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Barriers to the adoption of Life Cycle Assessment methodology for buildings in the South African construction industry

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Background 1: LCA defined

Life Cycle Assessment (LCA) is a technique for

- assessing the environmental aspects and potential impacts associated with a product, by:

- ➢ compiling an inventory of relevant inputs and outputs of a product system,
- ➢ evaluating the potential environmental impacts, and
- ➢ interpreting the results of the support tool.

International Standard 14040 (2006)

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Background 2: LCA defined

- Through LCA;
  the environmental impacts of all phases of the product's life are assessed, i.e. from the time materials are extracted through manufacture, transportation, storage, use, recovery, reuse/recycle and disposal *(Crawford, 2011; Kohler & Moffatt, 2003; Khasreen, 2009).*

- LCA takes a systemic view of the interaction between human activity and the environment *(Grant & Hes, 2002).*

- LCA is a type of Environmental Impact Assessment (EIA) tool.

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Background 3: Construction Industry

The construction industry is one of the largest sectors in any community and thereby consume a huge amount of resources (i.e. renewable and non-renewable) and hence greatly contributes towards the environmental impacts.

Buildings are one of the major products of the construction industry and they affect the environment through six major life cycle stages, namely:

- extraction of raw materials,
- manufacturing,
- construction,
- operation and maintenance,
- demolition, and
- disposal (End of life)

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Key literatures used

- Crawford, R.H., 2011, Life Cycle Assessment in the Built Environment, (London/New York: Spon Press)

- Department of Environmental Affairs and Tourism (DEAT) Republic of South Africa, 2009. Green building in South Africa: emerging trends, Pretoria, pp. 15–16.

- Khasreen, M.M., Banfill, F.P.F.G. and Menzie, G.F., 2009, Life-Cycle Assessment and the Environmental Impacts of Buildings: A Review. Journal of Sustainability, 1(10), 675-701.

- Kohler, N. and Moffatt, S., 2003, 'Life-cycle analysis of the built environment', Journal of Sustainable building and construction, 17-21.

- U.S Environmental Protection Agency (EPA), 1993, An Evaluation of Environmental Life Cycle Assessment', Economic Analysis and Innovations Division, Environmental Law Institute, 1-32.

Motivation: SA environmental performance

- According to Van der Merwe (2015) South Africa is still behind in the adoption of green-building practices.
- Measures of environmental sustainability show that South Africa has exceeded its ecological carrying capacity (DEAT, 2009:21).
- According to OECD (2013) South Africa has used up most of its natural resources including water and does not give enough attention to the environmental consequences.
- And therefore, South Africa faces environmental challenges in; waste management, land pollution, pressures on biodiversity and marine resource management, water scarcity, local air and water pollution (OECD, 2013:40).

Purpose of the study

The objective of the study was to identify the barriers to the adoption of life cycle assessment for buildings in the South African construction industry.

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Barriers identified in the literature:
but not limited to the list

- Lack of knowledge and awareness
- Lack of life cycle inventory (LCI)
- Methodological gaps
- Building lifespan
- Geographic location and Site-specific
- Time constraints
- Cost implications
- Interpretation of results

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Methodology 1

Quantitative research approach

This approach attempts to deal with complexity by reducing and simplifying situations to the point where they can be examined, measured, and tested, *(SACQSP, Mod.18:25).*

Research area

Gauteng Province's City of Johannesburg and City of Ekurhuleni, Metropolitan Municipalities, South Africa.

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Methodology 2

Targeted respondents

Construction professional team:

- Quantity Surveyors
- Architects
- Facilities Managers
- Construction Managers
- Civil Engineers
- Site Engineers

Sampling Design

A simple random sampling strategy was used when distributing questionnaires

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Methodology 3

Data collection

- The secondary data for the study is derived from the review of literatures, published and unpublished.

- Primary data was collected through the use of structured questionnaires.

Data analysis

- Descriptive statistics
- Multivariate statistics (Factor analysis)

(factor analysis results are not reported in this presentation)

