An assessment on the drivers and obstacles of sustainable project management in South Africa: A case study of Johannesburg

I Ohiomah, C Aigbavboa and W D Thwala

1SARChI in Sustainable Construction Management and Leadership in the Built Environment, University of Johannesburg, South Africa

Abstract. The construction industry has been identified as the industry which carry out unsustainable practices, and processes, this has led to several countries seeking to incorporate sustainable practices such as sustainable construction, sustainable construction project management to handle the growing concern over climate and environmental issues. Despite the construction industry awareness of these sustainable practices, it has been a problem implementing these sustainable practices. The aim of this study is to identify the barriers that hinder the implementation of sustainable project management in the South African construction industry, as well as drivers that encourages the implementation of sustainable project management. A quantitative methodology approach was adopted for this study, a questionnaire was employed to gather data for this study. A total of fifty-two (52) respondents returned their questionnaires. Findings from this study reveal that a major barrier to implementation of sustainable project management is the perception that green buildings are expensive, lack of expertise and lack of training also obstacles of the implementation of sustainable project management. Findings on what drives organisations to invest in sustainable project management is the benefits that will be gained financially This study concluded with recommendations stating that an increased level of training and drumming interest in the clients so that when the construction professionals propose the use of sustainable project management, there is an understanding by the clients.

1. Introduction
Industries are ever more under pressure to integrate the objectives of sustainable development into company policies and decision-making processes. It is well known that organisations who participate globally are more and more looking to pledge to and report on the whole sustainability performances of operational initiatives. The practise of project management are not omitted from this pressure, as project management is a major ability in a construction project whereby the methodologies entails planning, execution and implementation procedures which are inside the sustainability framework. The concept of sustainability is driven more and has turn out to be more operational at the organisational level than on the state and global level as discussed in earlier literature [1]. Thus, this knowledge has led to the realisation that sustainability must be added to the project management procedures.

Project Managers are known to focus mainly time, cost and quality instead of the long standing influences of the project to the environment, leading to this project becoming unsustainable [2]. Construction projects are known to have a long-term social, environmental and economic impact to a nation thus it is imperative that to ensure a sustainability to happen it is required that there must be a high level of cooperation amongst various participants [3,4]. Thus, leading to how to incorporate...
sustainability in construction projects has been a problem in the project management field. These problems identified has led to the aim of this study to identify the barriers and drivers of why sustainable project management is a difficulty to implement in construction project in the South African construction context. The sections to follow will be divided into literature review, Methodology, Findings and discussion of findings.

2. Literature
In recent times, the drive to build with a conscious drive to be environmentally sustainable in construction has seen a substantial progression during the last decade. This is as a result in the public more aware of the benefit of sustainable construction as highlighted by government, press and citizens and amongst others. This drive to carry out construction practices in the area of sustainability has led to practices such as project management to be looked at and reconsidered in the sphere to be sustainable. Sustainability is progressively observed as a required tool for understanding the social, economic and environmental concerns related with the way that projects and their support systems are considered, constructed, operated, maintained and eliminated [5; 6]. However, the lack of a common structure and language for analysing sustainability, i.e., the absence of a tool for integrated analysis which leads to the lack of a useful and applicable method to projects [7,8,9,10,11; 12,13]. The incentives that drive establishments to improve sustainability projects are not solely based on solidarity. Research have established that sustainability is not only limited to environmental and social benefits, but also improves the economic value of establishments [14]. Furthermore, in the recent times it is impossible to consider economic development shorn of the parallel construct of protecting the environs and the mutual benefits to the public.

Silvius and Schipper [15], defined sustainable project management as the practices of “ensuring profitable, fair, ethical and environmentally friendly project delivery which is aimed at a project deliverable that is socially and environmentally acceptable throughout its lifecycle”. Despite this definition a number of issues has made it difficult for construction professionals to implement sustainable project management as they are faced with excess influences to accomplish, but have restricted time and resources to meet all the essential needs satisfactorily.

