

ICORCE 2022

BIM as Mediator between Development Control and Spatial Justice: A Participatory Approach for Nairobi City County.

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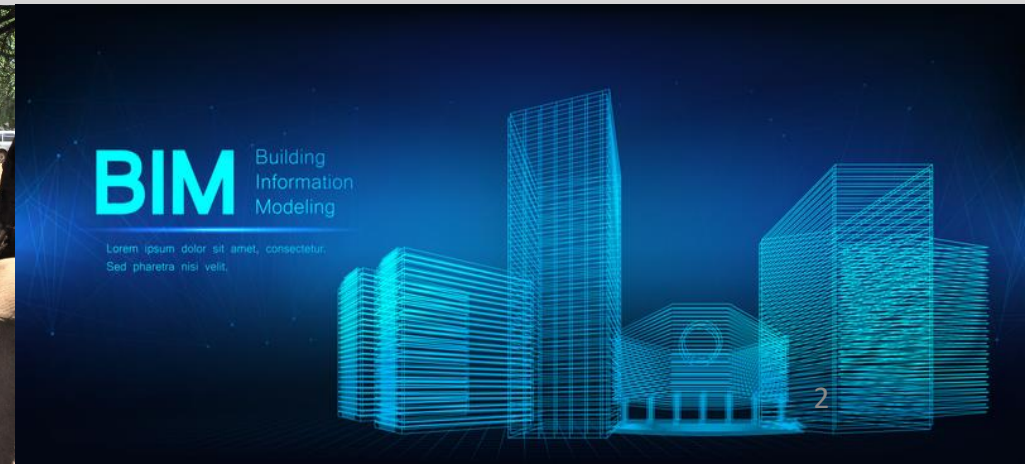
Study Objectives

1. To document the current processes of Development Control in Nairobi City County.

Pilot Study: Employed mixed methods approach to establish whether

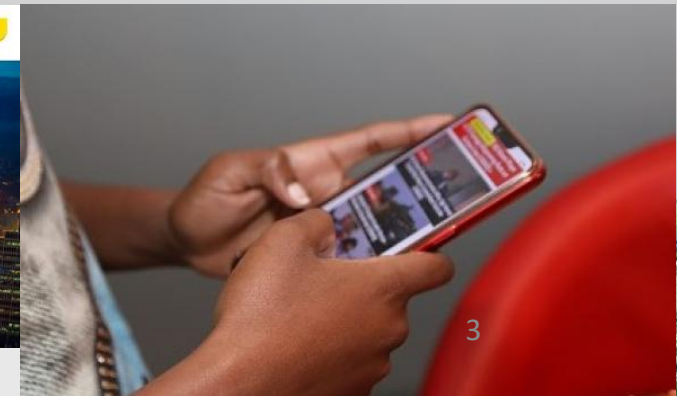
3. To develop a model (prototype) participatory BIM - Development Control system.

there is need for intervention in the development control process on the
4. To simulate the use of the prototype participatory BIM - Development Control system in Nairobi
Nairobi City County.



The Problem: The **opaqueness** of development processes and **inaccessibility** of development control to urban citizens results in impacts on everyday practices and deteriorating conditions in the built environment in Nairobi. Particularly; increasing **building collapses** over the past decade, **unsatisfactory lived spaces** and other reported dysfunctions of planning, design and construction in the urban environment.

The Gap: The study will address the gaps between development control as formal and centralised planning practice in Nairobi City County and the emerging applications of Building Information Modelling/Management (BIM) in the shaping, use and maintenance of built environments



Introduction

Cities are shaped by **multiple realities**

The **speed** of design and building often **outpaces** planning processes and development control

Resulting in **illegal/unplanned** development and **informal** settlements in vulnerable areas

Bureaucracy in development control complicates this problem

Needs of majority urban dwellers ignored in official **decision making**

Citizens resort to various stratagems to cope with urban life.



Development Control and Public Participation

Limited citizen engagement hampers efforts for better cities

Non-compliance to DC and simultaneous retro-fitting to serve needs/resources clashes with overstretched city capacities

Nairobi's DC was inherited from the colonialists, premised on seclusion and racial segregation

Nairobi's urban structure and DC practices have racial underpinnings that have been replaced by political and economic ones

Today, public participation is required but often undertaken as token exercise.



