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Building resilience through informality: Urban form development in Mamboleo 'B', Dar es Salaam, Tanzania

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Abstract

This paper defines resilience as a systemic "adaptive capacity" to address social and economic risks cities face at local and urban levels. Over the past 20 years, the concept of resilient urban forms has gained popularity in addressing resilience-related issues, as it has been shown that a city's form influences its ability to withstand and recover from adverse events. Numerous studies have examined urban form resilience. However, there are still few studies highlighting the role that informality plays in enhancing the resilience of urban forms. This study, therefore, examines how informal processes of urban space production result in socio-economic resilient urban forms using Mamboleo "B", an informal urban neighbourhood in Dar es Salaam, Tanzania. According to this study, delineation of boundaries of plots; creating circulation paths; construction of dwellings; land disposal; control of access to spaces; and services installations are key activities landowners perform in creating urban forms. The ability of these processes to adapt quickly to changing socio-economic situations contributes to making their resulting urban forms resilient. The study concludes that the insights gained may enable urban planners and policymakers, particularly in developing countries, to properly create and manage the socio-economic resilient urban forms.

Keywords: Adaptive Planning; Socio-economic Resilience; Informality; Resilient Urban Form

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1. Introduction

Cities, as socio-ecological systems, face a variety of stress factors, such as population growth and resource depletion. These days, people view human activity and natural disasters as erratic and unpredictable threats to cities. To anticipate and reduce the related consequences and risks, cities need to be able to act swiftly and efficiently. In keeping with that, fresh approaches—among them, resilience—are being looked for to counteract these inescapable threats. Resilience, according to Ercoşkun and Oğuz (2021), provides quick fixes for uncertainties and vulnerabilities through adaptation and flexibility steps. In light of the increasing frequency and intensity of natural, social, and economic challenges, resilience strategies are implemented (Masik and Grabkowska, 2020). Local governments and researchers are becoming more interested in promoting urban resilience. Numerous global endeavours, including the United Nations Office for Disaster Risk Reduction (UNDRR)'s Making Cities Resilient (MCR) campaign and the Rockefeller Foundation's 100 Resilient Cities (100RC) program, were introduced in 2013 to assist cities globally in incorporating resilience principles into their planning and design methodologies (Eldesoky and Abdeldayem, 2023; Masik and Grabkowska, 2020). Developing nations now face the challenge of embracing resilience in the face of information gathered from strategies that have been implemented in developed countries.

The planning and land management of African Cities has often been overtaken by non-infrastructured urban production that is 'not planned' and spontaneous (Viana, 2018). A ray of hope is that informal settlements have high temporary adaptive capacity though they exhibit high overall vulnerability to flooding (Shukla, 2023). However, studies on the contribution of the informal processes in producing socio-economic resilient urban forms are still scanty as most of them are inclined to issues of resilience to climate. Urban resilience must not be regarded through a narrow climate change adaptation vision only, but rather as a wide and holistic fabric incorporating both environmental and socio-economic aspects, including social justice, equity and multicultural dynamics. In Tanzanian cities, informal creation of urban forms is common (Bahendwa, 2013; Kalugila, 2013). Urban forms are resilient in socio-economic aspects though weak in other aspects of resilience such as environmental issues. Studies on urban forms in Tanzania focus on understanding urban forms as they are but not from their resilience perspective. They discuss some aspects of urban form resilience but not the attributes of informality in building resilience of urban forms. This study highlights some lessons on the informal traditions of the production of space and their contribution to the resilience of resulting urban forms. It discusses the contribution of the informal processes of production of space in creating socio-economic resilient urban forms and suggests some of the ways the formal traditions could learn and embrace the lessons from informality with a focus on enhancing the resilience of urban forms. The study also sees that the lessons from informality could help craft new adaptive planning tools capable of producing socio-economic resilient urban forms.