Sustainable project management is not without what its difficulties and what drives the industry to implement it in its operations. The barriers that hinder sustainable project management are the following; perception that the concept of sustainable project management could be expensive, it is perceived to be expensive as initial cost to begin with, as a result most practitioners perceive the cost in the short run but in the long run it becomes cheaper [16]. In addition, increased expenses relating to sustainable construction practices which influences Sustainable project management has shown a drawback in sustainable project management [17]. Unequal distribution of benefits, has led to professionals who want to participate in sustainable construction difficult to convince as there is always an unequal distribution of advantages amongst the professionals and clients [18]. Construction contractors tend to come up with high cost premium for the building of green buildings, thus lead to an increase in the cost of employing sustainable project management, while the clients benefits the most from the use of sustainable project management such as indoor environment quality improvement and savings in energy and water cost, the charge accrued from the use of sustainable project management cannot be passed on the clients [19]. Legislation; regulations in the sphere of sustainability is becoming more complex, causing difficulties for organisations seeking to implement sustainability practices when evaluating costs involved in the compliance of such practices [19]. In addition lack of awareness has been touted as one of the barriers that hinder the application of sustainable project management, this is as a result of the fact that traditional perception of building is still in vogue and many project managers are of the opinion that implementing and carrying out sustainable project management practices could lead to untold cost [20]. In conclusion, there has been nonexistence of awareness by the clients concerning the benefits of using sustainable project management processes to develop green building owing to inadequate research, particularly on problems of indoor environmental quality of green buildings on productivity and health [20]. Despite the barriers of sustainable project management, here are instances of drivers that will lead to the employment of sustainable project management.
Drivers of sustainable project management includes, environmental friendliness; as a result of the 2016 Paris Climate agreement, South Africa, drafted a plan to reduce Greenhouse Gas Emission to 398Mt CO₂ by 2024 and 614 MtCO₂ by 2030 [21]. Windapo [22], further added that there is a need to avoid natural degradation and the conservation of the natural environment, this is a driver of sustainable project management as South Africa has an obligation to reduce the emission of carbon thus compelling the construction industry to put in place environmental sustainability strategies to processes such as sustainable project management; one of the drivers, is the perceived idea of the financial benefits that could accrue from the putting into practice of sustainable project management. Windapo [22] stated that as a result of the growing requirement of green buildings, this further adds to the fact that sustainable project management further adds to diminishing the cost of building activities which yields higher return on investment. Giving rise to the concept of lifestyle costing which is concerned with improving an incentive for money in the possession of corporeal properties by considering over all the cost factors identifying with the property amid its operational lifecycle [23]. Moreover, another driver for sustainable project management is the green image developed once organisations decides to adopt sustainable project management owing to the fact that stakeholders are required to fulfil commercial social responsibility. On the other hand, Griskevicuis et al. [24] mentions the fact that people are driven to sustainable project management for status and noticeable conservation as well as trend following. Furthermore, their study revealed that status expands the desire for green buildings, and thus an increased demand for sustainable project management, regardless of the fact that going green is perceived to be pricier than the conventional way of doing things. Moreover, quickly rising media consideration, straightforwardness and responsibility on ecological care and conservation have framed a social trend to significantly amplify green construction [25]. Green building is becoming more of a fashionable trend and therefore inducing the growth of sustainable project management.