NAIROBI CITY COUNTY

PUBLIC NOTICE

**INVITATION TO PUBLIC PARTICIPATION FORUMS ON
COUNTY ANNUAL DEVELOPMENT PLAN 2020/21**

Development Control and Spatial Justice

What - Development control is the mechanism of determining building and land use regulations...

Why - ...for purposes of aesthetic beauty and orderliness, public safety and welfare, and, coordinated and efficient urban growth

Scope - Development Control covers both the built environment and the natural environment.

Responsibility – Anchored in statutory documents. Laws, Urban plans etc

- Managed by Planners & other built environment Professionals.
- Enforced by the Governing Authority & Public Planning Agencies.



Development Control and Spatial Justice

Process of Development Control.

Application for Development Permission.

- Supporting documentation attached
- Eg. Drawings, ownership documents...

Review for Compliance.

- Done by various departments of agency
- Or by various agencies depending on scope of development...

Approval is granted or denied.

- Supporting documentation attached
- If refusal, then reasons are attached and required amendments detailed...



Development Control and Spatial Justice

Spatial Justice - The concept of the ordering of cities with consideration to just social relations.

Stems from **Social Justice** which is justice in terms of the distribution of wealth, opportunities, and privileges within a society.

Considerations of spatial justice in respect to Development Control .

- What essential social goods does development control distribute?
- How inclusive or participatory is the process of development control?



Development Control and Spatial Justice

Why spatial justice is critical in discussions on development control in Nairobi.

- Offers an **analytical framework** in evaluating the productive power of urban space and DC by extension.
- Produces knowledge about the relationship of man with the natural & built environment. **Theoretical framework.**
- Questions how the state uses its power through DC to physically transform space. **Practical Application.**
- Takes into account the negotiation of space between the state and multiple groups. **Public Participation.**



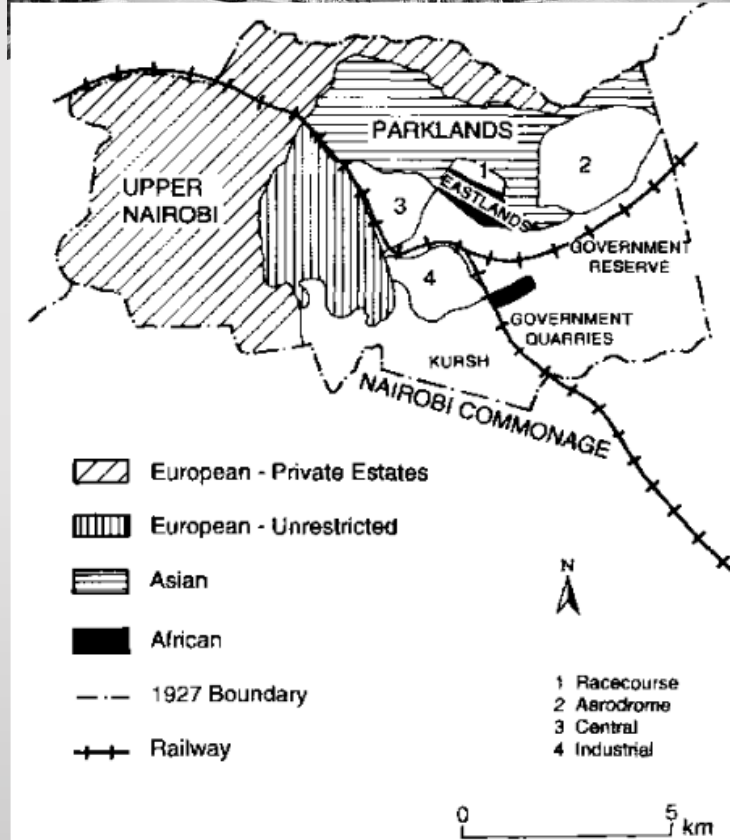
The origins of Development Control in Nairobi

Origins in **Nairobi of 1899** to safeguard well-being of white settlers. Africans and Indians **restricted** to specific quarters in the guise of health.

Segregation **abolished** in 1963 with independence.

Post-independence Governments have **successively** demolished Informal settlements and displaced residents.

Informality and other urban **problems persist** as Urban Development continues to outpace planning and Development Control.



