# Sustainable, Resource Efficient Informal Settlements: Assessing the Role of Co-design in Informal Settlement Upgrading


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A research report submitted for the degree of Master of Urban Studies in the field of Sustainable Energy Efficient Cities

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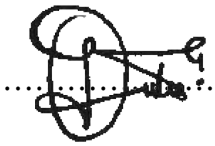
October 2021

# Declaration

I declare that this research report is my unaided work. It is being submitted for the Degree of Master of Urban Studies in the field of Sustainable and Energy Efficient Cities to the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination to any other University.



25 October 2021

# Abstract

Addressing climate change demands the promotion of sustainability in the formal and informal cities. However, sustainability interventions are widely critiqued for marginalising and neglecting the informal city. This study considers how co-design could enable spatial practitioners to harness informal design and construction tactics in the development of contextually responsive and sustainable solutions. It investigates the sustainability of design and construction practices in informal settlements and the effectiveness of co-design processes that draw from them to upgrading. It involved conducting of interviews, document analysis and observations of co-design workshops and informal design and construction tactics in a meta-analysis of five informal settlements. The application of sustainability practices such as recycling observed in the case studies, was mainly motivated by conditions of poverty, and co-existed with unsustainable conditions. However, through co-design processes, some interveners were able to harness informality in the development of contextually responsive, sustainable solutions.

# Acknowledgements

God, for His love, guidance, protection, provision and never leaving nor forsaking me!

My parents, for your constant prayers, faith in me and the sacrifices that you continue to make so that my siblings and I can lack no good thing but rather reach greater heights. My grandparents, for your love, encouragement, and constant prayers. My siblings, uncles, aunts, cousins for the constant mental health check-ins and prayers.

My supervisor, for your patience, time, guidance, and support through this, especially in a very unprecedented time.

To my friends, Purll, Lauren, Aimee, Nolwazi, you gave me family and a piece of home in a year we all needed them more, but mine were physically thousands of miles away. I saw and experienced God's love, kindness, and generosity, through you and the time we spent together. Sheila, Solophina and Kigozi, knowing that you were always one call away gave me the greatest comfort. My bible study friends, Edith, Hilda, and everyone, your constant prayers, and check-ins, meant the world to me.

1to1 – Agency of Engagement, for offering their time, support, and resources, all of which were important to this study. To the interviewees, thank you for offering your time, valuable information, and experience.

To the Wits-TUB Urban Lab for your financial assistance, without which this would not have been possible.

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# Chapter One: Introduction

## 1.1 Overview

Over the past few years, addressing climate change has risen to international prominence and with it the promotion of sustainability (Simon, 2016; UN-Habitat, 2014). A key concept to sustainability is resource efficiency; referring to the sustainable use of the earth's material and energy resources in a manner that effects minimal environmental impact. In view of a growing global population, resource efficiency is motivated by the importance of decoupling growth from resource consumption to sustainable development. Buildings and building construction are responsible for more than 50% of energy consumption and 40% of carbon emissions (Du Plessis, Irurah and Scholes, 2003). Accordingly, efforts made towards efficient resource consumption in the built environment have potential for great impact concerning sustainability. Addressing sustainability, therefore, brings resource efficiency in buildings and settlements to the fore and demands that we think critically about both formal and informal settlements. However, contemporary planning, design interventions and some sustainability agendas, are often anti-poor; responding inappropriately to or neglecting the complexities of working in informal contexts (Watson, 2009; Simon, 2016).

Informal settlements house the bulk of the urban population in the sub-Saharan Africa (Watson, 2014) and are a pressing concern and cannot be overlooked regarding sustainability. Contextually inappropriate design responses in informal settlements are attributed to the inability of architectural professionals to address informality and upgrading (Perold, Donaldson, Devisch, 2019). Combrinck (2015), referring to the South African context, argues that this is owing to the marginality of the architectural profession on discourse on the two concepts. As in the case of planning, traditional approaches to design persist in spite of being outdated and resulting in antipoor, exclusionary interventions that are unresponsive to urban and environmental issues (Watson, 2009). In that regard, Watson writing from a planning perspective argues for the reinvention of planning for it to remain relevant to urban development today. She suggests participation as a corrective to the shortcomings of traditional approaches to planning. Similarly, arguments have been made for the need for alternative ways of practicing architecture (Awan, Schneider and Till, 2011). for it to remain relevant in addressing today's concerns such as the urban issues of poverty and inequality, and

environmental issues of climate change. In that regard, there are growing appeals for participation in the design process and as such for co-design processes.

This study examines the concept of sustainability particularly resource efficiency as it relates to informal settlements with a focus on two aspects; (1) Co-design as a means by which architectural professionals can engage meaningfully and respond appropriately to sustainability in informal contexts. (2) The idea that the informal design and construction tactics employed in informal contexts imbue principles of sustainability relating to; recyclability, use of locally resourced materials and compact densities (Wekesa, Steyn and Otieno, 2011) from which architects can learn and draw. Drawing on these insights, the study explores the integration of co-design processes that draw from informal design and construction tactics in upgrading, concerning the development of sustainable and resource efficient solutions.

## 1.2 Background

The South African government has since the attainment of democracy in 1994, sought to realise equitable access to adequate housing. Whilst the housing policies and programmes enabled the provision of over a million houses within the first decade (Perold, *et al*., 2019), there is still a large and growing backlog with many people living in informal settlements. The housing backlog as in the case of backlog data in sectors such as education, health and transport, indicates that the basic needs of a large portion of the population have yet to be met (Du Plessis *et al*., 2003). Du Plessis *et al*. (2003) point out that efforts made to meet these needs will over the years effect a growth in demand for construction materials and consequently an increase in resource consumption and greenhouse gas emissions from related industries. In the view of sustainability, the improvement of equitable access to basics needs ought not to be undertaken in isolation from sustainability concerns. However, state responses to housing provision have been widely critiqued as being unresponsive to sustainability concerns.

State low-cost housing projects are often constructed on greenfield sites far from places of employment, consequently causing strain to the inhabitants who incur high transportation costs to access areas of employment. Additionally, even efforts made toward sustainability in low-cost housing are prone to marginalising the poor. For instance, Keller (2012) points out that some interventions regarding energy efficiency in informal settlements require high costs of maintenance on the part of the inhabitants, which many cannot afford. Osman and Karusseit (2008) note however, that there are lessons in vernacular architecture in informal settlements

from which architects can learn and apply in housing design. The question becomes how these lessons can be drawn from these contexts (*ibid*.). Research suggests that exploitation of local design knowledge and engagement of local participants in design processes could enable the development of contextually appropriate and sustainable solutions (Parsons, Fisher, Nalau, 2016; Zamenopoulos and Alexiou, 2018). Co-design entails the engagement between those with the informal knowledge and lived experiences and those with the expertise in the design process (Zamenopoulos and Alexiou, 2018). This study will explore the role played by co-design in the development of contextually appropriate sustainable design solutions.

## 1.3 Problem statement

In the context of climate change, addressing sustainability in both formal and informal settlements is critical. However, informal settlements have either been neglected or further marginalised by interventions in that regard. This is in part due to a modernist approach to planning that neglect the complexities of informality and the upgrading of informal settlements. Public participation is suggested in literature and urban policy to remedy the shortcomings of modernist planning (Watson, 2009; Simon, 2016). The argument for this being that participation facilitates poverty eradication, enables social inclusion, and reduces vulnerabilities. Participation in design can take the form of co-design. Co-design or participatory design has the potential to engage the inhabitants of informal settlements in the design processes of what pertains to them and employ their design knowledge in developing sustainable solutions. While there is evidence of research on co-design in architecture and planning in the global north, there is a relative paucity of research in the global south particularly concerning informal settlements and questions of sustainability and resource efficiency. This study explores the involvement of individuals or groups in co-design processes that draw on local design knowledge and navigation of the informal settlement reality towards sustainability particularly concerning resource efficiency in the upgrading processes.

## 1.4 Objectives

The study addresses the following objectives:

1. To assess the existing informal design tactics informal settlements through the lens of sustainability particularly, resource efficiency.

2. To identify how co-design processes that draw from informal knowledge can facilitate upgrading towards the development of sustainable, resource efficient interventions.
3. To establish the efficacy of co-design as an appropriate participatory approach for informal settlements upgrading.

## 1.5 Research questions

The study seeks to address the question: "To what extent do sustainable, resource efficient strategies for upgrading informal settlements benefit from co-design processes that draw from informal design knowledge tactics?" The sub-questions are:

1. What are the existing informal design strategies that demonstrate resource efficiency in informal settlements?
2. What elements of co-design facilitate the use of informal design knowledge?
3. How effective is co-design in informal settlements upgrading?

## 1.6 Study Hypothesis

This study hypothesised that co-design is critical to the development of contextually responsive design solutions for the upgrading of informal settlements pertaining to sustainability, particularly concerning resource efficiency. An initial literature search pointed to community participation in upgrading as a corrective to discriminatory and marginalising interventions for informal settlements. Furthermore, it highlighted that vernacular design tactics (referred to in this study as informal design and construction knowledge) offer lessons for architects that could facilitate the development of contextually responsive and sustainable design solutions. In addition, the effective implementation of these lessons would require the involvement of local knowledge groups. To test the hypothesis, the effectiveness of co-design as a participatory approach would be measured on capacity for self-determination, engagement of informal knowledge participants in design decision-making and implementation, and responsiveness to the social issues such as poverty. The effectiveness of informal design knowledge tactics will be measured on their demonstrability of resource efficiency.

## 1.7 Chapter Outline

Chapter one introduces the study and situates informal settlements in the broader context of the sustainability discourse. It highlights the inappropriate response of architectural professionals

concerning the upgrading informal settlements and sustainability in that regard. It highlights co-design processes that draw from informal design and construction tactics as a potential corrective. The problem statement, research questions, objectives and limitations are presented here as well. Chapter two elucidates on the research methods, approach, the tools, and strategies that were employed in the study. Chapter three provides a literature appraisal on the key concepts and theories that frame the study; informality, local knowledge, and co-design, as they relate to the overarching theme of sustainability with a focus on resource efficiency. Chapter four – the context chapter – describes the case studies. Chapter five describes how co-design was undertaken, as well as the application of informal design tactics in each case study. Chapter six – the analysis – critically reflects upon how the findings relate to the objectives, research questions and the expectations of conceptual framework. Chapter seven – the conclusion – reflects on the findings, their implications and how they relate to the research question.

# Chapter Two: Literature Review

## 2.1 Introduction

In the context of the large housing backlog in South Africa, there is a growing significance of *in-situ* upgrading of informal settlements and innovative ways to decouple improved wellbeing from resource consumption. However, housing policies and programs and sustainability initiatives have been widely critiqued for further marginalising the poor (Huchzermeyer, 2009; Wekesa *et al*., 2011; Simon, 2016). Inappropriate design interventions in informal contexts demand a reinvention of the architectural practice, placing emphasis on understanding the complexities of informal contexts with attention to the various layers of spatial production such as sustainability. In that regard, it is important to note that discourse around informal settlements has often cast them solely as settlements of the urban poor in need of humanitarian and institutional intervention (Mehrotra, 2010; Hernández and Peter, 2010). However, the solutions for the betterment of these settlements not only lie outside them but also exist within. For instance, the local design knowledge tactics inherent in these settlements challenges the spatial boundaries set by formal design and offers lessons on invention within constraints of limited resources (Mehrotra, 2010.) which is important to sustainability. Therefore, understanding how informal design tactics can contribute to sustainable design interventions is important and critical to that is understanding the role of co-design. Co-design processes that draw from informal design knowledge could offer a corrective to the shortcomings of marginalising interventions through fostering participation in the design processes. Participation in decision making is important in addressing the social issues of poverty and inequality alongside the environmental issues as well as in the implementation of vernacular design tactics (Huchzermeyer, 2009; Zamenopoulos and Alexiou, 2018). This literature appraisal is a discussion of co-design processes in informal settlement upgrading as they pertain to sustainability, resource efficiency, and to informal design and construction knowledge tactics inherent in informal settlements. It seeks to investigate the objectives of the study by exploring; (1) how co-design makes for effective upgrading and how this effectiveness can be measured; (2) how existing informal design strategies relate to sustainability; (3) what elements of co-design are important for the fulfilment of effective upgrading involving the application of informal design tactics.

This literature review is structured according to three themes that were identified to help frame the research and explore the objectives of the study. These are: *informality and the informal settlement as a built environment, the policy context for informal settlements upgrading in South Africa,* and *co-design as a participatory planning approach*. An exploration of the literature on informality provides a theoretical lens through which informal settlements can be understood. A review of literature of the informal settlement as a built environment provides an understanding of informal knowledge, its application and relevance to the concept of sustainability. A literature appraisal on co-design unpacks the concept as it relates to upgrading and its essentiality concerning sustainability, learning, and integrating informal knowledge into upgrading processes. Finally, a review of literature on the policy context for the upgrading of informal settlements in South Africa helps identify the gaps in housing policy and whether they have been addressed by current upgrading strategies such as community participation. The literature appraisal concludes with a conceptual framework that demonstrates the need to think critically about the integration of three variables; (1) capacity for self-determination of inhabitants; (2) identification and application of sustainable principles employed in informal design tactics; (3) involvement of informal knowledge groups in the employment and appropriation of sustainable tactics through co-design.

## 2.2 Informality and informal settlements as a built environment

### 2.2.1 Informality and informal settlements

Informality and informal are terms used widely in different contexts to imply distinct things and can be applied to housing, economic activity, architecture, transport, and different sectors. The term informality or informal can be traced back to the 1970s, from a focus on economic activity (Harris, 2017). An observation was made on economic activity outside formal structures that was thought to be peripheral and temporal (*ibid*.). However, that has not been the case, rather, informality continues to proliferate in cities today particularly in the global South. Harris (2017:268) writing from a perspective of the global North, claims that though informality is "urban in character," urban studies scholarship has failed to appreciate this aspect, treating informality as a "black hole" that can be disregarded. By contrast, Porter (2011) argues that informality is one of the key problems faced by cities and urban dwellers and therefore a key challenge for urban planning. The contrasting views expressed by Harris (2017) who claims that informality is often overlooked, and Porter (2011) who asserts that it is a

significant aspect of planning, illustrate how elusive the concept of informality can be. Informality is a significant issue in the global South as a high percentage of people reside in informal settlements, and a great number are employed in the informal economy.

A widely used definition of informality refers to it as activities in opposition to established regulations. For instance, Harris (2017:1) defining informality as it relates to the economic activity, refers to it as: "those actions of economic agents that fail to adhere to the established institutional rules or are denied their protection." This points to the relationship between informality and state regulation, in which informality is regarded as the opposition or resistance to legal frameworks and processes. In this regard, Harris claims that informality is urban in character, arguing that cities being the most regulated places give grounds for a lot to be regarded as informal. Informality is also often defined as a binary opposition to formal (Huchzermeyer, 2011). In this regard, formal usually refers to that which is ordered or structured and in adherence to the legal frameworks while the informal is the contrast to it; formless and in resistance to legal frameworks (*ibid*.). Such binaries are derogatory and fail to appreciate some of the positive attributes of what is considered informal Hernández and Peter (2010). Mehrotra (2010), however, uses a binary to define the informal city in a non-derogative manner. He refers to the informal city as the "kinetic city," in contrast to the formal city which he refers to as the static city. These terms refer to the spatial qualities that are characteristic of the different settlement categorisations, particularly the permanence of built form and materials. The static (formal) city is that "built of permanent materials such as concrete, steel and brick – and is comprehended as a two-dimensional entity on conventional city maps and is monumental in its presence" (Mehrotra, 2010:xi). By contrast, the Kinetic (informal) city is "temporary in nature and often built with recycled materials: plastic sheets, scrap metal, canvas and waste wood – it manifests and reinvents itself" (*ibid*.). This study leans towards the definition of informal as kinetic city as it does not cast informal settlements in a negative light but rather draws attention to their characteristics whose contribution to sustainability this research investigates. However, this study takes caution not to romanticise informal settlements and acknowledges definitions that point out the appalling conditions that are characteristic of many and thus call to attention the need for their upgrading. Informal settlements are also defined as human settlements "characterised by inadequate housing conditions; deficient urban services (water supply, sanitation, drainage, solid waste disposal, and roads and footpaths); unsanitary and dehumanizing living conditions; extremely high densities (of both people and dwellings); and, frequently, long travel distances to job opportunities" (Majale, 2008:27).

