# Alternative Building Technologies for Reconstruction and Development Programme (RDP) Housing in South Africa: Comparative Performance, Sustainability and Policy Implications

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# Presentation Structure

- Introduction and Background.
- Research Aim.
- Objectives of the Research.
- Scope of the Study.
- Research Methodology.
- Data Presentation and Analysis.
- Conclusion and Recommendation.
- Acknowledgement.

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# Introduction & Background (1)

- Social policy challenges in South Africa.
- Introduction of Reconstruction and Development Programme (RDP) to address housing inequality (Greyling,2010; Moolla *et al*., 2011).
- Amidst over million houses built, poor quality delays in delivery and backlogs are still eminent.
- Conventional brick/block methods are preferred.
- These methods are labour intensive significantly affect the environment and are costly (Twala, 2008;Greyling, 2010).
- As a result, dependency on skilled labour which is scarce, is the resolve.

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# Introduction & Background (2)

- This dependency on scarce skilled labour contributed to delays, rework and premature building deterioration.
- Alternative building technologies (ABTs) have been proposed as potential solution.
- This is to address delivery speed, reduce reliance on scarce skills, improve sustainability and increase opportunities for local participation. (Moladi, 2022; Windapo *et al*., 2021).
- Reusable formwork systems, interlocking block systems produced on site (Hydraform) and low-tech earthen systems (sandbags/earthbag) are the systems explored.

# Research Aim

The aim of this research was to examine and compare the performance of Alternative Building Technologies (Moladi, Hydraform and Sandbag systems) against traditional construction methods used in the development of RDP housing projects in South Africa. The variables of comparison are impact to cost, quality and sustainability.

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# Objectives of the Research

- Identify ABTs suitable for RDP housing construction process.
- Assess time to construction, the quality of the completed structure and the impacts on performance.
- Evaluate the stakeholder perceptions in the utilization of ABTs and explore the barriers to adoption.
- Propose strategy of implementing ABTs across construction projects.

# Scope of the Research.

- Single-storey low-cost housing typologies.
- Three ABTs were evaluated (Moladi, Hydraform and Sandbag systems).
- The evaluation of these systems was conducted in South Africa for material availability and socio-economic feasibility.

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# Research Design and Methodology (1)

- The study adopted a pragmatic mixed-method approach which combined quantitative and qualitative.
- The rationale for this paradigm was the recognition of multiple realities (technical performance and stakeholder perception).
- Primary data collected through research questionnaire targeted at contractors, government officials and end-users). Closed and open-ended questions.
- 33 contractors received the questionnaire, but 23 responses were received (69,6% response rate across contractors).
- Government official responses (n = 11) and end-user responses (n = 8).

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# Research Design and Methodology (2)

- Quantitative data was analysed through descriptive statistics (frequencies and simple tallies).
- Qualitative data was analysed through thematic content analysis to identify recurring themes (Ngoy *et al*., 2023; Bhandari, 2022).
- Triangulation of the findings with literature was adopted for validation of the results.

# Results (1)

- 15 out of 23 contractors indicated that the predominant method of construction they use was standard block and mortar.
- The composition of familiarity to ABTs was, sandbag construction (n = 12), Hydraform (n = 9) and Moladi (n = 6).
- Rationale for familiarity of ABTs was visible pilot projects, local NGO promotion and presence of suppliers.

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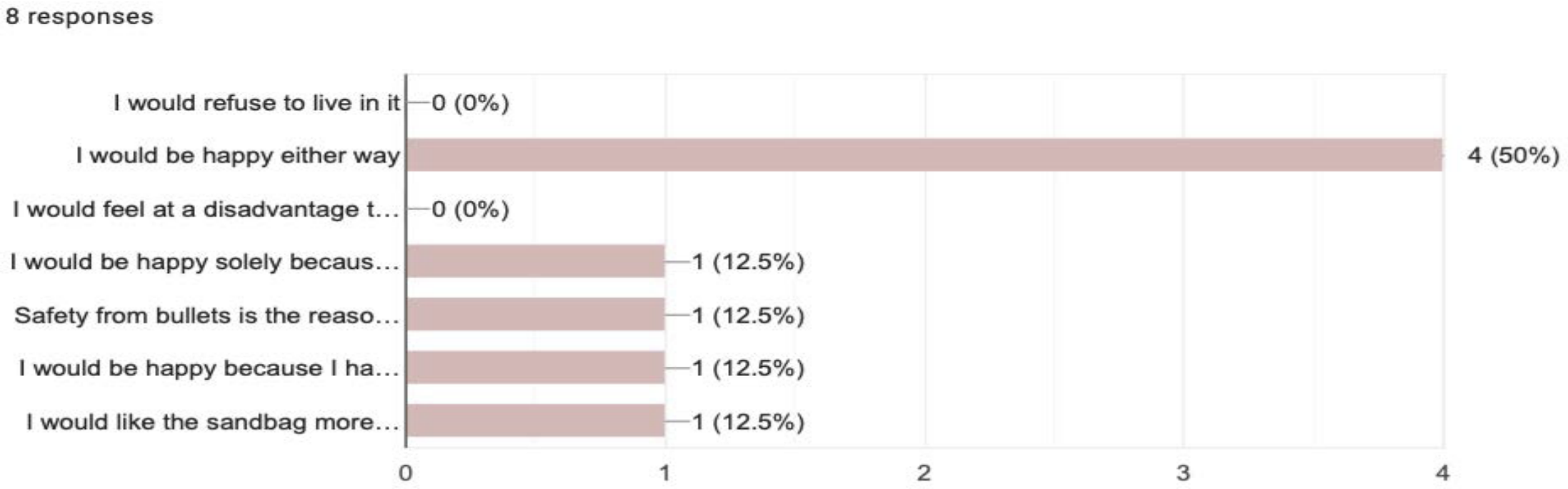
# Results (2) Drawbacks experienced by contractors using ABTs