Development Control and Urban Structure

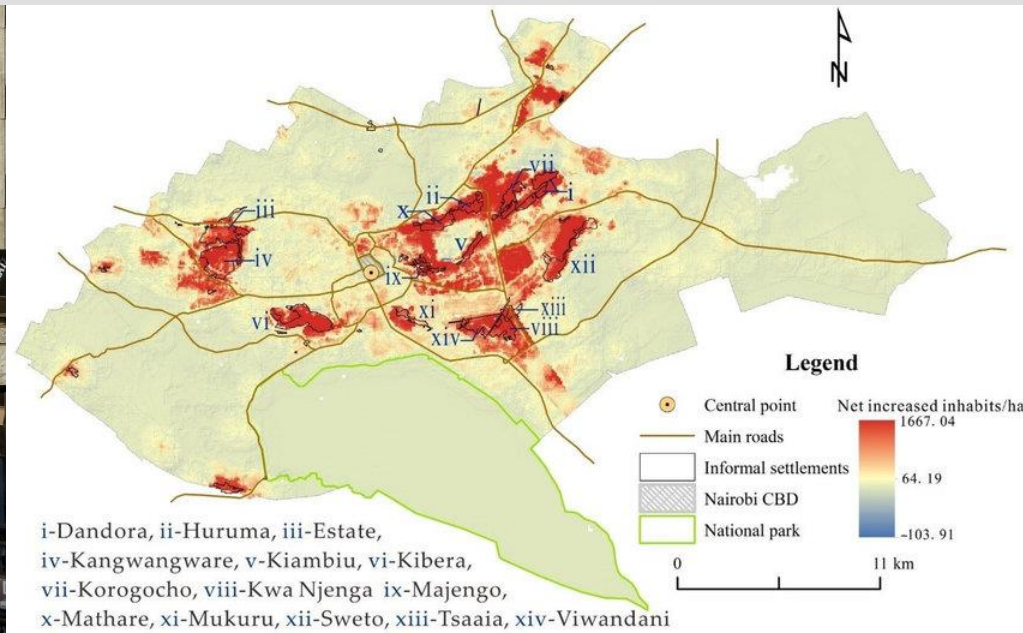
Rapid Urban Development in Nairobi. 4.39M Pop and 9.3M Metropolitan Pop.

Urban Structure split into affluent West and poorer East.

Informal settlements 5.2% of residential area housing 62% of Pop.

Development Control failures most prevalent in these areas:

- High Densities
- Building Failures
- Inadequate Infrastructure



Kenya's Digital Context

Kenya's information and communication technology (ICT) sector contributed about **8% to GDP** in 2021

Kenya has **59.58 Million mobile subscribers** with 54.5% of these being smart phones, and 67.9% being feature phones

Many of the country's projects focus on developing products that reach Kenya's poorest through **SMS services** available on basic mobile phones

Can these same platforms be harnessed to help the urban population to interact with development control tools?



Digitalisation and Technology in Construction

New materials and methods. **Prefabrication** and **3D printing**.

On the job sites. **CCTV Surveillance** and **Drones**.

Smart buildings and software. **Digital twinning** and **Building Information Modelling**.

Increased safety and productivity through **Virtual reality** and **wearables**.

Predictive analysis through **Artificial Intelligence** and **Machine learning**.