3. Methodology
This study seeks to adopt a quantitative approach, the quantitative approach allows a much larger response of communication [26]. A questionnaire is used to directly collect information from the suitable research area and targeted respondents, using closed-ended questions. The questionnaire is constructed in the best way possible in order for the respondents understand the questions and attempt to capture their perception on the topic been researched on. The data collected was analysed using the Statistical Package for the Social Science (SPSS). The respondents are categorised as follows; 3.8% are no post school holders, 44.2% are national diploma holders, 19.2% are bachelor’s degree holders, 20.2 % are postgraduate degree holders. This study also revealed that 57.7% of the respondents have participated in green building projects, while 42.3% of the respondents have not participated in green building project. A reliability test was carried on the questionnaire to determine the correlation between the two scores ranging from 0 to 1.00 where the Cronbach alpha is the most common form of internal consistency. The Cronbach alpha for the drivers and obstacles are 0.944 and 0.942 respectively. A Likert scale was formulated with the end goal to quantify the state of mind in a logically acknowledged and approved way. The five-point Likert scale was adopted in this research to allow respondents to express their perspective, observation and their discernments on the subject of study. The level of awareness, drivers and benefits section used the agreement scale in this way:

1-Strongly Disagree (SD)
2-Disagree (D)
3-Neutral (N)
4-Agree (A)
5-Strongly Agree (SA)

The scale utilized to determine the obstacles inhibiting the implementation of sustainable project management as well as impact of the obstacles on project performance is the agreement scale in this way:

1-Not at all (NTA)
2-Slightly (S)
The respondent’s factors were changed from the Likert scale to a Mean Item Score (MIS). This is the same method used to examine the response obtained from the questionnaires. The Mean Item Score was calculated using the formula:

\[
\text{Mean Item Score} = \frac{1n1 + 2n2 + 3n3 + 4n4 + 5n5}{EN}
\]

where:
- \(n1\) = Aggregate of respondents for strongly disagree and Not at all
- \(n2\) = Aggregate of respondents for disagree and Slightly
- \(n3\) = Aggregate of respondents for Neutral and Moderately
- \(n4\) = Aggregate of respondents for Agree and Very
- \(n5\) = Aggregate of respondents for Strongly Agree and Extremely
- \(N\) = Aggregate of respondents

4. Findings
Table 1 shows the obstacles that hinder the implementation of sustainable project management, the general perception from the construction professionals revealed that, they considered sustainable project management expensive, followed by lack of expertise as they claimed since they have no idea or training on it as a result of the professionals considering sustainable project management expensive. On the other end of the findings, they considered lack of standards less of a barrier.

Table 1. Obstacles hindering the implementation of sustainable project management

| Obstacle                                                                 | Mean \(\bar{x}\) | Ranking \(R\) |
|-------------------------------------------------------------------------|------------------|--------------|
| Perception that sustainable project management is expensive             | 4.29             | 1            |
| Lack of expertise or training                                           | 4.25             | 2            |
| Lack of awareness of sustainable project management                     | 4.25             | 3            |
| Lack of governmental support                                            | 4.21             | 4            |
| Lack of interest from clients                                           | 4.17             | 5            |
| Lack of experience                                                      | 4.12             | 6            |
| Limited access to green building material supplier                      | 4.10             | 7            |
| Limited government involvement                                          | 4.06             | 8            |
| Limited knowledge about green building principles                        | 4.04             | 9            |
| Limited financial services                                              | 4.04             | 10           |
| Absence of communication and interest among project team members        | 3.98             | 11           |
| Absence of general familiarity with the benefits of green building      | 3.98             | 12           |
| Absence of management and time to carry out green construction practices | 3.92             | 13           |
| High costs of green building materials                                  | 3.87             | 14           |
| Resistance to change from conventional to green practices by organization employees | 3.83             | 15           |
| The complexity of codes and regulations on green building and sustainable construction | 3.77             | 16           |
| Absence of dependable exact cost data/information                        | 3.73             | 17           |
| Poor association amongst stakeholders                                   | 3.73             | 18           |
| Attract a higher risk of delays in construction                         | 3.69             | 19           |
| Lack of efficiency codes and standards                                  | 3.67             | 20           |

Table 2, revealed the finding of the drivers of sustainable project management, professionals revealed that they will like government to invest in green building projects in the form of subsidy, grants, tax
breaks and amongst other as that will enable them to implement sustainable project management, the professionals also viewed educational program as very key as that will enable them understand the concept of sustainable project management and that will enable them drive up the demand of green building projects, they considered heavy tax and penalties as less of a driver.