1.1. An overview of resilient urban forms and the potential of informality in achieving them

As cities grow in scale and complexity, the extent to which their urban forms will be able to resist, adapt to or co-evolve under unpredictable circumstances and fulfil needs different from those they were originally designed for, may be crucial for the very survival of cities. An understanding of resilient urban forms calls for exploration of the meaning of urban forms. Most scholars concur that urban form refers to physical characteristics that make up built-up areas, including the shape, size, density, and configuration of settlements

(Shukla, 2023; Williams, 2014; Živković, 2020). According to Kropf (2018), key components of urban form are the plots, buildings, and streets. The geometrical and configurational properties of urban form components influence the extent to which places can preserve unique identities, adapt to new needs and innovate (Feliciotti et al., 2018) and these aspects are central to the resilience discourse. Sharifi and Yamagata (2018) define resilient urban form as a system nested in a network of interconnected spatial and socio-ecological systems characterized by evolutionary spatiotemporal dynamics, and socio-economic and environmental conditions whose integrity, habitability, and functionality are constantly changing. Resilient urban form can be understood, structured, or analysed based on scales namely: macro, meso, and micro-scales. At the macro scale level, urban form concerns the whole structure of the city, its existing position, and its future development in relation to other cities and settlements in the broader network of cities and city regions. At the mesoscale, urban form concerns the general structure of neighbourhoods and districts. Major attributes to be considered are the structure and shape of neighbourhoods, diversity, typology of transportation network, access to amenities, and size and shape of open and green spaces. At the micro-scale, urban form concerns the structure of buildings, how they are located in relation to each other (on the site), and their relative position with respect to the pedestrian and traffic networks in a finer level of granularity (Sharifi and Yamagata, 2018).

Decisions on what to explore in the studies of urban forms normally depend on the interest of the scholar. For some, the most important aspect of a city's urban form may be its aesthetic qualities. Others may look at a city primarily in terms of its capacity as a place to do a particular kind of business, and yet others may prioritize how a city meets the social, economic or cultural requirements of everyday life (Çubukçu, 2019). Other scholars have decided to venture into exploring the resilience aspects of urban form. The urban form resilience scholars have concentrated on exploring the value of resilient urban forms and how they can be made (Feliciotti et al., 2018; Sharifi et al., 2017; Sharifi and Yamagata, 2018; Shukla, 2023; Ercoşkun and Oğuz, 2021). Though many studies have already taken place on the aspect of urban form resilience, they have yet to systematically explore the positive lessons and contributions the informal processes of production of space can make in the creation of resilient urban forms. Therefore, this particular study highlights the way resilient urban forms are made from the informal processes of production of space. The study analyses the informal processes of production of space with a view to see their contribution to achieving the socio-economic resilient urban forms at meso and micro scales.

1.2. Approaches to understanding the concept of resiliency and its urban forms

An understanding of the concept of resilience is based on either an equilibrium or evolutionary approach. The equilibrium approach suggests that a resilient system absorbs or accommodates the shocks and disturbance but does not change the system (Ercoşkun and Oğuz, 2021). The Evolutionary approach, contrary to the equilibrium-based one, rejects a return to the normal and highlights adaptation, reform, and transformation processes. The main emphasis in this theme is that development can occur in multiple pathways, not just a single path. In short, the important point in this approach is that social systems adapt to change or transform the system by developing alternative ways (Davidson, 2010). Further, in the search for tools to be used in exploring resilient urban forms, Sharifi (2019) proposed a conceptual framework for analysing the resilience of urban forms (Figure 1). Based on the conceptual framework by Sharifi (2019), the analysis of resilience needs to respond to four key questions which are: "Resilience of what? resilience to what? resilience at what stage? and resilience for what purpose?

Neighbourhood shape and design, Neighbourhood density, Land use mix, Lots, Blocks, and Open spaces

Resilience stages: Planning /Preparation, Absorption, Recovery, and Adaptation

Shocks and stressors: Natural, Environmental, Social, Economic, Technological, Attacks and Terrorism etc.

Resilience Characteristics: Robustness, stability, Redundancy, Diversity, Flexibility, Modularity, Self – organisation, Efficiency etc.

Figure 1. The conceptual framework for analysing the resilience of urban forms Source (Adapted from Sharifi, 2019)