Furthermore, the location of informal settlements in hazard prone areas such as flood plains increases their susceptibility to environmental disasters and extreme weather events (UN-Habitat, 2009). The UN-Habitat (2009) argues that slums are a threat to the green agenda and points out that the brown agenda in these settlements is also compromised. Consequently, the characterisations of and issues in informal settlements demand for their upgrading to improve the lives and livelihoods of people and the environment. It should be noted that Majale's (2008) definition of informality only focusses its manifestation in slums and conditions of poverty. However, informality is "geographically ubiquitous," found in various contexts globally that is, it is found in both the global South and North and among the poor as well as the elite (Harris, 2017:268). Amongst the rich it can manifest as non-compliance to building codes for instance, middle class apartments constructed in Kampala from modern construction technologies are in opposition to legal formal planning. However, in informal settlements that are established in conditions of scarcity are innovative design tactics in attempts towards making positive spaces, challenging spatial boundaries with limited monetary and material resources (Osman and Karusseit, 2008; Hernández and Peter, 2010).

Informality is not a "black hole" that can be neglected but a pressing concern particularly in cities of the South. Informal settlements are the kinetic aspect of the urban space characterised by intuitive tactics such as the use of recycling practices that are often motivated by conditions of lack or shortfall. These tactics or vernacular design practices bear lessons from which design professionals can draw and integrate into their upgrading interventions. The next section investigates the role played by the vernacular design practices inherent in informal settlements as a mode of spatial production.

### 2.2.2 Informal design knowledge

Critical to the upgrading of informal settlements is understanding them as a "mode of spatial production" (Kamalipour and Dovey, 2020:7). Production of space is a concept accredited to French philosopher Henri Lefebvre. According to Lefebvre (1991:31), "every society and hence every mode of production … produces a space, its own space." Understanding this space requires an understanding of social and material relations of a society. Various factors influence the unique form of social production in informal settlements which is characterised by recycling practices, temporality and incrementality and more. Spatial production is to a large extent driven by the socio-economic conditions of poverty. Forced by conditions of poverty and scarcity, the urban poor adapt; using tactics and innovation to extend spatial limits

(Hernández and Peter, 2010). Inherent in informal settlements is local logic which defies the limitations of the formal or static city which would rather erase them (Mehrotra, 2010). This section looks at three of the spatial production practices that are characteristic of informal settlements, and which will be examined in relation to principles of sustainability. These are: recycling practices, self-construction and design, and incremental adaptation.

a) Recycling practices

The construction of shack dwellings in informal settlements is motivated by the advantage of fast construction, ease of accessibility of materials, and the employment of uncomplicated building techniques (*ibid*.). Shacks are constructed by hand from largely recycled materials including cardboard, plastic, wood and corrugated metal sheets (Matthews, Richards, Van Wyk and Rousseau, 1995; Mehrotra, 2010). However, these makeshift structures do not provide sufficient protection from the elements, making occupants vulnerable to natural hazards (UN-Habitat, 2009). Furthermore, Matthew *et al*. (2005) point out that a consequence, particularly resulting from the materiality of shacks is that they are often thermally inefficient and fire hazards. However, Steyn (2003, cited in Wekesa *et al*., 2011) argues that the material characteristics of the dwelling units in slums are not the fire hazard, but rather the forms of energy used. For instance, materials used in shack construction such as corrugated iron, are increasingly used as walling materials (as in informal settlements) in formal architectural projects which are viewed as innovative. In formal projects, the built environmental professionals employed are equipped with the necessary technical and design skills to enable responsiveness to structural, thermal, and other challenges that may result from the use of similar materials. However, in informal shack construction, built environment professionals are not engaged. Furthermore, due to conditions of energy poverty, inhabitants burn low-cost fuels such as wood and coal to meet their energy requirements, especially in winter. This not only increases their vulnerability to fires, but also has negative implications on their income, health and the environmental (*ibid*.).

The use of recycled materials in shack construction also aligns itself to concepts such as the recycling potential in buildings. Such concepts are a relevant means to resource efficiency in the built environment. Thomark (2002:430) defines recycling potential as “the potential for environmental benefits from recycling building materials after refurbishment or demolition.” It is a concept that is gaining recognition in sustainability discourse, driven by the increased interest in the life cycle analysis of buildings regarding resource consumption. Of the five

stages of a building's life cycle, that is, from the raw material extraction and processing, "erection, operation, maintenance and demolition" stages, the operation stage is the one during which the most energy is consumed (*ibid*.:429). As such, research and innovation has greatly focussed on reducing the energy consumed during a building's operation stage. However, interventions toward efficiency at the operations stage like the installation of insulation to better a building's thermal performance increase the "proportion of the total energy use attributable to materials" (*ibid*.:429). Therefore, strategies for the reduction of embodied energy such as recycling potential are important in the design of low-energy buildings.

Two of the concerns critical in the implementation of recycling potential are designing for deconstruction and the uptake of recycled materials after the demolition of a building and their recycling thereafter. According to the South Africa State of Waste Report, the construction and demolition waste stream was the third largest in 2017; generating 4.9Mt of waste (DEA, 2018). The report also notes that 90% of the waste was recycled in the form of crushed gravel for road construction. Therefore, there is a limited amount of recycling done for building construction. In this regard, informal settlements have played an important role in their uptake of recycled materials. Their temporal nature also allows for ease of deconstruction and continued recycling of materials, keeping construction materials in a closed loop. However, it is important to understand the complexities around the use of recycled materials in informal settlements, most of which is motivated by lack and would otherwise not be opted for.

b) Self-construction and design

Informal settlements are characterised by self-construction or self-build and design using basic materials and methods (Caballero, Alegre, Armengou and Aguado, 2019). Hernández and Peter (2010) note that informal architecture is often described as "formless" or regarded in a derogatory way as that which comes about without the involvement of a professional architect. They argue that though professional architects are not involved in the design and construction processes, structures that result from local logic have attributes of formal architecture, form being one of them. In this study the local logic innate in the spatial production of informal settlements is referred to as *informal design knowledge*, given that it is unacquired from formal education but intuitive. Osman and Karusseit (2008) suggest learning from vernacular settings as one of the principles for professional engagement in the field of housing. They argue that vernacular architecture offers lessons in housing design. One of the lessons highlighted is the

gradual development in informal settlements that creates a layered environment and effective urban spaces (*ibid*.).

Self-construction is a key aspect to integrate into upgrading processes (Caballero *et al*., 2009). The underpinning for this is the need for self-sufficiency and self-determination which are important in reducing dependency on external aid and in achieving sustainability. As such, labour-intensive interventions are the preferred option, particularly in which unskilled local labour can be employed (*ibid*.). Writing from a Colombian perspective, Caballero *et al*. (2009:195) who review "existing technical solutions for constructing low-cost floor slabs," suggest that the weight of materials, local sourcing, and the use of techniques that do not require specialised knowledge or complex machinery are important considerations for interventions in informal settlements. For instance, the weight of the material should be 70kg or less, so that it can be carried by two adults (*ibid*.). As such, labour-intensive interventions that are reliant on unskilled local labour are encouraged to make use of the human resource within the community.

c) Incremental adaptation

Another notable characteristic of spatial production in informal settlements is incrementalism or incremental adaptation. According to Kamalipour and Dovey (2020), incrementalism manifests in various typologies that produce different morphologies of informal settlements. They identify these as: 'extend', 'attach', 'replace', 'divide', 'connect' and 'infill.' Furthermore, they note that these typologies can produce "slum" conditions. It is important to understand the manifestation of incrementalism in a settlement, and how it can be incorporated in the upgrading of informal settlements to prevent "slum" conditions, such as overcrowding and unsanitary conditions. O'Brien, Carrasco and Dovey (2020) who analyse incremental housing using the case of the Villa Verde project in Chile raise a similar concern by asking if there exists any mechanisms to prevent the informal additions from resulting into a "slum."

The Villa Verde, a social housing project by a Chilean architectural firm Elemental, was designed to harness informality by enabling informal additions to houses within a formal framework (O'Brien *et al*., 2020). The project objective was to provide housing to people that were illegally occupying a piece of land following an earthquake that had left them homeless. This was met with hindrances such as budget restrictions given that the housing subsidy provided was low in relation to the housing need. Through engagement with the members of

the community the idea of incrementalism was agreed upon and implemented. The members were provided with a "half house" that was fire resistant, anti-seismic and had the basic spaces for a house, at the same time allowed for the occupants to build upon it over time. The Villa Verde provides a precedent on harnessing the informality and employing it in housing to address housing concerns whilst enabling self-help and determination.

*Figure 1: Villa Verde. Source: Arch Daily*

This section explored three aspects of spatial production within informal settlements: recycling practices, self-construction, and incremental adaptation. Conditions of poverty and limited resources drive many of the decisions in spatial production within informal settlements that result in the above characteristics. Additionally, the absence of built environment professionals' intervention results in deficiencies in the design and construction of the settlements. Simultaneously, there is innovation that challenges spatial limitations. In that regard, research shows that informality offers lessons from which professionals can learn (Osman and Karusseit, 2008). Projects such as the Villa Verde illustrate how informality can be harnessed to create contextually responsive and enabling solutions to housing. However, mechanisms must be put in place not to curb the escalation into "slum" conditions, as in the case of incremental adaptation (O'Brien *et al.*, 2020). This necessitates a furtherance in

understanding the development of the typologies and morphologies of informal settlements. Furthermore, the practices born out of necessity such as recycling, align themselves to principles of sustainability. The next section focuses on the sustainability debate in relation to informal settlements.

### 2.2.3 Informal settlements and the sustainability debate

While there is a growing recognition on the role of cities in the promotion of climate resilience agendas as a pathway to sustainability, the focus has been on the formal city (Brown, McGranahan, Dodman, 2014). However, the sustainable evolution of cities requires that the same consideration given to addressing the issues critical to sustainability within the formal city is given to the informal city as well (Gouverneur, 2014). Characteristic of informal settlements are practices advocated for in sustainability discourse such as; compactness, local sourcing of material, recycling, the consequent conservation of embodied energy of materials, and strategies like the incremental adaptation that allows for continued reinvention over time (Caballero *et al*, 2009; Kamalipour and Dovey, 2020). Furthermore, researchers agree that informal settlements have smaller ecological footprints than formal settlements (Ndlangamandla, Combrinck, 2019). Grove (cited in Ndlangamandla, Combrinck, 2019) argues that this is due to the practices of re-use and recycling of waste, compact nature of settlements and the consumption of less energy than formal settlements. Similarly, the UN-Habitat (2009:128) points out that informal settlements though a threat to the green agenda, bare positive aspects that align with the green and brown agendas; compact densities, promotion of walkability and high social capital.

Some interventions for the promotion of sustainability in informal settlements have resulted in the marginalisation of their inhabitants. One focus for intervention has been curbing energy poverty within informal settlements. Due to poverty and a lack of access to clean energy services and consequent energy poverty in informal settlements, households resort to using inefficient energy sources such as burning low-cost fuels (Keller, 2012). Keller (2012) who explores interventions for addressing energy poverty and promoting efficiency in informal settlements argues that upgrading programmes are contributing to the marginalisation of slum dwellers both spatially and economically. He illustrates this in an assessment of the upgrade of the Witsand informal settlement in which an ecological design intervention approach was implemented to improve the thermal performance of a shack. He notes that “project developers argue that ecological design interventions are more costly, an assertion that is oftentimes true”

(Keller, 2012). As such, ecological design interventions cannot be afforded by many in informal settlements. Furthermore, in instances where ecological interventions are implemented by the state, complexities such as the associated cost of maintenance over time marginalise those that can neither afford them nor conduct the maintenance or repairs.

Research suggests that employment of local knowledge could enable the development of contextually appropriate solutions (Zamenopoulos and Alexiou, 2018). Appropriate in that they respond to issues such as affordability, self-determination and self-sufficiency that are important for effective upgrading and sustainability of informal settlement communities. However, Huchzermeyer and Misselwitz (2016) note that whilst state-led programmes on housing could benefit from lessons drawn from informal housing development, they do not utilise them. Furthermore, because certain sustainable practices such as the use of recycled materials are associated with lack, they are often put aside in informal settlement upgrading interventions or the construction of low-cost housing.

Within informal settlements are practices that adhere to principles of sustainability, however, there are also unsustainable conditions within informal settlements. Some approaches to the promotion of sustainability, however, marginalise the inhabitants. Whilst research suggests that drawing from local knowledge could facilitate the development of contextually appropriate solutions, state-led programmes on housing do not utilise them.

## 2.3 Policy context and strategies for informal settlements upgrading in South Africa.

The South African government at the attainment of democracy in 1994 sought to redress apartheid disparities such as the housing deficit through its policy instruments. The initial post-apartheid housing policy saw the drafting of the Reconstruction and Development Program (RDP) and subsequently, the drafting of the 1994 White paper on Housing. Through the RDP, beneficiaries, that is, people whose monthly household incomes were less than R3500 were "entitled to a once off grant for land, services and a top structure" (Keller, 2012:30). The housing policy, however, did not consider informal settlement upgrading assuming "that the post-apartheid housing subsidy scheme would automatically address the plight of residents in informal settlements" (Marais and Ntema, 2013: 86). Even with the delivery of over 2.5 million housing units within a decade of the policy's enactment, the subsidised housing programme was insufficient in meeting the increasing housing backlog which outpaced housing supply. It

was also heavily criticised for perpetuating apartheid planning by relocating informal settlement dwellers to peripheral areas far from employment and services such as education (Huchzemeyer, 2009).

During apartheid, the state's response to informal settlements was through evictions and forced removals (Marais and Ntema, 2013). The state's approach has changed post-apartheid in a manner similar to what Khalifa (2015) observes in Egypt; from eviction policies to upgrading interventions that mandate for community participation (*ibid.*). This change aligns itself the argument by Wekesa *et al*. (2011, citing Steyn, 2003), that in South Africa, the problem of housing for the poor is not that they are housed in informal settlements, but rather that the state regards informal settlements as part of the housing deficit and responds by seeking to eradicate them. In building informal settlements, though inadequate housing, the poor reduce the pressure on the state to provide low-cost housing. In acknowledgement of this aspect, governments have changed approaches to informal settlements from eradication to upgrading policies. Notably, Wekesa *et al.* (2011) who review intervention approaches to housing the urban poor, that is, direct public housing, sites and services schemes and more, argue that the most effective approach is informal settlement upgrading. Upgrading is evidenced in various research as international best practice, presenting advantages such as social inclusion, addressing poverty as well as creating more sustainable environments and human settlements (Ziblim. 2013).

In 2004, a review of the housing policy saw the launch of the *Breaking New Ground*: A Comprehensive Plan for the Development of Integrated Sustainable Human Settlements also known as *Breaking New Ground* (BNG). This was a revolutionary turn in housing policy that saw the inclusion of informal settlement upgrading (Keller, 2012). Ziblim (2013:26) points out that a progressive aspect of the policy was that it approached the challenge of informal settlements "not merely as a housing problem but as the product of an underlying socio-economic predicament that need to be addressed holistically." Similarly, Huchzermeyer (2009), Pithouse (2009) (cited in Keller, 2012), and Khalifa (2015) argue that informality (referring to informal settlements) are not the housing crisis. Instead, they are the urban poor's response to inadequate affordable housing provision, political control, and limited economic resources (*ibid*.). As such, addressing the challenge requires a holistic approach that is responsive to the socio-economic, and political complexities. It is in that context that the BNG policy sought to shift from merely supplying housing structures to developing sustainable

integrated human settlements (DHS, 2004). The BNG policy document defined sustainable human settlements as: "well-managed entities in which economic growth and social development are in balance with the carrying capacity of the natural systems on which they depend for their existence and result in sustainable development, wealth creation, poverty alleviation and equity" (*ibid*.:17). The BNG policy emphasised addressing poverty, social exclusion, and vulnerability (Huchzemeyer (2009) and acknowledged the natural systems within which the settlements are embedded.

A key instrument for and appendage of the BNG policy is the Upgrading of Informal Settlements Programme (UISP). The UISP's primary objective was to "cater for the special development requirements of informal settlements" (DHS, 2009:9). Also core to the UISP are its three interrelated policy objectives: land tenure security, health and safety and empowerment of communities (DHS, 2009:13). Another objective of the UISP was to enable South Africa to localise the United Nation's Millennium Development Goals (MDG) particularly, Goal 7, Target 11; "which provides for the significant improvement in the lives of at least 100 million slum dwellers by 2020" (DHS, 2009:9). In the context of policy and legislative frameworks, the UISP finds backing and legitimacy in Article 26 of the 1996 constitution (Ziblim, 2013). Article 26 stipulates not only that adequate housing is a right for all, but also that legislative and other measures that can enable its achievement ought to be utilised, and that one ought not to be evicted in the absence of a court order. The UISP's focus on *in situ* upgrading of informal settlements that are located on suitable land facilitates the above. It also looks at causing minimum disruption for those found on sites considered unsuitable, such as, settlements located on dolomite and flood plains.

The recommended implementation of the UISP is through a phased development approach. The four recommended project phases of the UISP are (DHS, 2009):

- Phase One: Application. During this stage, municipalities apply for funding from the Provincial Government through submitting interim business plans.
- Phase Two: Project Initiation. Municipalities are required to carry out the initial upgrading activities such as land acquisition, a demographic profiling of the settlement, "installation of interim basic services," and an environmental impact assessment.
- Phase Three: Municipalities at this stage submit their final business plans, and upon approval receive funds to carry out a range of activities such as, land rehabilitation, construction of community facilities and more.