Table 2. Drivers of the implementation of sustainable project management

| To what extent do you agree with the following drivers | Mean | Rank |
|--------------------------------------------------------|------|------|
| Subsidy from government for green building projects | 4.21 | 1 |
| Educational programs to supplement knowledge regarding sustainable construction | 4.17 | 2 |
| Public demand for green buildings | 4.15 | 3 |
| Training provided to professionals before the start of a project | 4.15 | 3 |
| Creating awareness so clients can see the benefits | 4.13 | 4 |
| Increase in research and development in green buildings system and management | 4.06 | 5 |
| Enhanced green image reputation through publications and certifications | 4.04 | 6 |
| Compulsory green certification to be made by regulators | 4.04 | 7 |
| Global warming scare | 4.04 | 8 |
| Ensuring the codes are simple to understand | 4.02 | 9 |
| Adoption of sustainable practices by project teams | 4.00 | 10 |
| Government to make available motivations to counterbalance high premiums of green building projects | 4.00 | 11 |
| Engaging personnel with background in green building | 4.00 | 12 |
| Investigation studies to illustrate that green building help increase productivity and health of inhabitants | 3.96 | 13 |
| Green building practices framework which employees can follow easily to facilitate the transition from conventional to green practices | 3.92 | 14 |
| Insistence from client | 3.88 | 15 |
| Organise construction trip to familiarise and inform the public about the benefits of green building | 3.87 | 16 |
| Bonuses on condition that staff meets the green mark certified or qualified for green mark awards | 3.75 | 17 |
| Interest free loaning systems provided by government to overcome financial obstacles | 3.58 | 18 |
| Unsustainable construction practices should attract heavy tax and fines | 3.48 | 19 |

5. Discussion and Implications of Findings

5.1. Discussion
The findings revealed the barriers and drivers, the primary barriers to the implementation of sustainable project management is that professionals perceived the concept of sustainable project management as very expensive, but will be willing to participate in green building projects thus prompting the use if sustainable project management if government will be willing to grant subsidy to enhance the demand for green buildings. Furthermore, the findings revealed that lack of expertise also contributes to one of the reasons why sustainable project management is not implemented on projects. this was also seen as a driver whereby training will drive the use of sustainable project management.
This finding is in line with t

5.2. Implications of Findings
The result infers that there is a correlation amongst the drivers and barriers which shows that the South African construction professionals are willing to buy into the concept of sustainable project management as seen in the findings of this study. The findings revealed that there is a strong awareness of sustainable project management and as a result they are concerned about the environment.
6. Conclusion
This study reveals the barriers and drivers of sustainable project management, the findings show a highly positive correlation, as the highest ranked barriers are also the highest ranked drivers. It is imperative that in order to reduce the level of CO$_2$ that the construction industry has been known to generate, sustainable project management will be one of the construction operations that will assist in tackling the problem. This study recommends that there must be a come together between professionals and government, to come up with policies that will lead to a win-win situation for both parties.