Key 'measures' of urban form resilience can be grouped into four dimensions namely: Physical, Environmental, Social, and Economic (Smith and Davis, 2013). In the physical dimension, among others, a resilient urban form is regarded as one which can be used differently, to be converted, adjusted, extended or retrofitted in ways that continue to facilitate and enhance use in economically sustainable ways. Its buildings are those that have the flexibility to accommodate minor space planning modifications, that is, convertibility allowing for changes of use and expandability thereby facilitating subtle additions and extensions. In the Environmental dimension, a resilient urban form is permeable and accessible from near and far places and incorporates publicly accessible green open space for recreation and the promotion of urban biodiversity. In the Social dimension, a resilient urban form is able to concentrate on diverse land uses and diverse tenure types allowing for the sharing of resources and amenities. Diversity of uses can promote safety and 'vitality' and ensure presence in the public realm throughout the day. They also promote local economies by creating opportunities for different kinds of activity to stimulate and catalyse one another. Tenure diversity extends to the types of housing that accommodate different kinds of people, such as young families and different levels of affluence. Social shocks deal with issues such as poverty, disasters, cultural loss, economic instability and safety systems at the family level (Altun and Tezer, 2019). In the Economic dimension, resilient urban form is considered in terms of property values over time. The relative value of real estate at the local scale can reflect characteristics of the urban form in terms of density, land use patterns, and public space accessibility which are key factors in the decision-making processes of potential developers and buyers (Smith and Davis, 2013). The impacts of economic shocks are joblessness or income decline (Rahman et al., 2021). This study is interested in the adaptability of urban form to social and economic shocks under the Evolutionary approach. Diversity, flexibility, and self – organisation are the key characteristics of the targeted resilient urban form. The study uses the physical, Environmental, Social, and Economic dimensions to discuss aspects of resilience of the urban form of the area examined.

1.3. Making resilient urban forms

Urban form is classified as either organic or planned. While planned urban form refers to an urban form which is the result of pre-determined intention or planning, an organic urban form is the kind of urban form that has evolved without pre-conceived planned intervention (Taruza, 2016). Urban areas, including cities and neighbourhoods, are dynamic, changeable environments that sometimes follow unexpected routes (Rauws, 2017). Traditional forms of urban design practice – focused on top-down regulation and the production of fixed

designs and master plans, resulted in the planned urban forms which have often failed to easily adapt to changes. Such forms of urban design and planning have proven both destructive and blind to uncertainties (Dovey, 2019). Spatial planners are now wrestling with how to deal with uncertainties in their daily practices (Rauws, 2017). They are now turning to adaptive urban planning and design encapsulated in the resilience concept (Cozzolino, 2020; Eldesoky and Abdeldayem, 2023; Rauws, 2017; Sharifi et al., 2017). The inclusion of the resilience concept in urban planning is increasingly becoming a crucial task for urban planners and designers (Shukla, 2023). Informality and resilience have common features, as both are considered solutions and survival strategies. From the informal processes of production of space, urban form arises from a bottom-up organisation based on interaction and negotiation between the different decision-makers: state and non-state actors whose actions are enabled and constrained within a socio-spatial context (Chatterjee, 2018). The processes are normally characterised by dynamic situations like the de facto transfers of land rights, piecemeal land subdivisions, sharing of space utilisations, negotiations of transactions and dwelling construction activities, variations, non–timely, incremental, spontaneous, and adaptive dwelling construction activities, and the free use of spaces. These aspects enable the informal developers to adapt to changing situations during their space creation activities. For example, when there is a rise in the cost of living, dwellers adapt by sharing their space utilisations, when they run – out of budget, they can adapt by selling portions of their land parcels causing the settlement to begin densifying gradually; when their income is not sustainable, they adapt by building incrementally over a long time.

To easily understand the informal processes of production of space, the unitary theory of space by Lefebvre (1991) can be involved. According to this theory, space can be produced physically, socially or semiotically (Rice, 2015). The physical production of space entails physical and visible change to an environment represented by activities like building, digging, planting, construction, painting, weaving, moving objects and/or modifying. In social production, space is 'produced' through the actions of individuals and social groups. Here the physical space does not necessarily change, but the activities of its users change the meaning, purpose, signification or classification of that space (Rice, 2015). Semiotic production refers to the production of signs (literally) and/or the production of meaning. Production occurs when individuals become active rather than passive in creating meaning (Rice, 2015). According to Zieleniec (2018), space can also be produced when attempts are made to change, manipulate and control the space and the people and activities that are allowed or required to use it. The use of space is strongly related to space management. Because individuals want to control privacy, they create rules to govern access to certain spaces and areas, both spatially and visually. Further, Claudio (2012) describes a residential model of formal and informal urban space. He points out that the settlement begins with the commissioning of buildings and the marking of boundaries, followed by the construction of water, electricity and road networks and the securing of land ownership.