- Phase Four: Housing Consolidation. It is during this stage that activities such as the construction of the dwelling structures take place. This phase is not funded under the UISP, but under the housing subsidy program.

The BNG and UISP have been fraught with challenges, notably a gap between the policy rhetoric and its implementation. This can be partly attributed to a refusal of municipal authorities to change their mindsets about informal settlements, as such, continuing to implement eradication methodologies and relocating people to greenfield sites (Ziblim, 2013). Other contributing factors to the hindrance of the realisation of the UISP's said goals are; a lack of community involvement and participation, lack of access to suitable land for upgrading, and a lack of capacity and material resources (*ibid*.). Community participation which is one of the key principles of the programme has been particularly lacking in implementation. This study focuses on the aspect of community participation through looking into participatory design and its role in sustainability.

## 2.4 Community participation

In cities of the global South, the marginalisation of informal settlements is partly attributed to the adherence to modernist town planning systems that were transferred from the global North through colonialism and globalisation (Watson, 2009). Modern town planning grew out of the response to the industrial city in which pollution, excessive density, diminishing green space, caused health and social problems during the industrial revolution (Waters, 2016). Though cities of the South are changing markedly due to rapid urbanisation, planning systems have scarcely evolved. The current urban context is defined by increased urban poverty, informality, and concerns for environmental sustainability. Notably, though modernist town planning sought to address these challenges, its normative values such as "modernisation" and "aesthetics," result in antipoor and exclusionary interventions. For instance, slum removal, which has negative implications the dwellers, is the response to urban poverty (Watson.:167). Watson (2009), therefore, calls for the reinvention of planning with an emphasis on the socio-spatial aspects of urban context. Notably, shifts have been made to planning systems in both the global North and South, but do not offer a ready solution (*ibid*.). For, instance, some contemporary planning approaches which emphasize sustainability in cities are antipoor; focussing mainly on higher income areas but neglecting urban poverty and inequality (Simon, 2016). Whilst these approaches ought not be directly transferred, they offer principles that can be applied with an appreciation of the socio-spatial aspects of different contexts (*ibid*.). Of

interest to this study is the in the shift from master planning to more participatory and strategic planning approaches (*ibid*.).

Participation is suggested in contemporary planning as an antidote to the shortcomings of sustainability approaches and traditional planning approaches; given the need to look at the links between poverty, environment, and development (Simon, 2016; Watson, 2009). Owusu (2019:3), who conducted a study in Ghana on vulnerabilities to climate change in informal settlements demonstrated that a contributing factor was the "low community participation in adaptation decision-making processes." He consequently advocated for genuine participatory adaptation planning.

Bianco (2016) argues that while participation is a useful tool in urban processes, it has been applied simplistically to endorse policies and programmes already determined in bureaucratic processes, and thus problematic. Similarly, Madimetja and Makombe (2014) note that participation in many instances is carried out only for the sake of compliance with legislation. Citizens in such cases are passive participants. They further note that the idea of perfect participation cannot be achieved, however, projects and programmes should strive toward meaningful participation. This entails inclusivity and the involvement of citizens in the decision-making processes and to enable citizens to have ownership or stake in the result.

Concerning literature on participation, Cornwall (2002:51) notes that it:

> "largely focuses on *what* mechanisms for public involvement exist and *how* they are supposed to work. Less attention has been paid to instances of participation as situated practices, on how they actually work in practice, and on *who* takes part, on what basis, and with what resources - whether in terms of knowledge, material assets or social and political connections."

In this study codesign is explored as a situated practice, focusing on the value of informal design and construction knowledge and the experiences of the inhabitants to the development of contextually appropriate solutions for the promotion of sustainability in upgrading. In this regard, the resource is the informal knowledge or local logic and experiences of the inhabitants.

Community participation whilst a requirement throughout the UISP process, is often overlooked in many projects as a time-consuming activity. However, Ziblim (2013) illustrating from an example where community participation was overlooked to save time, points out that

the result was dispute over a project which the community neither liked nor felt a sense of ownership for. Additionally, Wekesa *et al.* (2011) also advocate for self-determination as critical to upgrading processes and meaningful participation is a pathway to it. Community participation is critical, not only in getting the community's buy-in on a project, but also in creating empowerment and sustainability. Participation is recognised as international best practice, however, it's implementation in upgrading is met with challenges such as the simplistic application as a tick-box exercise. Conventional participation ought to be challenged and alternatives for meaningful engagement of inhabitants in the decision-making processes investigated.

### 2.4.1 A case for co-design

On discourses of participation, Cornwall (2002) argues that the terms by which participants are referred to also reflect the perception of the positions they take in the participatory processes as well as their contributions to it, obligations, and entitlements. For instance, participants are referred to as, "'beneficiaries', 'clients', 'users' or 'citizens'" (*ibid*.:51). In co-design, the participants take on the role of co-designers, or co-creators alluding to their contribution to design decisions. Co-design or participatory design refers to a design process in which all stakeholders are actively involved (Sara, Jones, and Rice, 2020). Co-design acknowledges that the users are "experts of their own lived experiences, they can participate in design decisions and even participate as designers themselves" (*ibid*.:3). It involves design workshops in which the professional takes on the role of facilitator, while the residents step into a design decision-making role. As such the knowledge of the resident concerning the site, construction techniques and technologies, material resourcing, affordability and more, are acknowledged and employed appropriately.

Traditional design approaches much like traditional planning approaches are inadequate concerning addressing the complexities of social issues of poverty and inequality that plague urban areas (Watson, 2009). The proliferation of informal settlements in cities demands for change in approach to design interventions that pertain to them, to enable the development of wholistic and contextually appropriate solutions. In this regard, Fischer (2003) argues that the knowledge required to address complex design problems ought to come from not one person, but all stakeholders. This allows for innovative solutions to address a problem. Similarly, Galvin, Reid, Fernández-Giménez, Kaelo, Baival, and Krebs (2016) argue that transformation requires a transdisciplinary approach that engages formal and informal knowledge to provide

contextually appropriate solutions to complex problems. Furthermore, they note that it is not enough to acquire local knowledge, its appropriate application requires the involvement of the local knowledge groups. They emphasise the above concerning the concept of Indigenous Knowledge (IK) on which they research. They argue that though research shows that IK is beneficial to western science, its integration into western science has encountered difficulties owing to "differing systems of knowledge production and underlying world views" (*ibid*.:100). This they argue could benefit from the involvement of indigenous groups through co-design to facilitate a better understanding of the knowledge and its application and prevent its misappropriation (*ibid*). This demands the employment of approaches such as co-design. Co-design processes can, therefore, facilitate the harnessing of local design knowledge as well as its application.

## 2.5 Conceptual Framework

The review of literature considered the following themes, informality and informal settlements as a built environment, the policy context and strategies for informal settlements upgrading in South Africa and participation. It demonstrated that upgrading is the most effective intervention to informal settlements and addressing the lack of housing for the urban poor, and that critical to it is community participation. However, many approaches to informal settlements upgrading concerning sustainability are anti-poor and contextually inappropriate. Whilst participation is suggested as a corrective, it still falls short in its application demanding that conventional participation approaches are challenged. The literature demonstrates a need to stitch together the following concepts: informal knowledge and its inherent sustainability principles, self-determination, and the involvement of informal knowledge groups in the application of informal tactics in upgrading through co-design processes (Figure 2).

Concerning self-determination, it is key to the sustainability of interventions to a time after institutional investment has been withdrawn. It reduces dependence on external aid during and beyond the implementation of the project and as such addresses not only sustainability, but also prevents the further marginalisation of the poor by interventions that are meant to reduce marginalisation. Regarding the application of informal knowledge, it is important to look within the settlements for the innovative solutions. Furthermore, to understand the complexity of how the informal ways of making relate to sustainability and socioeconomic issues such as poverty. Lastly, to involve informal knowledge groups. The understanding of issues affecting informal settlements and the local knowledge alone is inadequate. Appropriate intervention

requires the involvement of the informal knowledge groups in developing how best this knowledge can be applied in an appropriate and locally responsive way. This demands for participative processes which entail the involvement of local knowledge groups in the application of local knowledge.

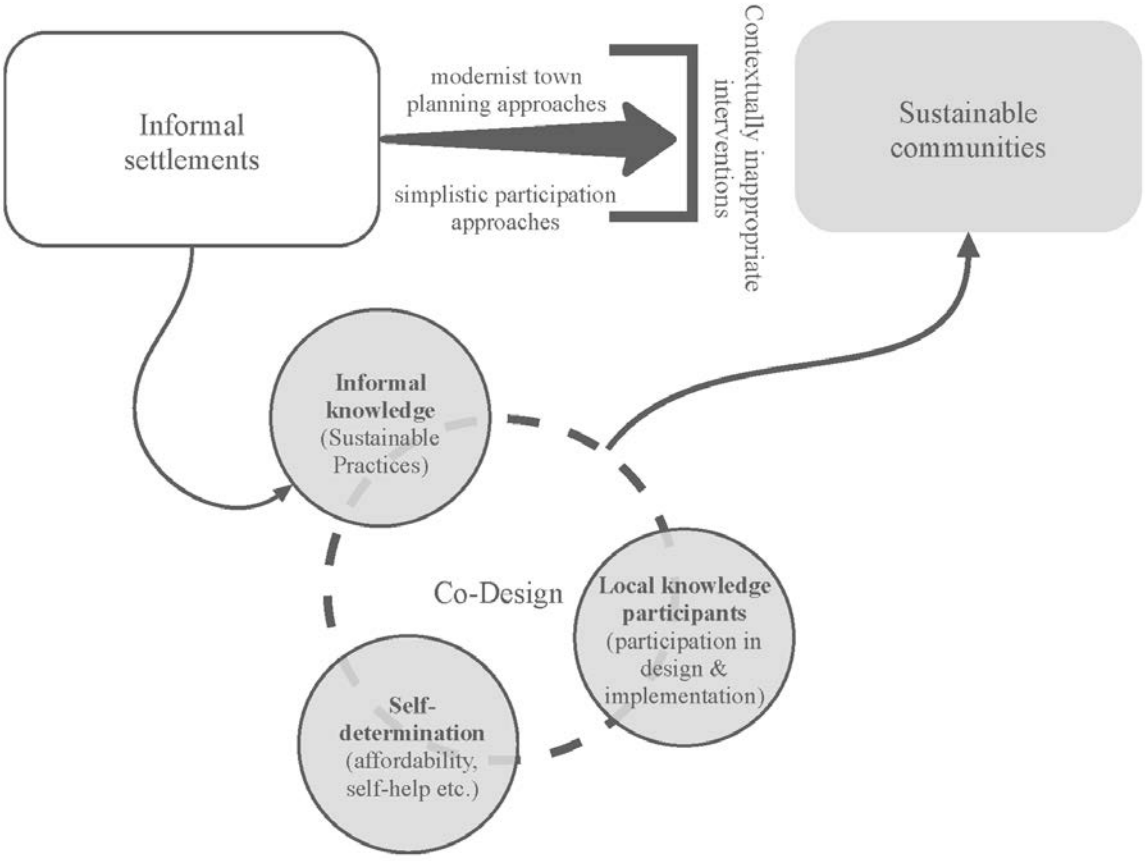


*Figure 2: Conceptual Framework (Author, 2021)*

# Chapter 3: Research Design and Methods

This study is situated in an interpretivist paradigm which is one that "aims to explain the subjective reasons and meanings that lie behind social action" (Blanche and Durrheim 1999:6). The underpinning for this is that the study seeks to explore the research questions through understanding the social and interpersonal influences of the context. This enabled the exploration and understanding of the identified concepts through the lens of the inhabitants of and professionals that intervene in the context of the study, that is, informal settlements. The study employed a qualitative methodological approach using the following instruments: (1) literature review and desktop study; (2) semi-structured interviews; and (3) ethnographic/ participant observations.

## 3.1 Literature review

A literature search was conducted using key terms that were identified as relevant concepts for the study. These were: informal settlement upgrading, resource efficiency strategies, local and indigenous design tactics, co-design, and sustainability. The purpose of this literature review was to achieve the study's objective of assessing the efficacy of strategies for sustainability and resource efficiency that are proposed for informal settlements. It was also a tool to inform the conceptual framework of the study as well as the semi-structured interview questions.

### 3.1.1 Data collection on literature

Due to the lockdown restrictions during the COVID-19 pandemic, access to University's on-campus library was limited. As such, literature was accessed through the University's online library; drawn from e-journal articles and e-books. Government and industrial reports were sourced from governments' departmental and companies' websites, respectively. Grey literature was obtained from blogs, online newspapers, and magazines. The literature was downloaded into computer folders; one for each of the identified key concepts. The key concepts were used as the themes through which the literature was structured and presented in the literature review chapter, and the conceptual framework drawn.

## 3.2 Semi-structured interviews

Semi-structured interviews were conducted to better understand the perceptions of the experts and the experiences of the inhabitants of informal settlements on co-design processes and the

informal construction and design knowledge employed in informal settlements. The questions posed in the interviews were drawn from the literature appraised and motivated by the research objectives on understanding the efficacy of informal design tactics and co-design concerning sustainability and upgrading. The participants included informal settlement dwellers and professionals; architects, urbanist, researchers, that had participated in upgrading projects and those that employed participatory strategies.

### 3.2.1 Data collection and analysis on semi-structured interviews

The professionals were identified through an internet search on projects in informal settlements, particularly those involving participation or the use of indigenous/informal design tactics. The participants that were also inhabitants of informal settlements were introduced to the researcher by one of the professional participants. The interviews were mainly conducted via the Google Meet, a video-communication service. This was in an effort to minimise the risk of COVID-19 infection. In the two instances where the researcher conducted in-person interviews, state health guidelines were adhered to. Social distancing was observed, masks always worn, and hands of the participant and researcher were sanitised before and after the interview. Also, it is important to note that the interviews were conducted at a time where travel and meetings were permitted by the state.

Prior to every interview, the participants were furnished with a participant information document which offered a summary of the project. The researcher also briefly explained the research questions and objectives to the participants before the interviews commenced. Thereafter, the participants were given a consent form which they signed before the interview. For some interviews, verbal consent was obtained. The interviews were recorded where consent was given, and the recordings safely stored on the researcher's online cloud. The researcher then used the recordings to transcribe the interviews and analysed them using thematic analysis. Table 2 in the Appendix is a summary of the formal interviews held. Informal interviews mainly with inhabitants of informal settlements were conducted during site visits and workshops.

## 3.3 Ethnographic/ Participant observation

Ethnographic observations of informal/local design and construction tactics and of co-design workshops were conducted with adherence to the COVID-19 restrictions and guidelines set by

the government such as always wearing a face mask, rigorous handwashing and use of hand sanitisers, social distancing, and travel within set boundaries and before the curfew. Visual data in form of photographs, videos and sketches were analysed using thematic analysis, using themes informed by the literature review.

### 3.3.1 Data Collection from ethnographic/ participant observation

The ethnographic observations of the informal settlements and of co-design workshops were carried out between August 2020 and March 2021 (Table 2). During this time, the South African lockdown restrictions on travel were gradually relaxed and eventually removed to Level one which was effected at the end of September. As such, the researcher was able to travel to the informal settlements to observe the informal design and construction tactics employed the co-design workshops carried out in various informal settlements at different stages. The study is a meta-analysis of four case study informal settlements in Johannesburg and one in Ekurhuleni. The underpinning for a meta-analysis was firstly that co-design processes are often lengthy, occurring over a period that could extend beyond the set duration of the study's fieldwork. By taking on a meta-analysis, the researcher was able to observe the different stages of the co-design process at the different sites, as well as observe how the processes had been adapted to the different societal and site conditions. Secondly, through a meta-analysis, the researcher was able to identify the variations and commonalities in tactics or approaches to design and construction in the different informal settlement contexts rather than generalise observations. The five sites visited are listed in table 1 below.

*Table 1: Summary of site visits conducted (Author, 2021). (W) indicates workshop.*

| **Project/Case Study** | **Dates** |
|---|---|
| Skoonplas Informal Settlement | 23 June & 9 December 2020 |
| Bertrams: Priority Block | 22 July, 7 August (W), 30 September (W), 3 November (W), 11 November, 12, 13 & 17 November (W) 2020 |
| Kliptown Informal Settlement | 18 September 2020 (W) |
| Slovo Park Informal Settlement | 3 November 2020 |
| Jampas Informal Settlement | 11 November 2020 |

The researcher observed participatory workshops that were conducted by the 1to1 – Agency of Engagement (1to1), a non-profit that focusses on informal settlement upgrading using

participatory methodologies. 1to1 was able to align their participatory workshops to adhere to the health guidelines. This was through enforcing social distancing and the continual sanitisation of stationery throughout the workshops. For instance, in a community mapping workshop, the neighbourhood map was covered with a transparent sheet on which participants would draw and write using sanitised markers. A photograph of each result was taken, after which the transparent sheet was wiped with sanitiser. Also used were laminated icons that participants could use to map activities, spatial qualities and more. The icons were also sanitised before and after every participant had used them. Additionally, each participant was required wear a mask throughout the process and to sanitise their hands.

