Malawi. *African Security Review*, 14(4), 91-101. <https://doi.org/10.1080/10246029.2005.9627593>
- Idris, N., Ismail, Z., & Hashim, H. (2015). Towards a Framework for Promoting Sustainable Construction in Malaysia. *Jurnal Teknologi*, 76(1), 303-311. <https://doi.org/10.11113/jt.v76.2674>
- Jarkas, A., Kadri, C. & Younes, J. (2012). A Survey of Factors Influencing the Productivity of Construction Operatives in the State of Qatar. *International Journal of Construction Management*, 12(3), 1-23. <http://doi.org/10.1080/15623599.2012.10773192>
- Kazaz, A. & Acikara, T. (2015). Comparison of Labor Productivity Perspectives of Project Managers and Craft Workers in Turkish Construction Industry. *Procedia Computer Science*, 64, 491-496. <http://doi.org/10.1016/j.procs.2015.08.548>
- de Lasso, J., França, J., Espirito Santo, K., & Haddad, A. (2016). Case Study: LCA Methodology Applied to Materials Management in a Brazilian Residential Construction Site. *Journal Of Engineering*, 1-9. <https://doi.org/10.1155/2016/8513293>
- Oladotun, A., & Edosa, O. (2017). The Need for Professionalism and Competencies in the Construction Industry. *International Journal Of Built Environment And Sustainability*, 4(1), 10-16 <https://doi.org/10.11113/ijbes.v4.n1.154>
- Osuizugbo, I. C., Oyeyipo, O., Lahanmi, A., Morakinyo, A. & Olaniyi, O. (2020). Barriers to the Adoption of Sustainable Construction. *European Journal of Sustainable Development*, 9(2), 150-162. <http://doi.org/10.14207/ejsd.2020.v9n2p150>
- Renault, B., Agumba, J., & Ansary, N. (2018). An exploratory factor analysis of risk management practices: A study among small and medium contractors in Gauteng. *Acta Structilia: Journal for the Physical and Development Sciences*, 25(1), 1-39. <https://doi.org/10.18820/24150487/as25i1.1>
- Saunders, M., Lewis, P. and Thornhill, A. (2016). *Research methods for business students*. 8th ed. Harlow: Pearson Education
- Seely, A. (2016). *Self-employment in the construction industry*. House of common library. Briefing paper, number 00196. 23 May. London. <http://researchbriefings.parliament.uk/ResearchBriefing/Summary/SN00196>
- Serpell, A., Kort, J., & Vera, S. (2013). Awareness, Actions, Drivers and Barriers Of Sustainable Construction in Chile. *Technological And Economic Development Of Economy*, 19(2), 272-288. <https://doi.org/10.3846/20294913.2013.798597>
- Statistics South Africa. (2021). *Quarterly Employment Statistics* (Publication P0277). S.A. Department of Statistics South Africa. www.statssa.gov.za
- Tshele, L., & Agumba, J.N. (2014). Investigating causes of skills shortages in South African Construction Industry: The case of artisans. *People in Construction Conference*, 102-110. <https://www.researchgate.net/publication/305790436>
- Whang, S., & Kim, S. (2015). Balanced sustainable implementation in the construction industry: The perspective of Korean contractors. *Energy And Buildings*, 96, 76-85. <https://doi.org/10.1016/j.enbuild.2015.03.019>
- Williams, K., and Dair, C. (2007). What is stopping sustainable building in England? Barriers experienced by stakeholders in delivering sustainable developments. *Sustainable Development*, 15(3), 135-147. <http://dx.doi.org/10.1002/sd.308>

Zolfani, S. H., Pourhossein, M., Yazdani, M., & Zavadskas, E. K. (2018). Evaluating construction projects of hotels based on environmental sustainability with MCDM framework. *Alexandria Engineering Journal*, 57(1), 357–365. <https://doi.org/10.1016/j.aej.2016.11.002>