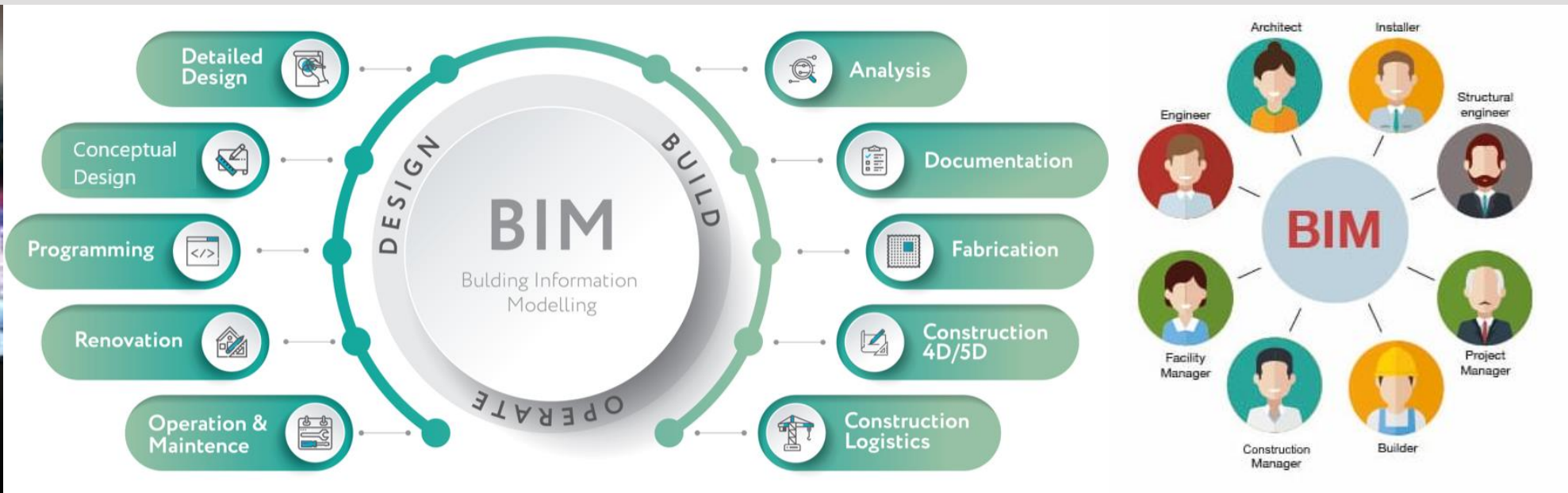


BIM-A brief Introduction

Is **digital representation** of physical and functional characteristics of a facility creating **shared knowledge** which forms a **basis for decisions** during its' life-cycle.

Has existed since the 1970's and is both **software** and a **process**.

The pillars of BIM are **Communication** and **Collaboration**.