## 3.4 Document analysis

Document analysis was also employed to better understand the co-design process. A review of documentation on co-design workshops by 1to1 was conducted. This was to better understand the process, and the tools that were employed.

## 3.5 Ethical Considerations

The research objectives and questions were explained to all the participants who were asked for consent and to sign an informed consent form before taking part in the research. Participation of respondents was voluntary, and participants had the right to withdraw from the research study at any time. Identifying information will be excluded from the final thesis paper unless a participant has given consent to have it included in the final paper. Finally, any work of other authors or organisations used in this study has been acknowledged according to the Harvard referencing system.

## 3.6 Limitations

Due to the COVID-19 pandemic, the use of research instruments such as face-to-face interviews, experimental co-design workshops and site visits are restricted. Running a co-design workshop would have benefited the researcher with a greater understanding of the finer details of planning and more. To counter the limitations, online interviews were conducted, data on the context sourced online, a document analysis of previously conducted co-design workshops and an observation of 1to1's workshops were carried out. Importantly, site visits were conducted with adherence to the health guidelines such as social distancing, wearing of masks and hand sanitising.

# Chapter 4: Context

## 4.1 Introduction

This chapter provides a contextual background to the case study informal settlements. Initially one case study informal settlement was to be investigated. However, due to the lengthiness of co-design processes relative to the time constraints of the research fieldwork and the danger of the generalisation, a meta-analysis of five settlements was adopted. These are: Slovo Park informal settlement; the Bertrams priority block, Kliptown informal settlement and Jampas informal settlement in the City of Johannesburg (CoJ) and the Skoonplas informal settlement in Ekurhuleni. Figure 3, an overlay of the location points of case study settlements on a CoJ (2019) map illustrating deprived areas and informal settlements. It shows the locations of the case studies in the municipalities and in relation to identified deprived areas. Whilst the case studies are found within two municipalities, focus is given to the CoJ within which four of the five case studies are situated.

## 4.2 City Context

The 2007 statistics on informal settlements point out that the municipalities of "Ekurhuleni, Johannesburg and Tshwane have the largest numbers amounting 220,830 and 214, 362 as well as 184,019 households respectively living in informal dwellings" (Ziblim, 2013:20). In 2017, there were over 190 informal settlements in the CoJ, according to the *Integrated Development Plan 2019/20 Review* (CoJ, undated). Informal settlements are part of the formal dwelling backlog which consists of "overcrowding in the public hostels, the non-regulated backyard rental, inner-city overcrowding, the housing waiting list, and homeless people in general" (*ibid*.:19). The abovementioned informal housing scenarios which constitute the backlog are characterised by a deficit of access to basic services such as piped water, sanitation, and electricity; inadequate housing; insecure tenure; and socio-economic exclusion (SERI, 2018; CoJ, undated). The backlog stands at 18.5% an improvement from 21.5% in 2016. Against the backdrop of an annual informal housing growth rate of 1.81%, the "average housing delivery of only 3500 housing units per year" trails the increasing backlog "conservatively estimated at 296000 units" (CoJ, undated:19). The increase of informal housing is partly owing to natural population growth, and to immigration which between 2007 and 2017 engendered a 3% increase in households (*ibid*.). Consequently, the growth of informal housing and housing backlog outpaces the CoJ's financial ability to provide affordable formal housing (*ibid*.).

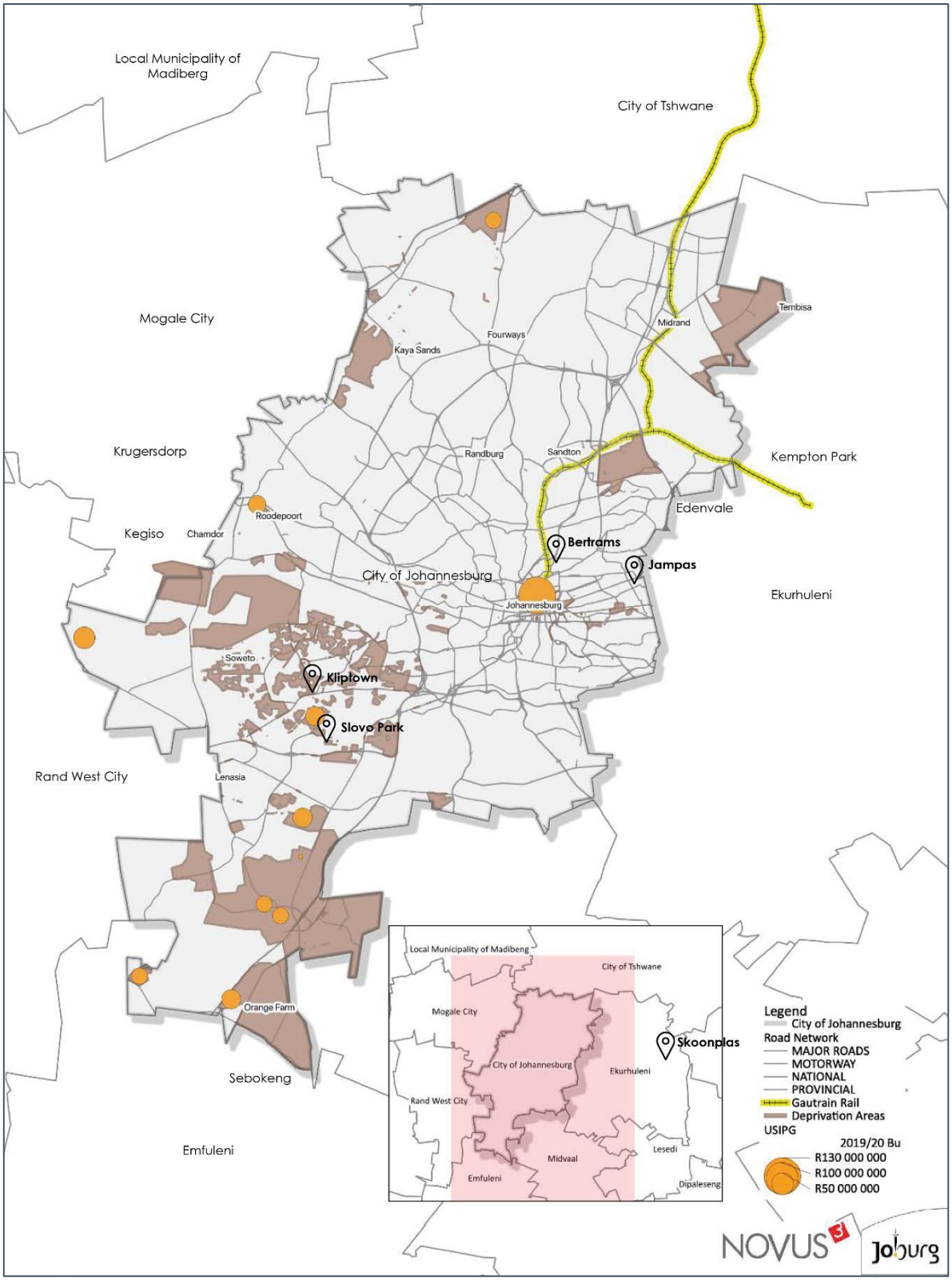


*Figure 3: Overlay of case study settlements on CoJ's Deprived Areas and Informal Settlements Map (CoJ, undated) (Edited by Author 2021).*

Additionally, the rising land costs and supply constraints which demand an increase in the allotted housing subsidy delay the delivery of housing by the CoJ (CoJ, undated). The gains

met by the housing subsidy program have been masked by the hurdles and systemic challenges such as inadequate capacity and poor planning, which have hindered the implementation of the housing policy and framework (SERI, 2018).

## 4.3. Local context

### 4.3.1 Slovo Park

Slovo Park is located in Nancefield, South of Soweto in the CoJ. It is North of the Nancefield industrial area and South of the Eldorado Park suburb. It was founded in the early 1990s by people in search of land close to employment opportunities (Tissington, 2011). By 2011, the community had over 5000 people in 1600 households as per an informal survey by the community (*ibid*.) which has since grown.

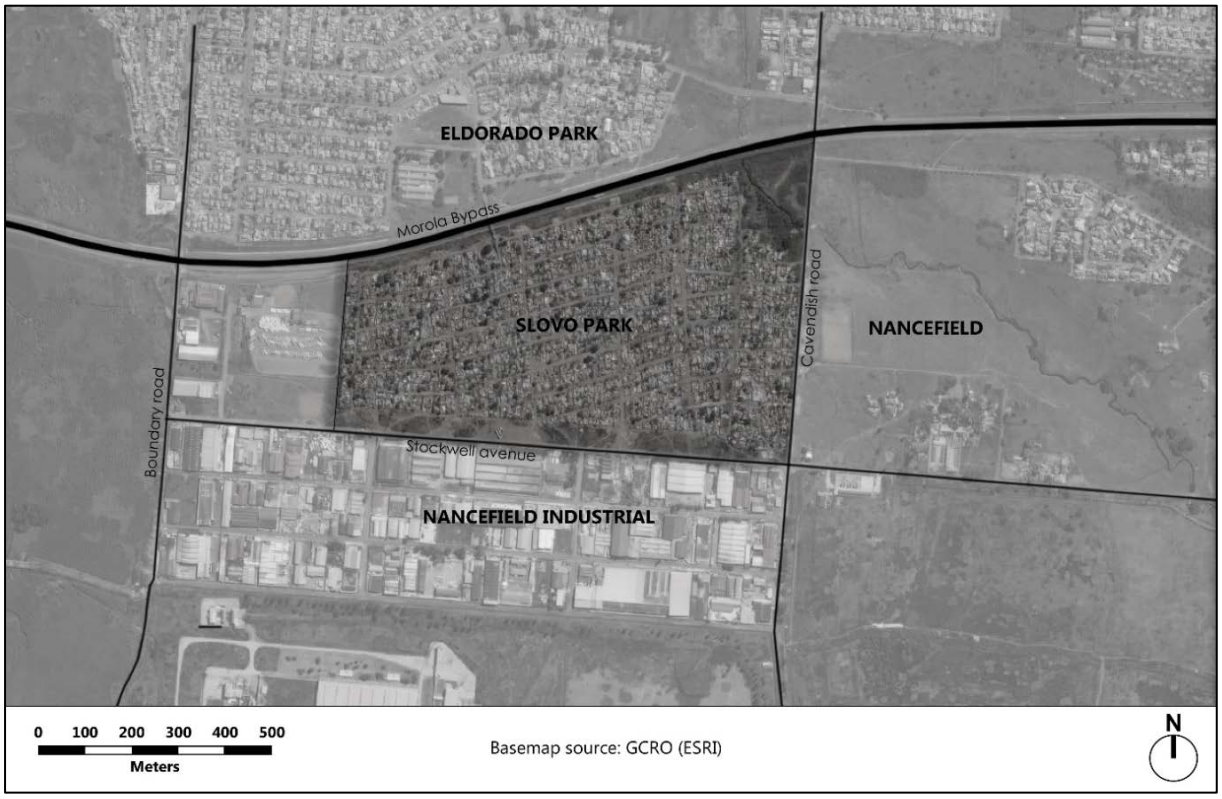


*Figure 4: Map of Slovo Park's local context (Author, 2021)*

Slovo Park sits on public land that has been earmarked for upgrading (Tissington, 2012). However, the promise of upgrading has shown slow progress “despite several sets of political promises, resources seemingly being allocated, consultants being appointed, plans devised, an Environmental Impact Assessment (EIA) conducted and deadlines for the commencement of

building set" (*ibid*.:53). Slovo Park's complicated history concerning upgrading can be traced back to 1994. Political promises were made concerning the construction of 950 houses for the residents of Slovo but never fulfilled. This remains in the memory of the residents who believe the funds were used to construct houses in Devland Extension 27 (*ibid*.). The unfulfilled political promises have inspired protests by the community (Bennett, 2011) as well as litigation. For instance, in 2016, Slovo Park litigated against the CoJ which was ordered by the court to upgrade the informal settlement. The City was found "in breach of section 26 of the Constitution and the Housing Act 107 of 1997" (SERI, 2018:16), and was ordered to carry out the upgrading of the informal settlement. Also motivated by the series of unfulfilled political promises and slow upgrading process is Slovo Park's current development process– one that is from within – championed by the SPCDF (Bennett, 2011). The self-help approach benefits from the partnerships the SPCDF has fostered with universities and civil society organisations to effect change in Slovo Park. By consequence, there have been several participative projects implemented through those partnerships. Some of the key participatory projects are;

1. Project on water access improvement. Community members with skills in water connection such as plumbers were identified to take part in the improvement processes through a skills audit using participatory processes. The funds for the project were also from the community (Tissington, 2011).

*Figure 5: Slovo Hall 2010 (Bennett, 2019).*

2. Slovo hall project (figure 5); a co-design and co-construction project in 2010 by students at the University of Pretoria in collaboration with the community. An addition was made to the hall, which was also closed with brick walling (Bennett, 2019).

3. Slovo Playground projects in 2013 and 2014. These projects were in collaboration with students from the University of Johannesburg and the Slovo Park community.

The motivation for Slovo Park as one of the case study informal settlements for this research is the presence of co-design projects conducted within it. Currently at Slovo Park is working towards implementing the UISP. I was able to observe part of the pre-project phase, which was conducted by 1to1 – Agency of Engagement.

### 4.3.2 Bertrams priority block

The Bertrams priority block is an inner-city project in which a conglomerate of illegally occupied building blocks was formed. It is in the suburb of Bertrams, on the Eastern edge of the Johannesburg CBD, North East of the Johannesburg Stadium and tucked between Berea road and Gordon road (Figure 6).

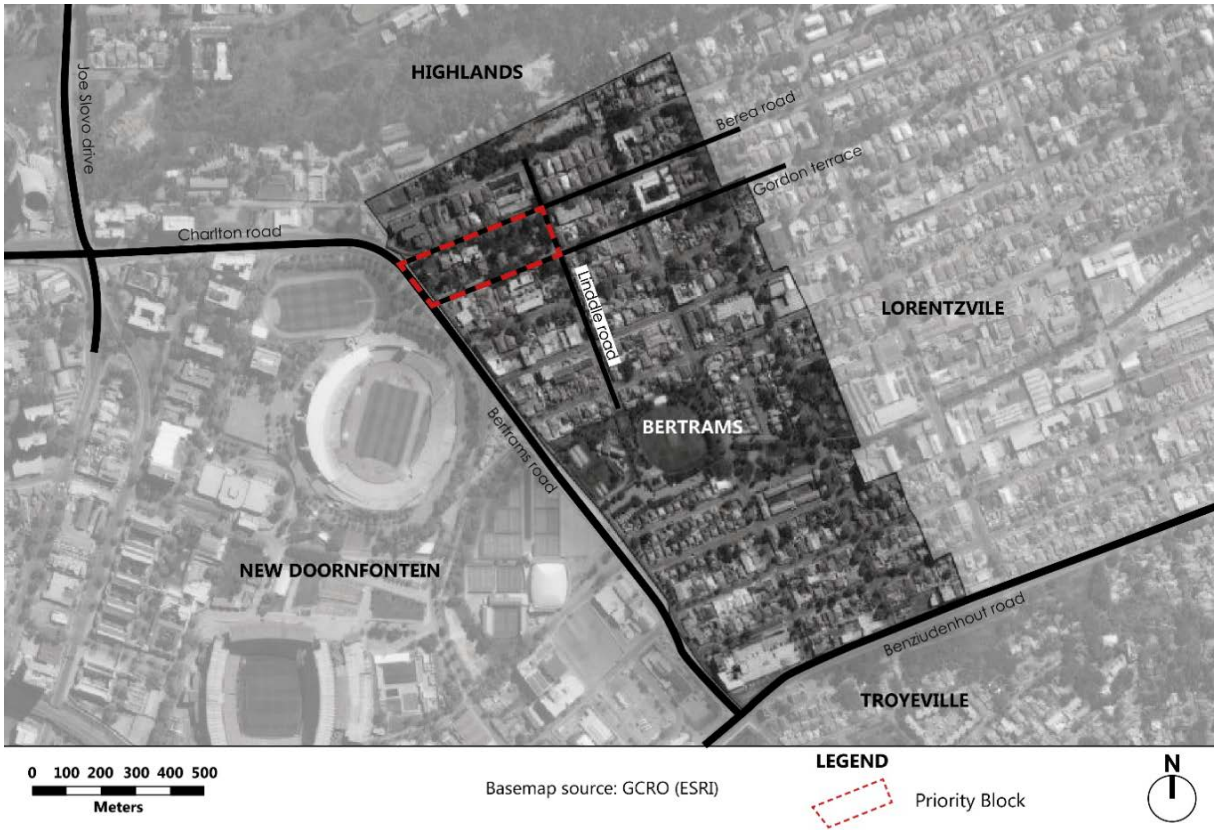


*Figure 6: Map of Bertrams priority block projects' local context (Author, 2021)*

Though there are some shacks on site, this case study does not constitute the common shack typology associated with informal settlements. However, it has the characteristics of informal settlements identified in the National Housing Code identifies as: "1) illegality and informality;

2) inappropriate locations; 3) restricted public and private sector investment; 4) poverty and vulnerability; and 5) social stress" (DHS, 2009). The National Housing Code further notes that the UISP is "applicable to all settlements that demonstrate one or more of the above characteristics" (*ibid*.:16).