| S/No. | Drawbacks of ABTs | No. of Responses |
|---|---|---|
| 1 | Time constraints | 8 |
| 2 | Quality deficiency in the long term | 5 |
| 3 | Under-allocation of resources | 3 |
| 4 | No drawbacks/downfalls | 2 |
| 5 | Other: Unskilled labour force | 1 |
| 6 | Other: Training needs of workers | 1 |
| 7 | Other: Corner cutting | 1 |
| 8 | Other: Planning of fill and quantities | 1 |
| 9 | Quality deficiency in the short term | 0 |

# Results (3)Comparison of ABTs in Terms of Time, Cost and Quality Requirements

| Performance Requirements | Moladi | Sandbag | Hydraform |
|---|---|---|---|
| Better in terms of Time | 7 | 9 | 8 |
| Better in terms of Cost | 5 | 5 | 4 |
| Better in terms of Quality | 6 | 6 | 6 |
| Worse in terms of Time | 0 | 1 | 0 |
| Worse in terms of Cost | 0 | 2 | 1 |
| Worse in terms of Quality | 0 | 0 | 0 |

# Results (4) Stakeholder Acceptance and Social Perceptions

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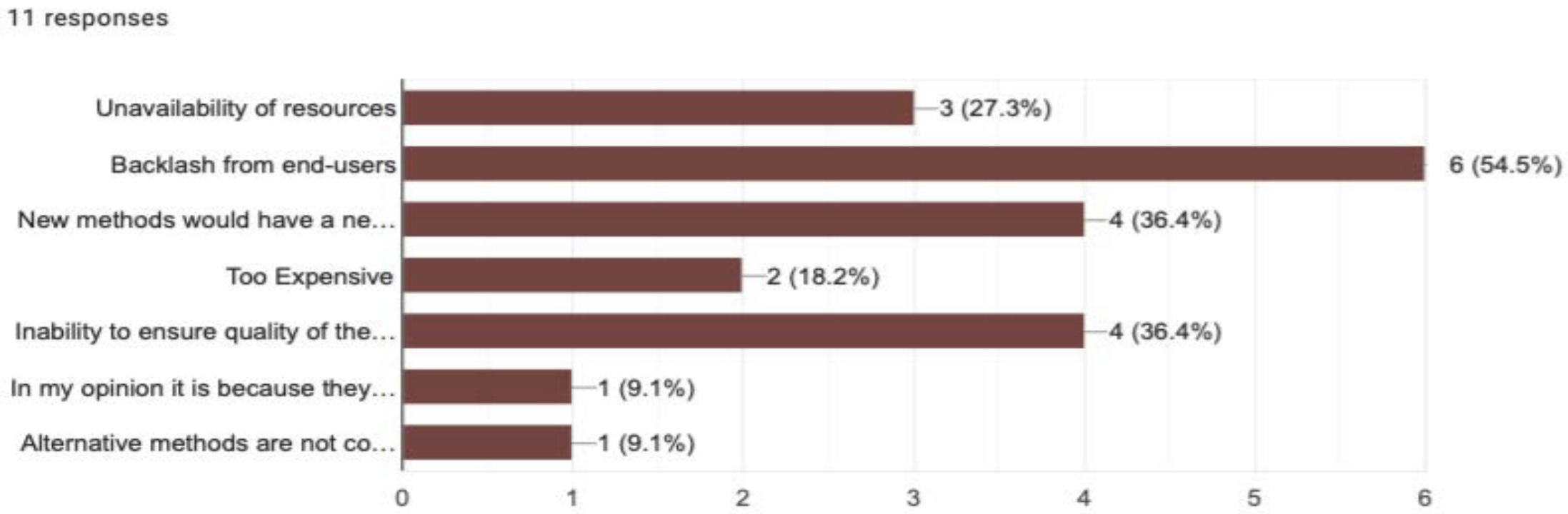
# Results (5) Government Officials' Perception of the Use of ABTs in Housing Construction

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# Discussions, Conclusions & Recommendations (1)

- Large proportion of familiarity is attributed to visible pilot projects and NGO Promotion.
- Sandbags are common and respondents are familiar with.
- Time constraints, and long construction cycles, quality deficiency and lack of skilled labour, and under-allocation of resources are identified challenges.
- End-users generally accepted ABT housing.
- Positive views on safety and moisture resistance of sandbags.

# Discussions, Conclusions & Recommendations (2)

- Across government officials', unclear SABS/NBR approval processes and risk aversion are key barriers.
- There is a need for streamlined approval process and channel.
- ABTs were found to deliver measurable improvements in construction speed, reduced reliance on scarce skilled artisans, lower materials wastage and enhanced opportunities for the community.
- Moladi demonstrated strong performance across  time cost and quality.
- Barriers to adopt ABTs are more institutional than technical.

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# Discussions, Conclusions & Recommendations (3)

- Development of performance –based ABT standards are recommended.
- The government to address regulatory limitations to ABT use.
- Encourage pilot projects that are geared towards targeted training, and procurement reform in to leverage technical competencies.
- Policy makers should integrate ABTs into procurement process of subsidized housing programmes.
- The construction industry to view ABTs as an opportunity to diversify business models.

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