References
[1] Jørgensen TH. 2008. Towards more sustainable management systems: through life cycle management and integration. *Journal of cleaner production*, 16(10) 1071-80.
[2] Mishra P, Dangayach GS, Mittal ML. 2011. An Ethical approach towards sustainable project Success. *Procedia-social and behavioral sciences*, 25 338-44.
[3] Kivilä, J.; Martinsuo, M., Vuorinen, L. 2017. Sustainable project management through project control in infrastructure projects. *Int. J. Proj. Manag.*, 35, 1167–1183.
[4] Silvius, A.J.G.; Schipper, R.; Planko, J.; van den Brink, J.; Köhler, A. 2012 Sustainability in Project Management; Gower Publishing: Farnham, UK
[5] El-Haram M, Walton J, Horner M, Hardcastle C, Price A, Bebbington J, Thomson C, Atkin-Wright T. 2007 *Development of an integrated sustainability assessment toolkit*. In Conference proceedings, International Conference on Whole life Urban Sustainability and its Assessment.
[6] Thomson CS, El-Haram MA, Emmanuel R. 2011 Mapping sustainability assessment with the project life cycle. In proceedings of the Institution of Civil Engineers-Engineering Sustainability, 164 (2) 143-157
[7] Cole R J. 2005 Building environmental assessment methods: redefining intentions and roles. *Building Research & Information*. 33(5) 455-67.
[8] Deakin M, Huovila P, Rao S, Sunikka M, Vreeker R. 2002 The assessment of sustainable urban development. *Building Research & Information*, 30 (2) 95-108.
[9] Thomson CS, El-Haram MA, Emmanuel R. 2011 Mapping sustainability assessment with the project life cycle. In proceedings of the Institution of Civil Engineers-Engineering Sustainability, 164 (2) 143-157
[10] Bebbington J, Brown J, Frame B. 2007 Accounting technologies and sustainability assessment models. Ecological economics, 61(2-3) 224-36.
[11] Singh R K, Murty H R, Gupta S K, Dikshit A K. 2012. An overview of sustainability assessment methodologies. Ecological indicators, 15 (1) 281-99.
[12] Welsch H. 2005 Constructing meaningful sustainability indices. In *Applied research in environmental economics*, pp. 7-22, Physica-Verlag HD.
[13] Labuschagne C, Brent A C, Van Erck R P. 2005 Assessing the sustainability performances of industries. *Journal of cleaner production*, 13(4) 373-85.
[14] Fiksel J, McDaniel J, Mendenhall C. Measuring progress towards sustainability principles, process, and best practices. In Greening of Industry Network Conference Best Practice Proceedings, http://www. economics. com/images/Sustainability Measurement GIN. pdf, Accessed June 1999 Nov 14 (Vol. 19, p. 2012).
[15] Silvius A J, Schipper R P. 2014 Sustainability in project management: A literature review and impact analysis. Social Business, 4 (1), 63-96.
[16] Nicholas JM, Steyn H. 2017 Project management for engineering, business and technology. Routledge.
[17] Ofori G, Kien H L. 2004 Translating Singapore architects' environmental awareness into decision making. *Building Research & Information*, 32 (1) 27-37.
[18] Yudelson J. Green 2008 Building Through Integrated Design (GreenSource Books): LSC LS4 (EDMC) VSXML Ebook Green Building Through Integrated Design (GreenSource Books). McGraw Hill Professional.
[19] Hwang B G, Tan J S. 2012 Green building project management: obstacles and solutions for sustainable development. Sustainable development, 20 (5) 335-49.

[20] Kibert C J. 2016 Sustainable construction: green building design and delivery. John Wiley & Sons.

[21] Claassen, S. 2017. Mitigation of GHG emissions now an obligation for South African companies. Available from: http://crown.co.za/latest-news/electricity-control/latest-news/5517-mitigation-of-ghg-emissions-now-an-obligation-for-south-african-companies

[22] Windapo A. 2014 Examination of green building drivers in the South African construction industry: Economics versus ecology. Sustainability, 6 (9) 6088-106.

[23] Woodward D G. 1997. Life cycle costing—theory, information acquisition and application. International journal of project management, 15 (6) 335-44.

[24] Griskevicius V, Tybur J M, Van den Bergh B. 2010. Going green to be seen: status, reputation, and conspicuous conservation. Journal of personality and social psychology, 98(3):392.

[25] Lu Y, Cui Q, Le Y. 2013 Turning green to gold in the construction industry: Fable or fact? Journal of Construction Engineering and Management, 139 (8) 1026-36.

[26] Fassinger R, Morrow S L. 2013 Toward best practices in quantitative, qualitative, and mixed-method research: A social justice perspective. Journal for Social Action in Counselling & Psychology, 5 (2) 69-83.