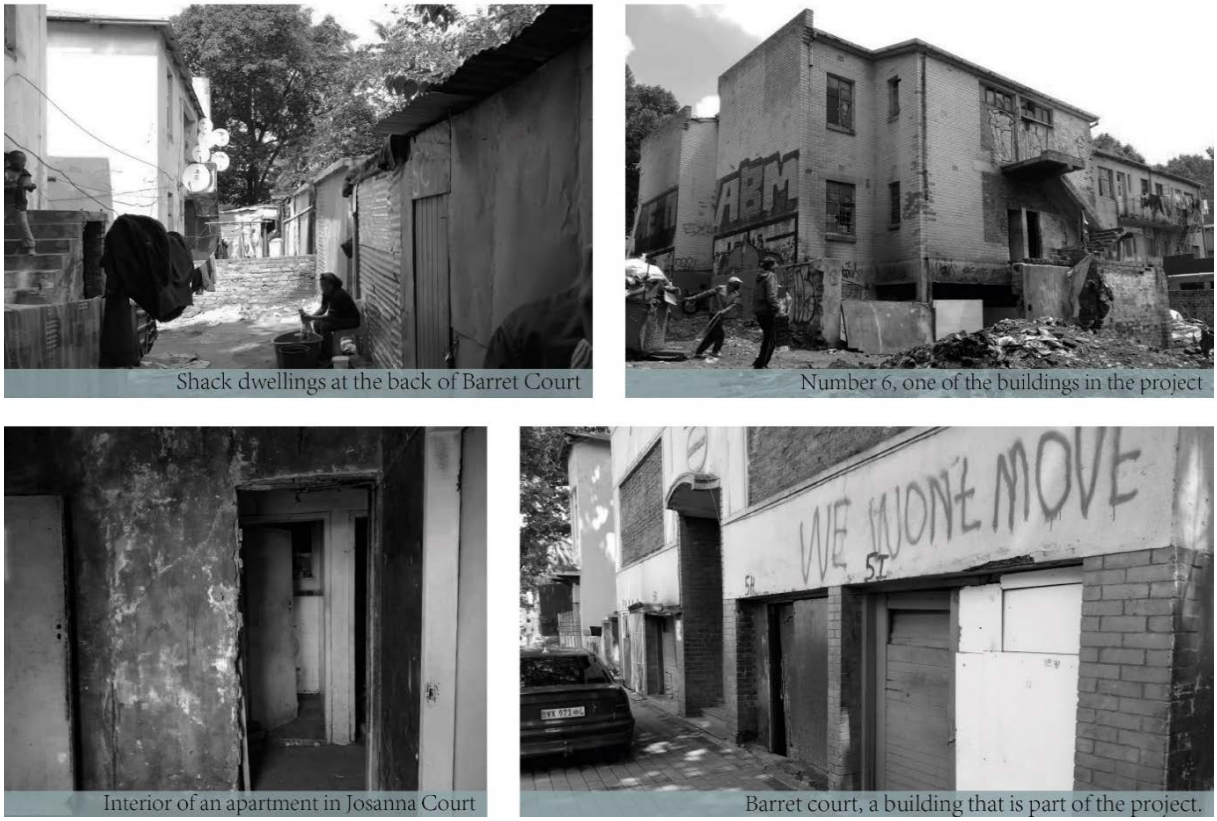


*Figure 7: Site photos from the Bertrams priority block (Author, 2020)*

The motivation for this as a case study was the presence of participative processes that were being conducted during the fieldwork stage of this study. These were conducted by 1to1 – Agency of Engagement as the spatial practitioners. Here the researcher was able to observe the participative process from mobilisation to the initial stages of co-design with the community.

### 4.3.3 Skoonplas

Skoonplas is an informal settlement in Modderfontein, Ekurhuleni (Figure 8). It has a population of approximately 9000 people in nearly 5000 households. It is on the Northern end of the Modderfontein East Gold Mine. In Skoonplas is an ongoing formalisation process for which participation has been an essential part. A notable participative exercise is the street naming exercise conducted by Planact, an NPO, with the community. According to Planact, street naming is a means of exerting pressure on the municipalities to implement the UISP

which they argue has been in limbo since its introduction in 2004 (Planact, 2020). The street naming exercise also improves access to informal settlements especially for emergency services like ambulances and the police. Its main purpose according to Planact (2020:26) is to facilitate incremental tenure acquisition.

The settlement's leadership works together with its inhabitants to ensure safety, health, and sanitation and more within the community. It also works closely and with organisations such as Planact and with the Ekurhuleni Municipality to enable processes towards formalisation and acquisition of services such as the portable toilets provided to the different households by the municipality (Figure 9).

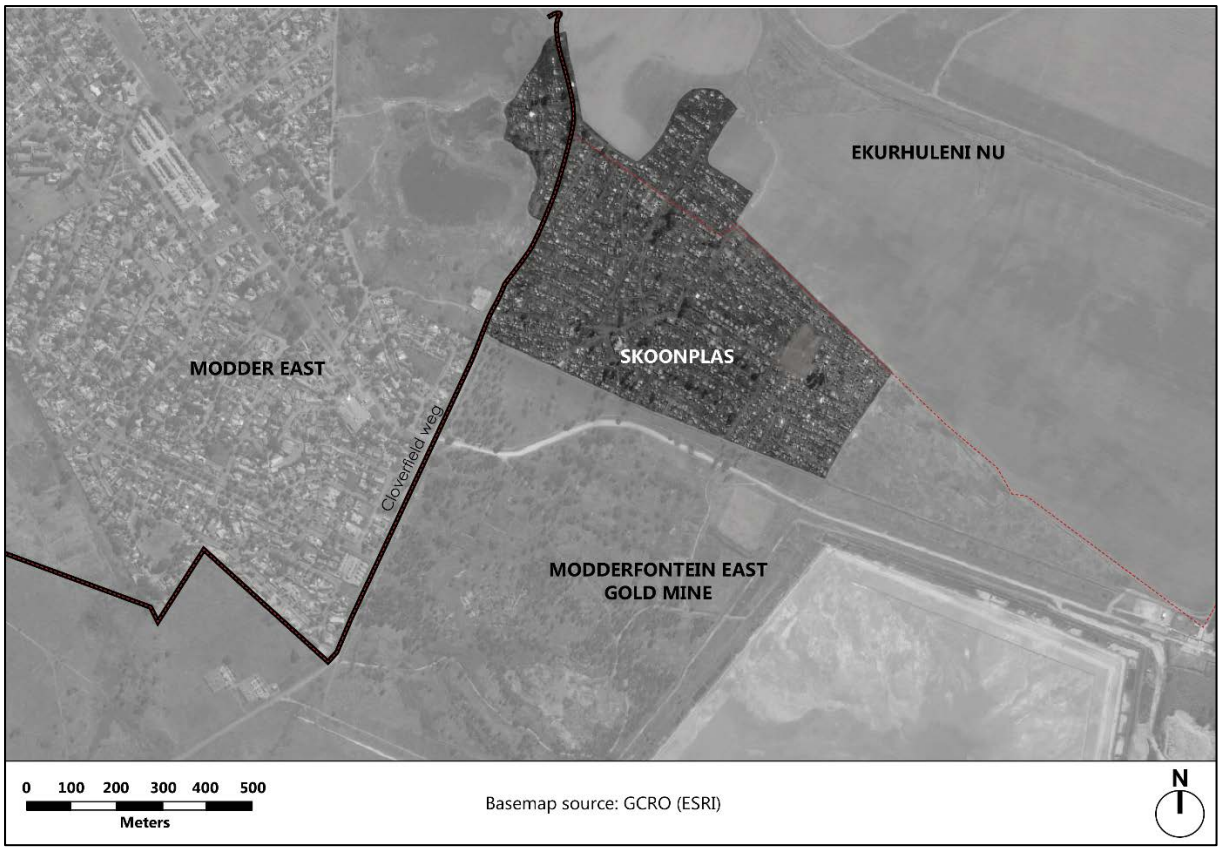


*Figure 8: Map of the Skoonplas informal settlement's local context (Author, 2021)*

In Skoonplas, the researcher was able to observe the materiality of the dwellings in the settlement and the different construction practices that were used within the settlement.


*Figure 9: Site photos of the Skoonplas informal settlement (Author, 2020)*

### 4.3.4 Kliptown

Kliptown informal settlement is found in Kliptown, one of the oldest suburbs of Soweto (Figure 11). It is 17km South-West of Johannesburg. It is neighboured by the suburbs of Pimville, Eldorado Park and Dlamini. The Kliptown informal settlement is bordered by a wetland to the West and a railway line to the East.


*Figure 10: Site photos of Kliptown informal settlement (Author, 2020)*

Unlike Skoonplas, with its 5m wide streets and allocated stands each with toilet facilities, the common features of Kliptown are inadequate access to water and sanitation services and crowding.

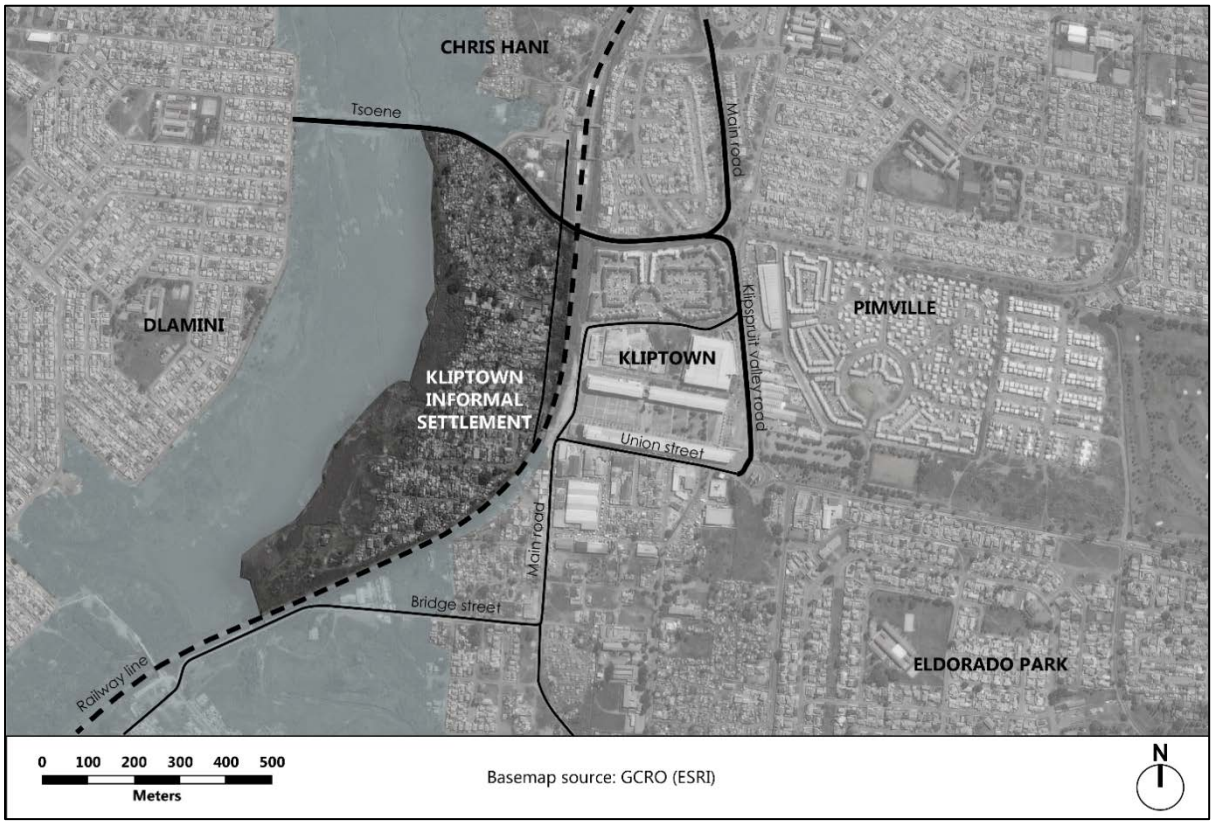


*Figure 11: Map showing the local context of the Kliptown informal settlement (Author, 2021)*

At this informal settlement, were initial steps towards the implementation of the UISP. The researcher observed an initial participative meeting with the community and its leadership.

### 4.3.5 Jampas

Jampas informal settlement is in Cleveland, Johannesburg by the Ekurhuleni border (figure 12). Jampas is tucked in between industrial buildings, which were a pull factor for those looking for housing near sources of employment. Also, a pull factor is the informal mining within the settlement which is a source of income to some of the residents. As in the case of Kliptown, characteristic of Jampas are conditions of inadequate water access, inadequate sanitation, and overcrowding. This informal settlement was visited to observe the informal design and construction tactics applied and their manifestation and their relation of sustainability or the lack thereof.

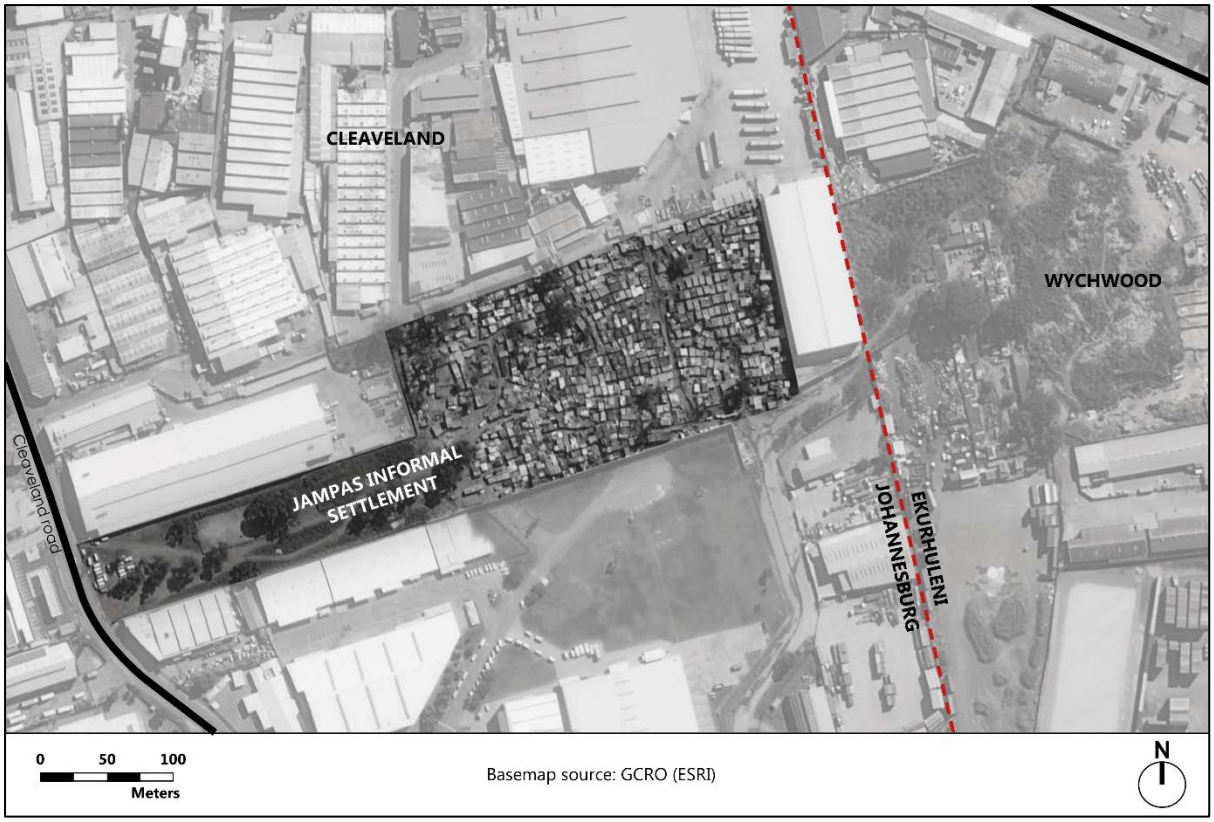


*Figure 12: Map showing the local context of the Jampas informal settlement*

A study of the above five informal settlements instead of a focus on one enabled the researcher to observe the co-design process in different contexts and at different stages. It also provided an opportunity for the researcher to observe the different informal tactics applied in the different contexts and the conditions and implications of their use, particularly to environmental sustainability.