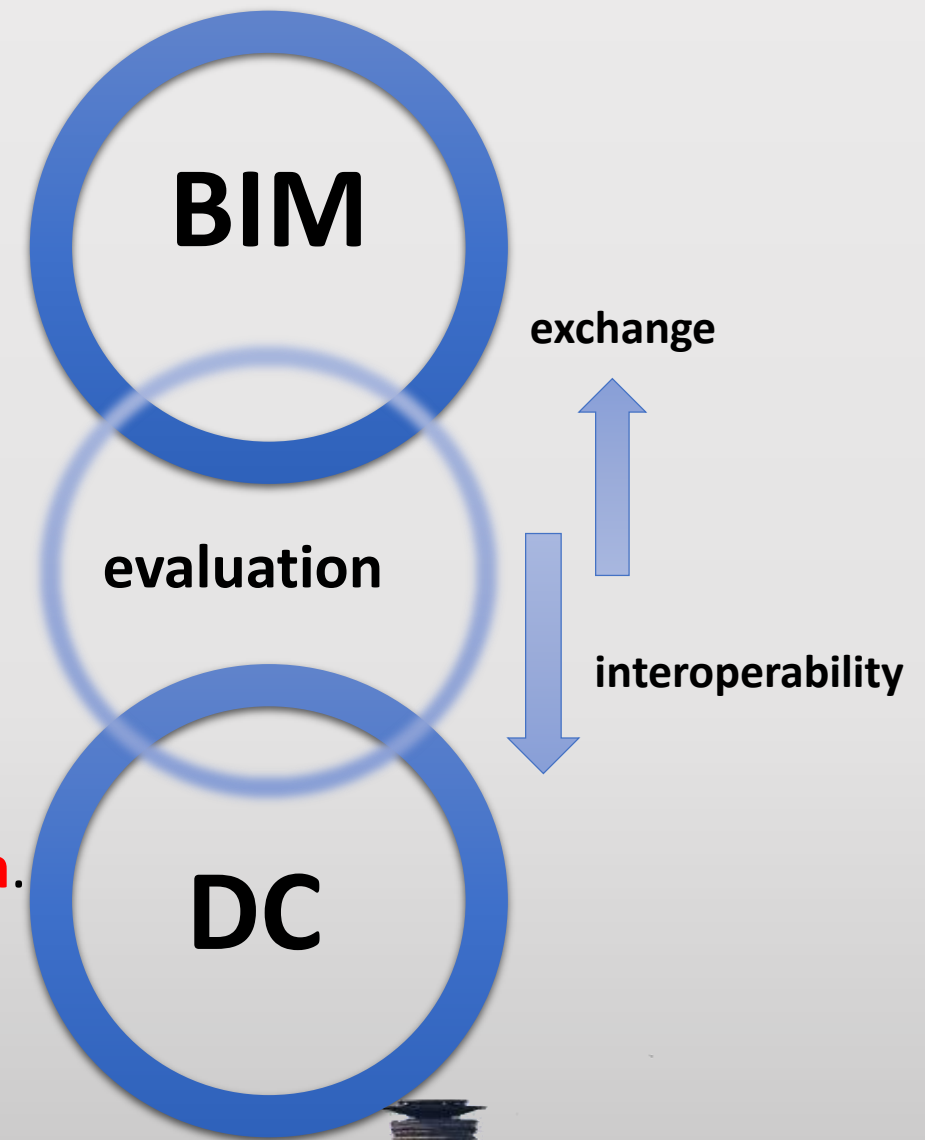


BIM and Development Control

BIM can improve Development Control by facilitating **exchange** and **interoperability** of information in digital format.

Models can be **evaluated** for compliance to Development Control parameters.

BIM can be a tool for **Communication** and **Collaboration**.

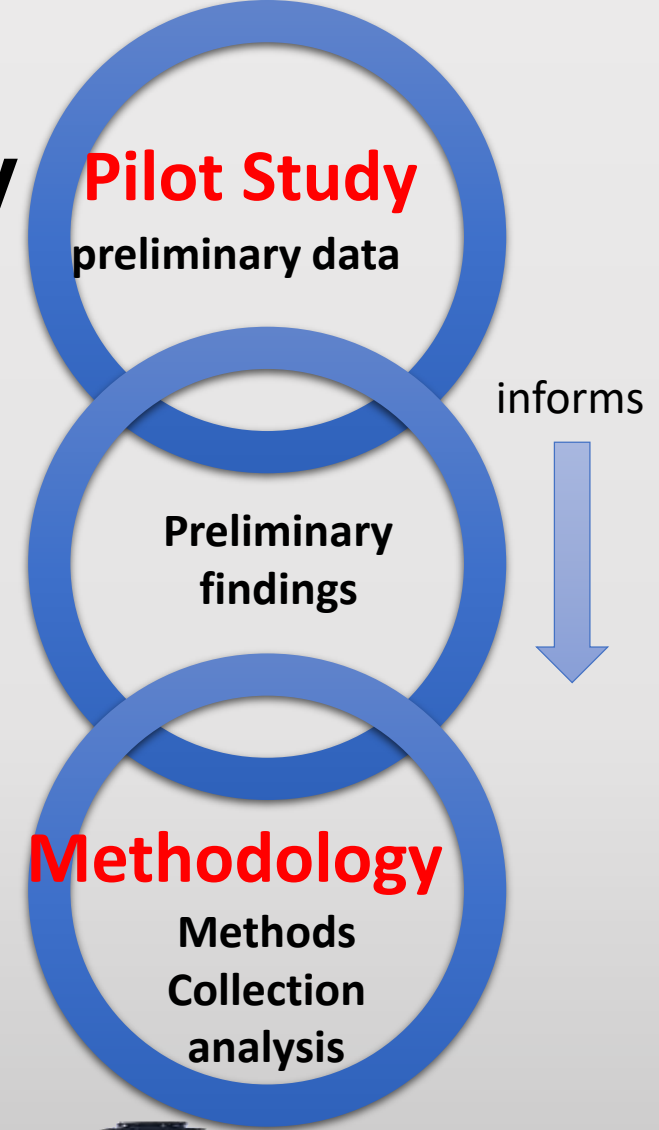


The Pilot Study-Research Methodology

Study Area – Nairobi, including the Metropolitan.

Study Approach – A pilot study to establish the need for intervention in the Nairobi Development Control Process.

Data Analysis – The qualitative data collected was coded, Patterns identified and described and the implications explained.