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FINDINGS

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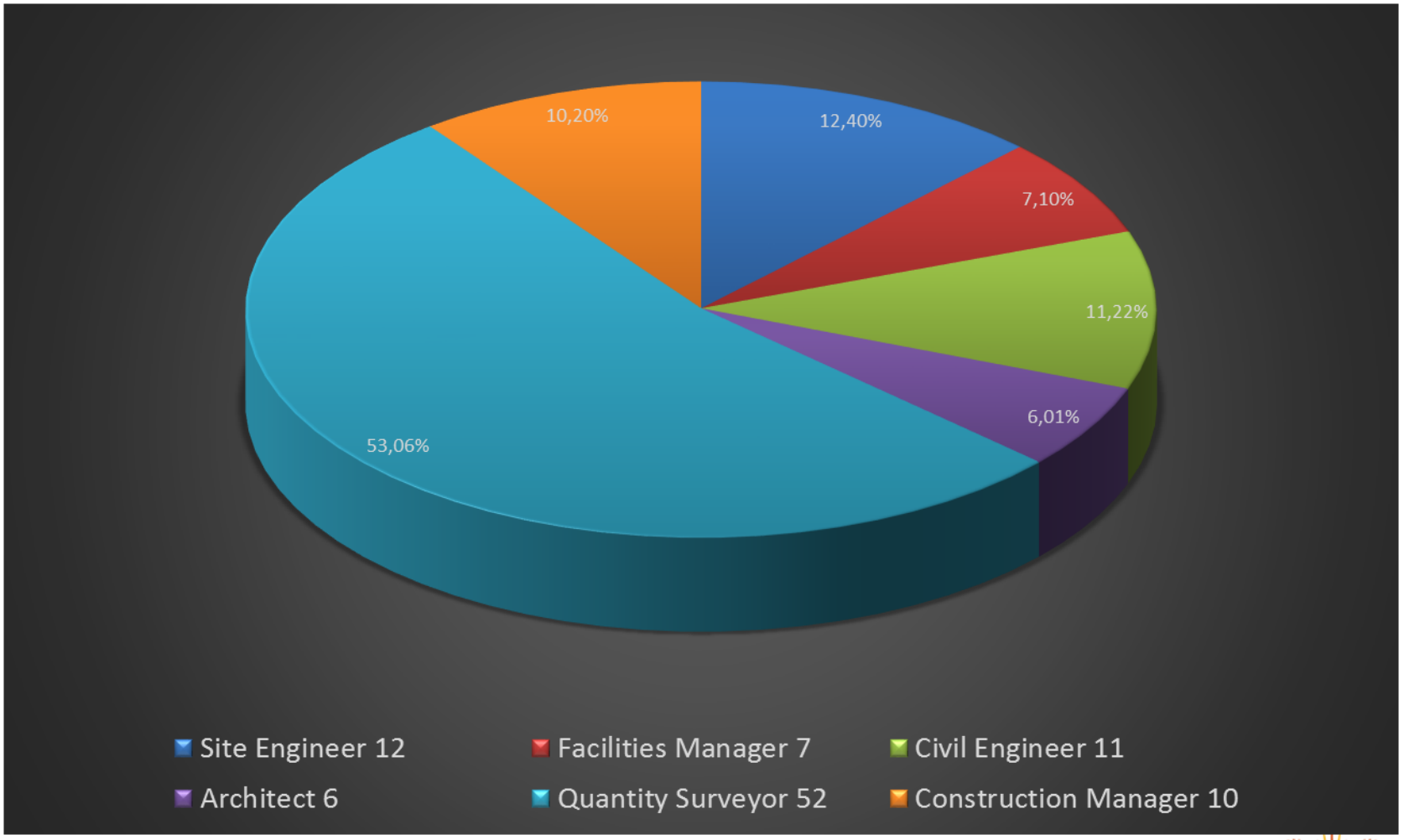
Demographics of the Participants



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Barriers to the Adoption of LCA for Buildings

Factors	Mean	SD	R
Lack of knowledge and awareness of life cycle assessment	4,32	0,98	1
Lack of government support for life cycle assessment studies in the construction industry	4,25	0,91	2
Lack of availability of Life Cycle Inventory (LCI) for buildings	4,18	0,78	3
Life cycle assessment methodological gaps due to the standard system boundary for various products, or processes	4,05	0,76	4
No standards governing the interpretation of life cycle assessment results for buildings	3,99	0,97	5
Time constraints	3,97	0,91	6
Cost implications	3,89	0,98	7
Long building life span	3,86	1,09	8
Geographical issues such as the site-specific of the building	3,80	0,99	9

Interpreting results

A 5-point likert scale:

1 = Strongly Disagree (SD)

2 = Disagree (D)

3 = Neutral (N)

4 = Agree (A)

5 = Strongly Agree (SA)

was used to record the responses for all the questions in this section.

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CONCLUSION

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General Conclusion

The study contributes to the body of knowledge on the barriers towards the adoption of life cycle assessment methodology for buildings in the South African construction industry.

The study therefore is valuable to the SA construction industry, built environment, infrastructure development, and/or sustainable urban development.

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Thank you!

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