# Chapter 5: Fieldwork

## 5.1 Introduction

This chapter presents the findings from the fieldwork. It is structured thematically, that is, co-design and informal knowledge as the primary themes. Firstly, it presents co-design in informal settlement upgrading using stages of the co-design processes as a narrative device. This aligns with the objective, 'to establish the efficacy of co-design as an appropriate participatory approach for informal settlements upgrading.' Secondly, the chapter presents the findings on informal design and construction knowledge applications on the various sites visited and how they relate to resource efficiency and co-design. Lastly, it concludes with a preliminary analysis reflecting on the conceptual framework.

## 5.2 Co-design in informal settlement upgrading.

This section presents a description of stages of the co-design process, and the extent to which the case studies adhere to or deviate from it. The focus in this section is on Slovo Park and the Bertrams' priority block case studies, which were purposed for the observation of previous and current co-design projects, respectively. In addition, cases given as examples by interviewees such as the Empower shack project in Khayelitsha, Cape Town are also presented. Each professional participant interviewed expressed a different way in which their organisation went about the process, and shared the tool sets they used. The narrative in form of the stages below is a synthesis of the steps taken in different projects that the participants shared as well as in the observed co-design projects.

### 5.2.1 Mobilisation

The interview participants overwhelmingly asserted the essentiality of an initial stage in which the project and the spatial practitioners are introduced to the community through its leadership. During this stage, the community is also sensitised on how participation works, the expectations of the community and the end expectations. This stage was observed at the Kliptown informal settlement. It was conducted at the commencement of their UISP project. The leadership held a community meeting in which they explained the project expectations, showed their current progress, sensitised the community on the roles of the different stakeholders. They also introduced the spatial practitioners to the community. The spatial

practitioners then gave a presentation on their role and explained how the initial mapping with the community was to be conducted. Cuyler (interview, September 2020) pointed out that if a community is not approached through its leadership, it might become unresponsive or sceptical. As such, interveners ought to first identify a community's leaders and approach the community through them. Problematically, in some settlements it is not clear who the leaders are. Such was the case in one of the buildings on the Bertrams' priority block project. In an evaluation meeting carried out in the project, it was noted that there needed to be a collective of leaders, with representatives of the project to drive it from within. An important process of identifying volunteers to assume the leadership roles for that block was conducted. Their aim was to mobilise the different households to have buy-in into the common goal to better the priority block. Following the formation of this collective – SHAP Bertrams – participation from the community in the subsequent stages was greater; in attendance of meetings, in giving feedback, and in the co-construction of the project.

> "Because the most important thing to people is a buy-in. As much as we want the government or municipality to have a buy-in, firstly, the community must have a buy-in into a certain idea... Then the community will feel that they own that idea. And when that idea comes to reality, the whole community will participate in that project, even if it goes on for years to come. Because they feel that it is their project, it is their idea and their hard work, and it is their thinking" (Mathebula, interview, October 2020).

According to Mathebula, mobilisation is the backbone of participative projects without which they are bound to fail. A project becomes susceptible to misuse, unuse or destruction. Such was the case for a street paving project in Kliptown informal settlement. The paving was taken apart by the inhabitants within weeks of installation and used to pave their yards. "The people didn't feel that that project it is for them. It didn't feel like the project is done to save their lives, and the people didn't feel the ownership of the project, that's why they vandalised it (*ibid*.).

In an evaluation meeting of the Bertrams project's participation process, the shortcomings were traced back to shortfalls at the mobilisation stage. The community identified the need for a toilet. However, whilst their participation was critical in the construction process especially due to budgetary constraints, they were not involved. It was decided that the mobilisation be re-conducted. Importantly, prior to mobilisation, is a pre-project planning and learning. This involves familiarisation with the site, community, literature, and policy on it. Bennett (interview, November 2020) notes that prior to the Slovo Hall 2010 project, the students were

familiarised with participative methods, drawing from the work of Nabeel Hamdi and other scholars, and given tools in a framework to work in a participative way.

### 5.2.2 Contextual Inquiry

The researcher observed this stage at in Bertrams, where a mapping exercise was conducted by 1to1 – Agency for Engagement (1to1). The facilitators conducted the exercise using a printed map of the local context (Figure 13). The community participants were asked to identify safe places, unsafe places, opportunities, strengths, weaknesses, and more questions about their local context. The responses were followed up by a prompting to give more detail. For instance, "what about that space that makes it unsafe?" Given that this exercise was conducted during the COVID-19 pandemic, precaution was taken to adhere to the safety guidelines issued by the government. One participant was engaged at a time, socially distanced from the facilitator with both having to wear a mask and their hands sanitised before and after the exercise. The printed map was also covered with a transparent sheet which was sanitised every after a participant.

*Figure 13: Mapping exercise at Bertrams. (Author, 2020)*

The spatial practitioners were able to learn about the concerns of the community and the relationships between different activities, spatial qualities, and accessibility to resources. Concerning accessibility, Mathebula (interview, October 2020) illustrates its essentiality using

a project on energy efficiency that was carried out in an informal settlement. It aimed to promote the use of an efficient stove that used a gel instead of paraffin. He notes that the project failed because the gel was not within proximity of the settlement.

An important step in this stage is the visualisation of the data for analysis as well as archival and sharing purposes. Visualising the data is a challenge given that it is qualitative, aspects of which can be lost in translation. In the current Slovo Park project (in the initial phases of the UISP), it was resolved to map the data thematically; safe spaces, unsafe spaces, activities, and environmental issues. GIS software and Adobe InDesign, a publishing software, were employed as tools to present the spatial and geographical analysis of the data collected. The analysis of the data informs the decision-making, particularly in the next stage.

### 5.2.3 Problem/ Project definition

In this stage, the communities were engaged on what their priorities for intervention were. Different tools such as design games, problem trees or dialogue with the community were employed. Understanding the community's priorities is key. The government and intervening organisations often assume what to prioritise (Mathebula, interview, October 2020). While they could be right concerning the observed needs of the community, these may differ from the community's priorities. Mathebula argues:

> "[i]t's important to consult the communities and have these sessions with them. So that you can exactly what do they want, and why do they want it. Because all of us we want, all of the settlements they want service delivery, they want development but in different stages and forms … you can't just close all the settlements in one blanket and say "we will put toilets in all the settlements." Because, in some settlements we don't want toilets. I can dig my own toilet… give me what I can't have. That is the thing that the people are saying, "give us what I can't do for myself. If I can do it for myself, why are you doing it for me?" (*ibid.*).

In the 2010 Slovo Park project, the students from the University of Pretoria came with an expectation of designing housing as per their brief, however, that changed after engaging with the community. "What we ended up designing was other forms of neighbourhood infrastructure to support the bigger processes of housing as a verb" (Bennett, interview, November 2020). Bennett, a then student participant explained:

> "Instead of trying to answer like a housing question is a house. We said, well, people already have houses. That's not the issue at the moment. They told us this in the [engagement] process. The issue is about technical recognition and larger government efforts. So, then we designed projects that supported cohesion at grassroots on a neighbourhood scale that would then allow more cohesion to take place towards those goals. (Bennett, interview, November 2020).

All the interview participants asserted that pre-conceived ideas on needs and priorities are often challenged by the community's input during engagement and that spatial practitioners must be flexible and open to learn.

During this stage in Bertrams, the priorities were outlined, and emphasis placed on the role the community would play. The open space between some of the buildings which had been pointed out in the mapping as an opportunity, was identified as the site for the first intervention. An important aspect in this process was a continued emphasis on the role of the community, through asking questions like, "who will build it?" and "what are the available resources for this project?" These questions were further emphasised in the design development stage.

### 5.2.4 Design development

*Figure 14: Design games exercise during the Slovo Park 2012 project (Bennett, 2019)*

At this stage, the community members, spatial practitioners, and other project stakeholders are involved in an iterative design process. Mediation tools such as design games, 3D modelling

and sketching are used in facilitating the process (Figure 14). In the Bertrams project, this stage involved five workshops carried out on Saturdays and Wednesdays over the duration of three weeks. In the first workshop, the community participants were split into four groups, each focusing on a priority the community had defined in the previous stage. The four priorities were: business spaces; salon, car wash and spaza shop; a fence; children's play area and community garden. In a second workshop, the priorities were presented to the project committee which included volunteer community representatives, planners, architects, and a landscape architect. These were split into two groups and tasked with proposing a design that included the four concepts. The facilitator asked the groups to respond to a few questions about their joint goals for the community, and how they hope to achieve them. The answers were thereafter presented before all workshop participants. This encouraged participation as people became more comfortable with each other and rallied around their common goals. The next step in the workshop was designing of the open space using a physical model of the site built at scale 1:100. They were given a range of modelling materials including clay, pins, markers, strings, scaled cars as well as precedent images to aid their design process.

*Figure 15: Co-design workshop for the Bertrams priority block settlement (Author, 2020)*

The spatial practitioners in the groups assumed the role of facilitator; prompting discussion around the design decisions made. In one instance, the facilitator asked a participant why they had sited the car wash at one end of the site and not the other. This prompted discussions around

spatial adjacencies. According to the workshop facilitator, Van Der Walt (interview, November 2020), the sketches or modelling proposals made by the participants might not be to scale, however, the designer can draw from them useful observations on priorities, spatial relationships and more. In the following workshop, these designs (physical models) were presented to the community as two options. The community members critiqued the designs and offered suggestions to how the two could be merged into one. The community's comments were incorporated into the final design in the fourth workshop; merging the two ideas into one.

The final design was then presented to the community in the fifth workshop. It was set out on the proposed site using materials from it, bricks from a previously demolished building; tyres; rubble and poles. Additionally, placards with precedent images were mounted to mark out what activities would be taking place in a space. The design was presented to the community by a fellow member, who had been part of the project committee. She guided the other community members around the site, explaining the proposal to them as they followed along with printed flyers of the design that had been handed to them. Visualisation is an important aspect in this process and a key role of the architect in co-design according to Brillembourg (interview, September 2020). He explained: "Because visualisation is what brings people together, they look at an image and they say, "I like it. I don't. I could live there. I won't" … So, the architect is the glue. He is the one who can bring all the desires together and visualise it for people to take votes." (*ibid.*). It is for that reason that in his project, the Empower shack project in Khayelitsha, the final design was presented at a scale of 1:1 (*ibid.*). People were then able to walk through it and experience it.

Citing a 2009 housing project, Luruli (interview, September 2020) noted that the community was not involved in the initial design of the proposed house. However, it was altered to accommodate the community's suggestions through their engagement. This included incremental adaptation and the re-use of windows from their shacks. It was also important at this stage to reflect on the resources identified within the community and how they could be employed in the project. Additionally, the design could align to responses to the questions asked in the previous stages concerning resources; 'how will it be built?' and 'with what?'

### 5.2.5 Co-production

This stage involved the engagement of the community in the construction of a project. It was an opportunity to use the human resource of the community, further ownership of the project

and to create employment opportunities. In a 2009 Peoples Housing Process (PHP) project cited by Luruli (interview, September 2020), this necessitated the skilling of participants in construction. Similarly, the Empower shack project also involved skilling of inhabitants that took part in the construction. Brillembourg argues (interview, September 2020) that skilling of informal settlement inhabitants in construction is a means of redressing apartheid disparities given that blacks were not given an opportunity then to learn the technicalities of construction. He explains that during apartheid, non-white people were limited to providing manpower. Construction knowledge such as how to lay foundations or concrete mixing processes were concealed from them. He links this to the structural failure of informal settlement dwellings, claiming: “[t]hat's why they never learnt how to build shacks with a good foundation” (*ibid*.).

*Figure 16: Co-production, the beginning of the construction process in Bertrams (Author, 2020)*

In Slovo park, the students in collaboration with the community built the hall in the 2010 and 2012 projects. In the Bertrams project, the project committee helped garner participation, encouraging people to sign up for and participate in the construction of the community space (Figure 16). Interestingly, once the work begun, curiosity and progress on site elicited more participation from onlookers. The children cleaned up the mountain of garbage that covered up their proposed play area. They also helped the adults to sort bricks from demolition waste, which was piled up into two heaps: the half bricks and full bricks. Some were to be used in the

construction of the toilet and others on the footpath. Also collected were tyres, on site and around the neighbourhood. These were later as suggested by one of the community participants used in the construction of the fence around the site, a more affordable alternative to what had been proposed initially. The construction saw a continuation of the design process, as more ideas were proposed by the enthusiastic community participants, many of which involved the use of demolition waste on and around the site. As such, engaging the community and having them take ownership of the project saw the intuitive use of recycling.

### 5.2.6 Evaluation

Evaluation was an essential part of the participatory design process that was carried out not only at the end of a project but also in-between stages (Figure 17). It enables the spatial practitioners to reflect on whether the project is achieving said aims and whether people are participating meaningfully or not and why. In an evaluation meeting for the Bertram's priority block project that was carried out before the design development stage, it was revealed that the initial mobilisation was not satisfactory, resulting into low community buy-in and participation. This was also noted as the reason for the low participation in the construction of the toilet project, which had been left entirely to hired contractors. As the process moved into the design stage of the shared space, a rethinking of how to approach the community and garner their participation in the project was therefore critical. As such, the plans for the co-design workshops were halted, and efforts placed on how to address the gaps in the mobilisation process. One of the decisions made was to form a project committee with members of the community that would encourage participation.

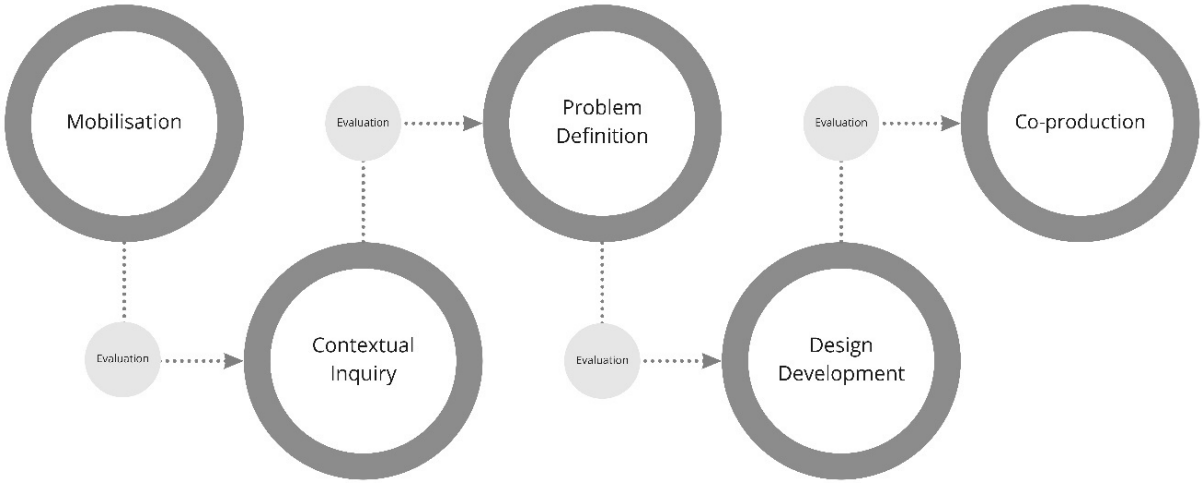


*Figure 17: Co-design process summary (Author, 2020)*

## 5.3 Informal design knowledge in informal settlements

This section describes the informal design and construction knowledge observed in the case studies and that were described in the interviews. Two issues stood out, the first being that the application of these tactics is driven by poverty. The second issue was co-existence of resource efficient practices and poor living conditions and environmental degradation.

> "…in general, marginalized communities are just by nature more economical and more sustainable because they do not have the ability to be wasteful. From that perspective informal settlements are probably a more sustainable, environmentally sustainable way of living than your average suburb. But that does not necessarily mean that it is a good thing." (Cuyler, interview, September 2020).

This section addresses the informal design tactics in the case studies, how and why they were employed, and their implications on the natural environment and the inhabitants lives and livelihoods.

### 5.3.1 Density

A common aspect observed in the case studies was the compact construction of the dwellings. The average area of shacks in Slovo Park for instance was about 8.75sqm. Additionally, in the over 1000 stands in Slovo Park, at least half were less than the 300sqm (minimum recommended by the Department of Human Settlements (DHS)). The dwellings were also constructed in proximity of each other, particularly in Jampas and Kliptown. As such, the settlements had a high dwelling density. In the Bertrams priority block, compaction resulted not from the size of the dwellings but through co-living; a concept of communal living in which people or different households live under the same roof, sharing a home. Whilst each household had a separate sleeping space, spaces such as the washrooms and laundry area were shared. In the instances where a household of more than 3 shared a room, the space was inadequate. Some problematic implications here were, a lack of privacy, particularly where a single room was shared by an intergenerational household; insufficient space for some families; and poor sanitation particularly due to the insufficiency of sanitary facilities.