Pilot Study

Informed the Study as follows:

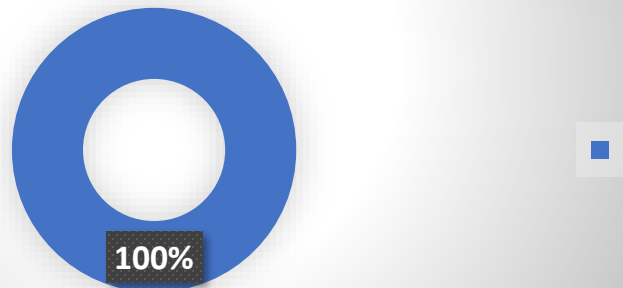
- (1) The researcher needs to think of how to get the general public to participate in the study perhaps by the method of administration of the questionnaires chosen, say an interview.
- (2) Areas of further interrogation were identified.



Results and Discussion

- Residence/Practice in Nairobi – **100%**
- Understanding of DC – **100%**
- Ways DC is carried out - **Approval**
- Necessity of DC – **97%**
- Mode of Application– **65% online system**

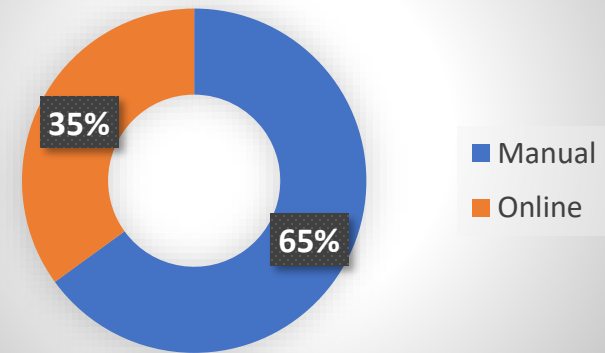
Residence/Practice in Nairobi



Development Control is Necessary



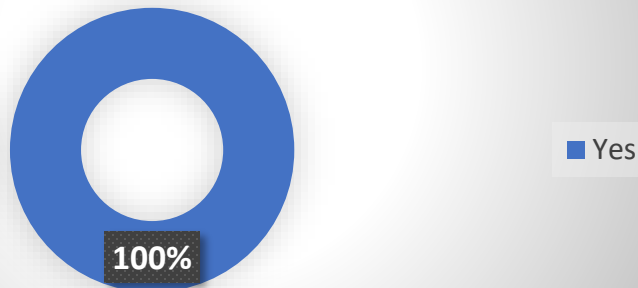
Mode of Application



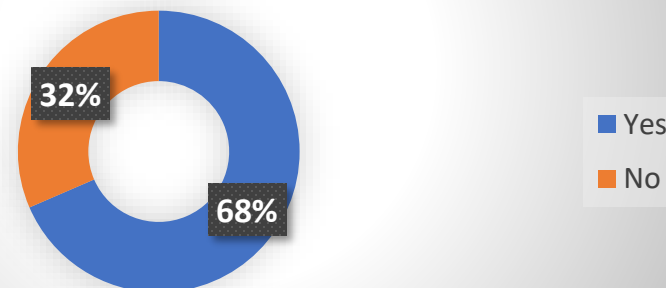
Results and Discussion

- Importance of DC – Well intentioned but **not successful**
- Active engagement in DC – **77%** have applied, **68.5%** are able to comply.
- Obstacles faced in DC - **delays** cited by 45%
- Consequences of non-compliance - are **clear to all** participants
- Recommendations for improvement—online system requires **further improvement**

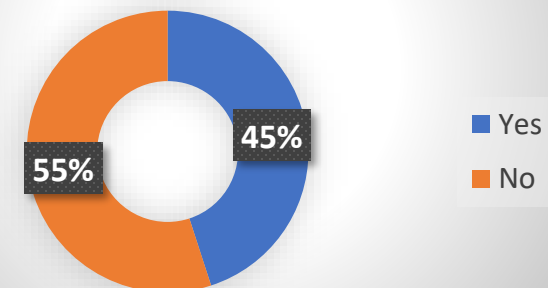
Have applied for
Development Permission



Were able to comply with
Development Control



Encountered
Delays



Conclusion

In conducting the pilot study, it was hypothesised that there is a need for intervention in the development control process in Nairobi City County to enhance participation and increase efficiency and transparency of the process. It is proposed that by introducing BIM into the development control process, citizen participation can be facilitated and increased making the process more inclusive and therefore more attractive to citizens, and ultimately increasing compliance.



Thank you