In Jampas, the high-density manifested as crowding. The proximity of the dwellings and the narrow pathways through the settlement made for an impermeable appearance. It was accessible to pedestrians, but difficult for service provision. Additionally, there was a lack of

privacy, increased vulnerability to disease as in the case of the COVID 19 pandemic, insufficient green space and more. The lack of privacy was heightened by the placement of the plastic portable toilets – installed by the CoJ and the City of Ekurhuleni – on the edges of the settlement. This might partly have been due to the lack of space for their placement by each household given that the dwellings were closely layered beside each other. Furthermore, there was environmental degradation due to pollution because of inadequate waste disposal and more. Notably, in the Skoonplas informal settlement, the issues experienced in Jampas were countered by an organised leadership and participatory processes that saw the allocation of adequate stands sizes, and portable toilets allocated to each. The layout of the settlement also allowed for well-defined roads (approximately 5 metres), making the settlement accessible to both pedestrians and vehicles. As such, the compactness and high density co-existed with better living conditions than in the case of Jampas. Kliptown too had a similar experience to Jampas in that the high-density manifested crowding, leading to inadequate sanitation, a lack of privacy, and inadequate green spaces. However, observed in the settlement was an appreciation of the shared open space which was used for meetings and for social gatherings.

To counter the issues related to bad density, Brillembourg (interview, September 2020) suggests advanced re-blocking that engages the community. Firstly, the project involved participative re-blocking. He explained that through a participatory process, the spatial practitioners together with the inhabitants could negotiate and agree on the positions of shacks and infrastructure in an informal settlement. Co-design processes provided a platform to navigate the complexities of stand ownership regarding who would give up what, and how shacks would be moved around to create better access and orientation of buildings. Next was the construction of dwellings that incorporated vertical incremental adaptation and allowed for adaptability of interior spaces.

### 5.3.2 Materials

Recycling was a great part of informal settlement construction, not only so, but also part of the informal economy in the case studies. Most of the dwellings in case studies were constructed from locally sourced recycled materials; timber, corrugated sheets, plastic as well as reused elements of demolished buildings such as windows and doors (Figure 18). Mathebula (interview, October 2020) pointed out that the popularity of materials used in a settlement is based mainly on their availability locally. The use of recycled materials was motivated by affordability and temporality. Affordability due to conditions of poverty that restricted material

choice to the cheapest ones, which in many cases were the recycled or discarded ones. Temporality is partly due to the notion that informal settlement living is transient and the lack of tenure. As such, long-term or costly investments are considered unfeasible.


*Figure 18: Recycled materials used in construction of dwellings (Author, 2020)*

Importantly, concerning designing for the use of recycled materials, Brillembourg (interview, September 2020) notes that it is important to understand what is used, how and why. Through a co-design process, the Empower shack project explored the idea of using the recycled corrugated sheets – a common construction material in the Khayelitsha settlement. The design was of a concrete block frame as the primary structure and for fire-resistance purposes. The infill was corrugated metal sheets, for which the inhabitants could use the recycled material from the shack they had occupied. This was dependent upon whether that sheets were in good condition (*ibid*.). The Slovo park 2010 project also employed the use of recycled materials; post office boxes that serve as seating, tyres for the children's play area. In Bertrams recycled materials from the site were used in the co-construction of the shared space as alternatives to some that were initially proposed. This proved useful given the budgetary constraints. These materials were also pointed to as a resource by the dwellers in a co-design session in response to the question, "How will it be built?"

### 5.3.3 Technology

Most of the buildings within these settlements were self-built, by hand by those that owned or occupied them with the engagement of paid but mostly unskilled labour. Mathebula (interview,

October 2020) noted that he built his own house with the help of his wife and children. He also notes that one can get help from one's neighbours but at a cost. He further notes that also in informal settlements are some of the skilled builders employed on formal projects, however these are expensive to employ. The dwellings were individualised, avoiding the monotony that is characteristic of RDP housing. Most were built without the engagement of design professionals or pre-determined design drawings. Instead, spatial layout, material choice and assembly are largely dictated by living conditions. For instance, Mathebula (interview, October 2020) pointed out that the materials used and their assembly, were such that one can easily disassemble a shack and move it to another location. This is driven by temporality and a lack of tenure. Additionally, incremental additions are made to stands and to shacks as need for space increases over time due to a growth in family size or as an income stream from rental payments. Mathebula (interview, October 2020) explained that for some, as was the case for him, moving to an informal settlement was supposed to be temporary. As such, he built a small shack just for him. However, over the years, his family grew necessitating the expansion of the shack to accommodate the growth.

## 5.4 Conclusion

The fieldwork highlighted that the employment of informal design and construction tactics is largely due to conditions of lack that motivate decisions based on availability and affordability. As such, even though some practices might align with sustainable solutions, sustainability is not a driver of choice or decision-making. Furthermore, the application of these tactics in some instances led to the undesired social and environmental conditions such as crowding. However, through co-design, some of these tactics were employed – as in the incorporation of incrementality in the Empower shack project – to develop contextually responsive solutions. The researcher also observed the co-design process at its various stages and understood how it did or did not achieve what literature posits it. This will be discussed further in the next chapter.

# Chapter 6: Discussion of findings

## 6.1 Introduction

This chapter is a discussion of the findings in relation to the research question: “To what extent can co-design processes that draw from informal knowledge tactics benefit strategies towards sustainability through resource efficiency in upgrading?” The research questions are employed as the themes through which the chapter is structured, and findings discussed. The first section considers the existing informal design tactics in relation to resource efficiency. The second section considers the elements of co-design concerning the facilitation of the employment of informal knowledge. The third section addresses the question on the efficacy of co-design as a strategy for informal settlement upgrading. It also explores the limitations of co-design and the hindrances to its implementation. The chapter concludes by tying back the findings to the conceptual framework.

## 6.2 Informal design and resource efficiency

This section discusses the practices observed in the case studies and those discussed in the interviews conducted during the study. This section considers the tactics, that is, compact and incremental construction; recycling; and local sourcing through the lens of sustainability particularly resource efficiency.

### 6.2.1 Compact and incremental construction

Compaction was a spatial characteristic observed in the case study informal settlements. Densification and urban compaction are concepts that are promoted in sustainability discourse and international policy concerning sustainable urban form (Boyko and Cooper, 2011). Urban compaction is advocated for because of the advantages it presents to sustainability and resource efficiency. These include but not limited to, efficient land use, promoting walkability and social cohesion. In essence urban compaction reduces pressure on eco-systems and on land that could have otherwise been used for agricultural purposes. In that regard, informal settlements being compact urban forms presents advantages like resource efficiency in land use, sharing of open spaces, public transport and more. However, urban compaction or densification is also critiqued for its negative implications (Waters, 2012; Boyko Cooper, 2011) particularly regarding the urban poor in cities of the global South. Some of the demerits of densification such as

overcrowding, criminality and environmental pollution were evident in the case studies. As such, the demerits of densification contradict its merits. For instance, in the Jampas informal settlement the green space was inadequate and its quality poor, contradicting the claim that compaction allows for the prioritisation of green space. Instead, people's need for housing is prioritised and consequently buildings over public green spaces.

In most instances, the crowding or "bad density" was traceable to incremental adaptation which manifested as addition of extra rooms onto shacks and of shacks onto stands. The incremental additions to shacks in the Jampas and Kliptown informal settlements have resulted in crowding, and consequently the conditions of poor sanitation and drainage, insufficient green space, and a lack of privacy.

Through participatory design-and-build workshops, the informal design aspect of incrementality was harnessed in the Empower shack project in Khayelitsha informal settlement (Brillembourg, interview, September 2020). This facilitated a response to the dwellers' financial resource limitations that had dictated the need for incremental spatial change over time. A nuanced understanding of the nature of incrementality in the informal settlements (which mainly occurs horizontally and over time manifested 'slum' conditions), further demands a response to the concern raised by O'brien *et al*. (2020) in the analysis of the Villa Verde project in Chille. This entailed entails implementing mechanisms to prevent "slum" conditions that may arise from further informal additions over time. The bulk of the dwellings in the informal settlements were single-storey due to the limitations in construction skills and knowledge concerning foundations, and multi-storey structures (Brillembourg interview, September 2020). As a result, growth of the settlement is restricted to the horizontal plane.

*Figure 19: Exterior (left) and interior (right) perspectives of the Empower shack project dwellings (Source: dezeen.com)*

To prevent the development of “slum” conditions in the Empower shack project, vertical incrementality was considered and not horizontal as was the case in the case studies. Two-storey row houses were designed and provided as the complete outer shell structure, limiting appropriation by the user to subdivision of the interior and addition of an extra floor to accommodate a growing family.

### 6.2.2 Recycling

Recycling was a concept observed in all case studies, both in construction of dwellings and as part of the informal economy. Recycling is a key principle of the Circular Economy (CE) for which decoupling is a goal. Decoupling refers to “the efforts to break the causal link between economic prosperity and the depletion of finite resources and degradation of environments” (UNEP, 2013:19). Resource decoupling speaks to a reduction in resources consumed per capital. Recycling and re-use of building elements is imbued in informal settlement construction. As such, informal settlements contribute to resource efficiency and decoupling in that regard. As South Africa addresses the housing backlog, more resources are consumed in the construction of housing, demanding for decoupling of improved quality of life from resource consumption (Du Plessis *et al*., 2003). Construction solutions that involve the use of recycling are therefore important, and so are informal settlement upgrading interventions that incorporate recycling already presently used. It is important that such interventions not only consider the provision of the basic need of shelter and address issues of thermal comfort through their ingenuity, but address issues around social acceptability and enable the use of the house as an enabling asset. Co-design, therefore, becomes critical to the application of such principles to understand the social dynamics and complexities in housing and consequently intervene appropriately.

There are two concerns that the findings highlighted regarding recycling in informal settlements. Firstly, it is driven by conditions of scarcity that drive people to economical alternatives and not by sustainability. This was also evident in the co-design and co-construction processes where the turn to recycling as a solution was motivated by financial or budgetary constraints. As such, it comes as no surprise that in some state or Non-Profit Organisation (NPO)-financed and in instances when the financial resources of dwellers increase, the concept of recycling is foregone. In state projects, resource efficiency is often sought through the optimisation of renewable energy through installation of solar panels. However, it is important to note that in making buildings more efficient by such means, while

it reduces their energy consumption at operation stage of their life cycles, it increases their embodied energy (Thomark, 2002). Recycling and designing with recycling potential provide a corrective to that.

Secondly, there are negative implications of the material choices. For instance, materials such as plastic sheets provide inadequate protection from the weather elements, and from fires. The fire hazards are often a consequence of the energy forms used. As such, there is a need to acknowledge the complexities around the available materials. This is something the Empower shack project achieved by using a hybrid method that tied the formal and informal. The blockwork walls provided the primary structure and fire resistance, and corrugated sheets could be used as infill (Brillembourg, interview, September 2020). Mathebula (interview, October 2020) also pointed out that there were creative tactics that have been devised to counter thermal discomfort from the use of zinc sheets. One tactic involves the addition of an insulative layer made from recycled paper that has been soaked in soap, to the sheets.

### 6.2.3 Local sourcing

The materials used in the construction of dwellings in the case studies were locally sourced. This was also driven by availability and affordability. A key advantage of local sourcing is its ability to reduce the negative environmental impact of transportation of materials over a long distance. It can also drive positive change within the context by providing capital gains for suppliers as well as providers of services such as construction, from within. However, it also presents demerits that were evident in the case-studies. For instance, some of the materials as mentioned in the previous subsection are not in good condition for construction.

Additionally, the locally sourced labour in many instances was unskilled, a family member, and as such the dwellings made were not in adherence to code and had structural, thermal, and other deficiencies. Fast construction and ease of assembly and disassembly are also motivating aspects of building technology used in informal settlements. Furthermore, through the temporal construction tactics employed, dwellings are built with ease of deconstruction, a concept that is critical to realisation of recycling potential in buildings. Dwellings can be easily dissembled, and materials re-used in the construction of a structure on a different site. As a result, materials are kept in the building cycle, leaving no waste thus promoting resource efficiency.

It was evident that co-design and later co-construction permitted the application of local sourcing. For instance, in the Bertrams project, the construction of the toilet block was led by a plumber that lived on-site. In the Empower shack project, the co-construction was an opportunity to skill those interested in attaining construction skills to provide the labour force for the project. Luruli (interview, September 2020) also pointed out that there was an opportunity to train the participants on the implications of design decisions on sustainability issues such as thermal comfort and energy consumption. For instance, they were informed on the recommended orientation of a building along the East-West axis. As such, they could intentionally employ such a principle in future projects in which they were involved. The employment of local labour and self-construction tactics in formal intervention is advocated for in literature. Caballero *et al* (2009) for instance, advocate for labour intensive proposals that do not require specialised knowledge or the use of complex machinery.

### 6.2.4 Scarcity-driven tactics

The practices observed in the case study settlements, imbue principles of resource efficiency advocated for in literature and policy. The findings highlighted that the motivation for the application of the above principles, however, is not concern for the environment, but driven by poverty and scarcity. The application of these resource efficient practices co-exists with environmental degradation and unsustainable living conditions. However, it was also noted that through co-design, these tactics were employed to develop contextually responsive designs. Notably, their application in the projects on the different case studies was also partly driven by financial constraints related to funding. This begs the question as to whether they would still be applied in instances where monetary resources were readily available. Furthermore, is the question raised by Cuyler (interview, September 2020) as to whether it is just for informal settlements to “carry the load of environmental sustainability.” Informal settlement dwellers live below their ecological footprint. It is therefore important to not only investigate how these tactics can be utilised to enable resource efficiency in informal settlements but also in formal settlements.

## 6.3 Co-design elements in informal knowledge application

This section discusses the elements of co-design that facilitate the employment of the informal design and construction tactics. It addresses the study objective, ‘to identify how co-design processes that draw from informal knowledge can facilitate upgrading towards resource

efficiency.' From the fieldwork, identified as elements (characteristic components) of co-design were engagement, co-creation, and learning.

Co-design, as observed in the fieldwork, entails the engagement of the community in the design and the different aspects of the decision-making processes. Through meaningful engagement, the spatial practitioners were able to understand the layers of complexities, the expressed and latent needs of the communities. In the Slovo Hall project for instance, while housing seemed like the immediate concern for the community, participatory design processes revealed the latent need for "neighbourhood infrastructure to support the bigger processes of housing as a verb" (Bennett, interview, November 2020). The inhabitants were then able to partake in the authorship of the projects; contributing not only the material resources available to them, but also the informal design knowledge concerning how they utilised these resources.

Co-creation was also observed as an element of co-design. This involved a co-authorship of a project by the spatial practitioners in collaboration with other stakeholders. The findings highlighted that participatory design processes not only involved the inclusion of the inhabitants of the settlement but of various stakeholders taking on different roles. Fluidity was important in the authorship process of the project, with the spatial practitioners having to be fully aware of where participants, themselves included were in the process; as stakeholders, design professionals or as authors. This allowed for the voices of different stakeholders and their knowledge contribution to be heard. For instance, in the Empower shack project cited by Brillembourg (interview, September 2020), it was critical to engage legal professionals to advise on matters around tenure, financial professionals to advise on aspects of financing the project, and more. In projects like the Slovo hall and the Bertrams priority block project, the co-creation involved the co-construction of the projects. It was therefore important for the design to allow for the employment of the skills and knowledge of the participants. Both projects were labour-intensive and employed unskilled labour.

An important aspect of the co-design processes observed in the fieldwork and discussed in the interviews was 'learning'. This involved an exchange of knowledge between the professionals and the inhabitants. The professionals for instance were made aware of the tactics used, why and how. The inhabitants too were skilled in other construction techniques and more.

Galvin *et al*. (2016) point out the importance of involving local persons or groups in the application of indigenous knowledge arguing that lessons learned from local participants can

be misappropriated when they are not involved in the implementation. Through the application of the elements of co-design, the spatial practitioners not only became aware of the concerns of the communities in which they intervened, but also learned the informal design and construction knowledge in them. The engagement of community participants in the co-creation process enabled the application of this knowledge in the different projects.

## 6.4 Co-design, an effective strategy?

This section addresses the research question on the effectiveness of co-design as a strategy for informal settlement upgrading. It also discusses the hindrances to the implementation of co-design and its limitations. The interview participants overwhelmingly argued for co-design or participatory design as best practice for intervening in informal settlements. The arguments raised in favour of co-design are discussed below.

### 6.4.1 Limitations in traditional planning and design approaches

An argument for co-design presented by participants Bennett and Brillembourg was that it is a corrective to the datedness of traditional approaches to the planning and design of settlements. Traditional approaches to planning and design limit the reach of professionals to formal settlements. Watson (2009) argues that traditional approaches to planning are antipoor resulting in the further marginalisation of the urban poor many of whom are housed in informal settlements. In line with Watson's argument, Brillembourg (interview, September 2020) argues:

> "As architects, we don't have the best reputation. We tend to come in and want to *tabula rasa* (clean slate) or "clean." Or, with this cleanse idea of bulldozing that is identified with modernism as well as apartheid. But we realise that when you bulldoze a neighbourhood to start again, you lose a lot of qualities and destroy communities. So, how do you work with the communities…?"

Brillembourg pointed out that such approaches are incognizant of aspects such as social cohesion and social sustainability that are present in informal settlements, which are lost through the enforcement of erasure strategies. As such, the poor are further marginalised by interventions that destroy communities, exacerbating poverty and inequality rather than addressing them. The complexities within the informal city require a reworking of planning

and design approaches to the informal city for the professions of planning and architecture to remain relevant to them.

### 6.4.2 Learning

Co-design facilitates learning for all stakeholders, that is, the professionals as well as the inhabitants of the informal settlements. The professionals can learn from the inhabitants who have the lived experience and the informal knowledge. As noted in the previous section the informal knowledge imbues principles of resource efficiency. However, its application can also result into unsustainable and unsanitary living conditions. Nevertheless, it provides opportunities to respond in resource efficient, rather than introduce unsustainable practices as applied in the formal settlements.

Learning in co-design is not one-sided, but an exchange of knowledge between all participating stakeholders. This was evident in all the projects observed and those given as examples in the interviews. In a co-design workshop for the Bertram's project, an inhabitant of the informal settlement noted that the process had been a learning opportunity for her. She had learned how to present her ideas, and about the various aspects of decision-making. Participants also learn about their rights and the state's responsibility to them. In a project like the Empower shack, participants were equipped with construction skills applicable beyond a project's completion.

### 6.4.3 Social acceptability

Concerning sustainability, some of the more efficient and affordable proposals are socially unwelcome. This is a point highlighted by Winkler, Spalding, Tyani and Matibe (2002) in a cost benefit analysis study conducted on thermal comfort interventions in different low-cost housing dwelling types. They point out that whilst the results indicated that energy efficiency investment in row houses presented the highest economic benefits, their social acceptability was low. By contrast, Brillembourg (Interview, September 2020) noted that row housing was proposed for the Empower shack project in Cape Town. The aspect of social acceptability was tackled through the participatory design processes through which the case for row housing was made and the community's buy-in for the idea garnered.

### 6.4.4 Agency

Another argument for co-design is for its enablement of agency and self-determination of the community. Mathebula (interview, October 2020), an informal settlement dweller, emphasised this in his argument for the carrying out of inquiries on what the priorities of the communities are. He argued that it is erroneous for interveners to assume what needs ought to be prioritised as it undermines their agency. External interveners ought not take agency from the people but rather enable them to address their priorities and the related issues. A key aspect of the co-design processes employed on the different projects presented in the fieldwork chapter was the identification of a community's needs, priorities and how they see it come to fruition first with the resources they have available to them. This aids in the promotion of agency and self-determination. Self-determination is important in any intervention in communities (Wekesa, Steyn and Otieno, 2011). Interventions that rely completely on external aid and knowledge may cripple vulnerable communities (*ibid.*). For instance, providing appliances that require continued yet costly maintenance or employing locally unavailable technologies undermines self-determination creating communities that remain heavily reliant on the state or external aid. Co-design projects observed and investigated harnessing local resources including human resources in addressing sustainability beyond the end of the project to enable communities.

### 6.4.5 Affordability

Poverty is a critical issue that not only contributes to the birth of informal settlements but, results in their perpetuation and continues to plague them. Due to conditions of scarcity in the informal settlements studied, affordability and accessibility were the most notable driving factors for the choices regarding materiality, location, density and more. As such, solutions developed for in informal settlement upgrading should consider financial sustainability by the inhabitants regards maintenance and more in the long term. Through the co-design processes observed, spatial practitioners could understand the ground conditions and together with the inhabitants, develop and test solutions that were affordable to and maintainable by the community. In the projects presented in the fieldwork the application of construction practices such as recycling not only enabled the application of resource efficiency, but also made for affordable solutions using available and accessible resources. This could prevent the dependency on external aid even long after the project funding runs out.

It is important to note, that the application of the resource-efficient practices such as recycling, was largely driven by affordability and by budgetary constraints in the externally funded projects. Notably, the housing subsidy from the South African government presents financial

constraints as well. As such affordability is always an important consideration in upgrading. Through co-design what to prioritise as well as tactics to achieve the most community transformation within financial limits can be ascertained with the community.

### 6.4.6 Ownership

Ownership of a project by the community is key to its success. Mathebula (interview, October 2020) pointed out that a lack of ownership has led to the vandalization of projects within months of their competition. If the community does not buy-into a project, it will neither protect nor sustain it. Furthermore, a critical aspect to buy-in is the engagement of communities in the identification of priorities and a common goal which are key aspects of the problem definition phase of the co-design process. During the problem definition phase, emphasis is placed on the priorities of the informal settlement and how they can be achieved using the available resources. Using this approach informal settlement dwellers are regarded as a resource, rather than merely recipients of external aid. Furthermore, their priorities are recognised and then can be aligned with larger concerns such as sustainability together. Interveners often approach upgrading with preconceived ideas of what the community needs are, then forcing them upon the community in participatory processes which are only to inform them. The inhabitants of informal settlements, like clients in formal projects have needs that they would want prioritised, after which they could be enabled to resolve the other issues without external aid.

## 6.5 Hindrances to the implementation of co-design in upgrading.

Though co-design is promoted as best practice, it is often not implemented in informal settlement upgrading. This section highlights some of the hindrances to its implementation. Co-design processes are time-consuming. For instance, engaging of the different stakeholders in the Bertrams project, a relatively small settlement, for the design stage of the process lasted over a month. This involved two workshops each week and design team meetings. The time spent in engagement could be a disincentive to the spatial practitioners and to the dwellers of the informal settlement (Bennett, interview, November 2020). This concern was expressed by a resident of Bertrams in one of the design workshops who noted his frustration over not seeing physical progress on site.

Another hindrance is the dated education and training of spatial practitioners that continues to prepare them to use traditional approaches and for work in the formal environment (Bennett,

interview, November 2020; Brillembourg interview, September 2020). The formal education of spatial practitioners in a number of built environment schools neither prepare them to work in the informal sector, nor to use methodologies such as co-design (*ibid*.). Brillembourg argued that architectural education still imparts traditional design approaches on its students. Similarly, Perold, *et al*. (2019) note that the architectural profession faces difficulty in engaging with informal settlements. The profession still focusses on the norm of the architect as an individual (*ibid*.). Citing Dovey (2013:87), they argue that for the profession to reach the potential it has to offer expertise in informal settlements, it ought to be reinvented, what they refer to as "informalising architectural practice." This they argue requires the "rethinking of professional ideology, architectural theory and education (Dovey, 2013: 87)."

Additionally, Bennett (interview, November 2020) notes that built environment schools and educators that challenge the norm often meet resistance. Consequently, the uptake of new approaches to design such as co-design is low. As a result, professionals are ill-equip when in informal contexts and participation may be reduced to a presentation of the design for the community to comment or vote on.

Lastly, the high-cost implications of co-design are also a hindrance to its application. Given the time aspect as well as the various stakeholders involved, co-design processes can be expensive in comparison to design without participation. Consequently, some projects will opt out of the co-design. However, opting out of co-design could result into even more losses after the project has been enacted if people have no ownership of it or even vandalise it.

## 6.6 Conclusion

The study hypothesis highlighted the measures for which the effectiveness of co-design as a participatory approach in informal settlements could be assessed. These are: the promotion of ownership, self-determination, and the responsiveness to social issues such as poverty. The findings pointed out that the above were achieved through co-design. Furthermore, co-design enabled the application of informal knowledge in ways that sustainable principles could be harnessed. Even then, the application of co-design is met with limitations and hindrances and call for changes to education and for enabling policies to encourage it.

# Chapter 7: Conclusion

## 7.1 Introduction

This chapter assesses the study and considers whether the data consolidated in chapter 6 addresses the research question and how it relates back to the hypothesis made at the commencement of the study. The main question was: 'To what extent can resource efficient strategies for upgrading informal settlements benefit from co-design processes that draw from informal design knowledge tactics?'

The research established four sub-questions which attempted to address different aspects of the main question and the research objectives. These were:

1. What are the existing informal design strategies that demonstrate resource efficiency in informal settlements?
2. What elements of co-design facilitate the use of informal design knowledge?
3. How effective is co-design in informal settlements upgrading?

## 7.2 Outline of main argument

Globally, there is a growth in concern for the role of cities in combating climate change and consequently the promotion of sustainability concepts such as resource efficiency. However, the informal city has often been neglected or the interventions in that regard have been anti-poor causing further marginalisation of the inhabitants of the informal settlements. The concepts of informality and resource efficiency in South Africa are linked to the government's efforts to redress apartheid inequalities that have manifested in housing leading to the rise and perpetuation of informal settlements. Addressing these inequalities and the housing question cannot be isolated from the sustainability question. In this regard, the research hypothesised that co-design in upgrading of informal settlements presents an opportunity to engage the inhabitants on the informal tactics that imbue the principles of resource efficiency in developing solutions that are contextually responsive. It was therefore critical to ascertain what the informal practices in the case studies were, whether they imbued the principles of resource efficiency, and what the implications of the application of these practices was. Furthermore, it was important to understand the role of co-design in upgrading and how through it the resource efficient practices could be applied in informal settlements.

Through a study of five informal settlements, interviews of professionals that had been involved in upgrading and informal settlement inhabitants, two aspects stood out. The first was the co-existence of resource efficiency and unsustainability in the application of informal tactics. The second is the effectiveness of co-design as a methodological approach to intervention in informal settlements.

### 7.3.1 Co-existence of resource efficiency and unsustainability in informal tactics

The findings highlighted the application of resource efficient practices such as recycling, compactness as being practiced in informal settlements. However, in many instances, their inadequate application had negative effects producing undesired living conditions for inhabitants and degrading to the environment. Thus, the co-existence of resource efficiency with unsustainable and unsanitary conditions. For instance, the use of recycled corrugated metal sheets as walling and roofing materials resulted into the creation of thermally uncomfortable indoor environments. This consequently led to the need for energy for space heating, which due to the energy poverty in many of the informal settlements, led to a reliance on dirty forms of energy and a heightened risk of fires. Another case is that regarding density, the compact forms in many instances failed to meet the spatial needs of families, creating spaces that lacked privacy and made for opportunistic infection to diseases and sustained criminality. This was especially in instances where the incremental adaptation was done poorly, creating indoor spaces with insufficient daylighting and ventilation. It also encroached on the greenspace. Due to the aforementioned issues, it is important to note that whilst informal settlements contribute to resource efficiency by having a low ecological footprint due to their compact scale, there are various challenges related to the compactness. Additionally, certain modes of incrementalism employed result into “slum” conditions which are associated with criminality and unsanitary conditions. As such, informal settlements require upgrading, the question then is how to upgrade sustainably in that regard.

It was observed on site visits and from the interviews that through co-design, the resource efficient practices imbued in informal tactics were applied in ways that made for contextually responsive designs. Contextual appropriateness was reflected in the responsiveness to aspects such as; affordability, accessibility, ownership, and enablement through agency and self-determination. Notably, their application in formal upgrading interventions by professionals as in the case of the daily application in informal settlements was also not mainly driven by the actualisation of sustainability but by financial drivers like budgetary constraints. The state

dictates a set subsidy for each stand, which necessitates innovative strategies to achieve certain upgrading objectives within financial limits of the subsidy. As such considering issues of affordability was critical. Ecological sustainability, however, was in most cases an *ad hoc.* The underpinning for this being that informal settlement inhabitants already bear the load of sustainability though they live below their ecological footprint.

### 7.3.2 The role and effectiveness of co-design in informal settlement upgrading.

The conceptual framework developed from the literature review set criteria with which to determine the effectiveness of co-design as an effective strategy. According to the criteria, effectiveness is measured by responsiveness to issues of poverty, the enablement of ownership and agency and the application of informal design and construction tactics. The findings of the research revealed co-design as an effective strategy based on said criteria. Through the elements of co-design and the process stages, it was found that its application enables the use of informal design tactics to respond to poverty through the development of affordable solutions and promotion of informal businesses. It also enables agency and ownership through meaningful engagement in which the priorities of the inhabitants were determined and addressed as well as enabling them to achieve other related goals.

The role of co-design in the attainment of resource efficiency was in addressing the underlying complexities in these settlements whilst allowing for self-determination and enabling the application of informal knowledge that pertains to employment of sustainable principles. The extent to which its application enabled the drawing of informal design and construction knowledge tactics for resource efficiency was dependant on the application of its elements, engagement, co-creation and learning through its stages. It's application and consequently the extent to which it can effectively enable the development of resource efficient solutions for upgrading is hindered by some aspects highlighted in chapter 6. These include, the dated built environment curriculums in some schools that neglect intervention in the informal city and participatory methodologies such as co-design; the high costs and long duration of processes. As such, there is a need for a re-working of the curriculum in built environment schools, enabling policies that encourage and require its application and enable funding, and facilitate research on improving it application.

South Africa's turn to informal settlement upgrading through the BNG policy has presented sustainability as important and additionally fronted and mandated the importance of public

participation in upgrading interventions. Participation whilst pointed out in literature as critical to intervention in the complex and vulnerable environments, however, falls short in its implementation as a tick-box activity. Consequently, it is failing to optimise the opportunity it presents to create positive change that addresses issues such as poverty and inequality that plague informal settlements. Co-design, a participatory turn in design provides an opportunity for meaningful participation in which both the professionals and the community learn from each other and together develop contextually responsive and resource efficient solutions. Furthermore, the co-design stages presented in the previous sections align to the UISP in that it demands for meaningful community participation at every stage of the programme.

## 7.4 Recommendations for future studies and practice

This study methodology did not involve the simulation of workshops to test the hypothesis, rather co-design workshops conducted by other interveners were observed. A recommendation for other studies in this regard is to conduct workshops in which the researcher is in control and an active participant. A further recommendation is for research on more inclusion of participatory methodologies and the informal city in the education and training of spatial practitioners. Furthermore, research on the analysis, visual representation of data from co-design workshops as well as on engagement tools such as design games and more. A contribution of the study in this regard is a synthesis of the co-design stages and how informal tactics were harnessed in each, as presented in the findings chapter. This is a proposal for how practitioners can include codesign in their projects.

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**List of interviews**

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Brillembourg, A. (personal communication, 3 September 2020) Co-founder, Urban-Think Tank, Sao Paulo.

Cuyler, J. (personal communication, 24 September 2020) Director, 1to1 Agency for Engagement, Johannesburg.

Luruli, S. (personal communication, 9 September 2020) Programme coordinator, Planact, Johannesburg.

Mathebula, D. (personal communication, 27 October 2020) Social-Technical Practitioner, 1to1 Agency for Engagement, Johannesburg.

Van Der Walt, S (personal communication, 3 November 2020) Director, 1to1 Agency for Engagement, Johannesburg.

# Appendix

*Table 2:Summary of interviews (Author, 2021)*

| Date & Location | Interviewee | Themes/Topics discussed |
|---|---|---|
| 03 Sept 2020<br>Google Meet | A Brillembourg:<br>Architect<br>Urbanist<br>Professor of Architecture and Urban Design<br>Co-founder at the Urban-Think Tank | • Co-Design<br>• Sustainability in informal settlements and upgrading.<br>• Informal design and construction tactics<br>• Architects' role in informality and upgrading.<br>• Project: Empower Shack, Khayelitsha, Cape Town |
| 09 Sept 2020<br>Google Meet | S Luruli:<br>Training facilitator<br>Programme coordinator at Planact | • Participation in informal settlement upgrading.<br>• Sustainability in informal settlements and upgrading.<br>• People's Housing Project |
| 24 Sept 2020<br>Google Meet | J Cuyler:<br>Architect<br>Co-founder and Director at 1to1-Agency of Engagement | • Co-Design<br>• Sustainability in informal settlements and upgrading.<br>• Architects' role in informality and upgrading.<br>• Project: Slovo Hall 2010 |
| 27 October 2020<br>Johannesburg | D Mathebula:<br>Social-Technical Practitioner<br>Informal settlement dweller | • Participation in informal settlement upgrading.<br>• Sustainability in informal settlements and upgrading.<br>• Agency in upgrading |
| 02 Nov 2020<br>Google Meet | J Bennett:<br>Designer<br>Researcher<br>1to1 Co-Founder at 1to1-Agency of Engagement<br>UCL Bartlett PhD Candidate | • Co-Design<br>• Sustainability in informal settlements and upgrading.<br>• Architects' role in informality and upgrading.<br>• Project: Slovo Hall 2010 |