1.4. Theory for studying the informal processes of making resilient urban forms

This study aims to examine how the socio-economic resilient urban forms are made informally. The activities involved in the process of making an urban form were analyzed using the Cultural Historic Activity Theory (CHAT). This theory is about 'Who is doing what, why and how' (Hasan and Kazlauskas, 2014). The most basic unit of analysis in the activity theory is the *activity system* which is defined as a group of people who share a common object and motive over time, as well as the wide range of tools they use together to act on that object and realize that motive. An *object* is the thing being done by the subject. An *outcome* of an activity is the intended

or unintended results of the activity. A *subject* is a person, or a group engaged in an activity. *Tools* can be *primary* (physical), *secondary* (language, ideas, models, etc.) or *tertiary* (communities, context, or environments). *Rules* are sets of conditions that help to determine how and why individuals may act and are a result of social conditioning. The Division of Labor describes how tasks are distributed within the activity system. Rules are defined not only as formal and explicit *'dos'* and *'don'ts'*, but also as norms, conventions, and values. *Community* refers to a group of individuals with a shared interest or culture that interact within an activity system (Hasan and Kazlauskas, 2014). An activity system is also embedded with internal contradictions referred to as tensions (Said et al., 2014). Tensions are crucial in understanding what motivates particular actions of the system and its evolution (Aksenova, 2014). Analysis of a real-world context using the activity theory is done in three steps. The first step involves an identification of significant activities of the system to be investigated together with each activity's *subject(s), object* and *purpose*. The second step entails an identification of the actions and mediating tools of the activity or activities. The third step is to identify the tensions within and between the identified activities using the triangle in Figure 2.

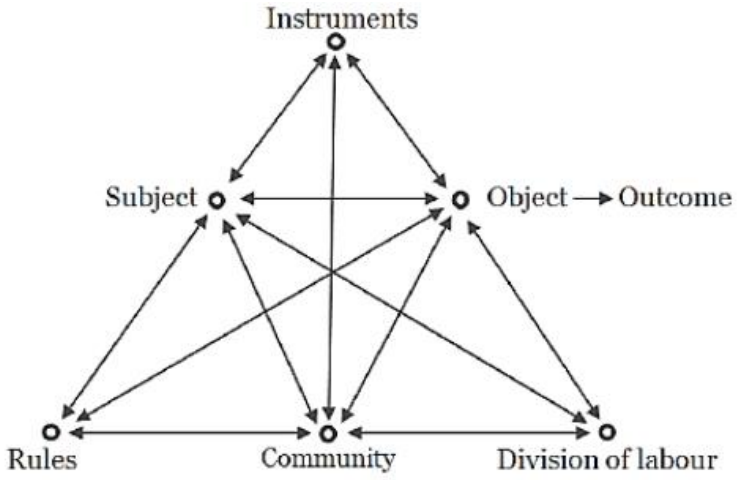

Figure 2. The basic schematic drawing of an activity system as developed by Engestrom (Source: Fardanesh and Maleki, 2016)

In this study, the activities of defining boundaries of plots; creating circulation paths; constructing new dwellings; making extensions, additions and alterations to starter houses; disposing of land; controlling access to spaces; and installing services are studied as systems. The key elements (actors, tools, rules, community, and division of labour) of each of the activity systems were identified through descriptive research methods. The outcome of an activity referred to the goal (s) of an activity while subjects were the people involved in carrying out activities. Tools included land parcels, time, money and ideas that were engaged in the production of space, and physical objects like trees that were used in plot demarcation. Rules refer to norms and regulations that govern the process of land acquisition. Community refers to a group of individuals such as land brokers, landowners, urban planning authorities, and planners who have a common interest in the activity of land acquisition. Division of labour refers to the duties of each of the actors involved in the activities.

2. Materials and methods

Data collection activity in this study adopted a mixed-method approach. Based on the process-typological approach of analyzing urban forms, step 1 entailed the identification of the elements of Mamboleo "B"'s urban form before discussing them. This was done through a general reconnaissance of the case study area, physical observations, map reading, sketching, photographic registration, and document analysis. The observations supplemented with the interviews helped to identify plots, buildings, and unbuilt spaces resulting from the activities of production of space. Step 2 involved an analysis of the processes of making an urban form using the Cultural Historic Activity Theory lens. This involved interviewing owners of the dwelling compounds identified in Step 1. The concern was to obtain answers to the following questions: What are the activities that comprise the informal making of urban forms? Who was involved in each of the activities? What were the motives behind carrying out the activities? What tools were engaged in carrying out the activities? What rules were employed in performing the activities? And how was labour distributed amongst the actors performing the activities? Mamboleo "B" settlement in Temeke Municipality of Dar es Salaam city (Figure 3) was chosen as a case study site.

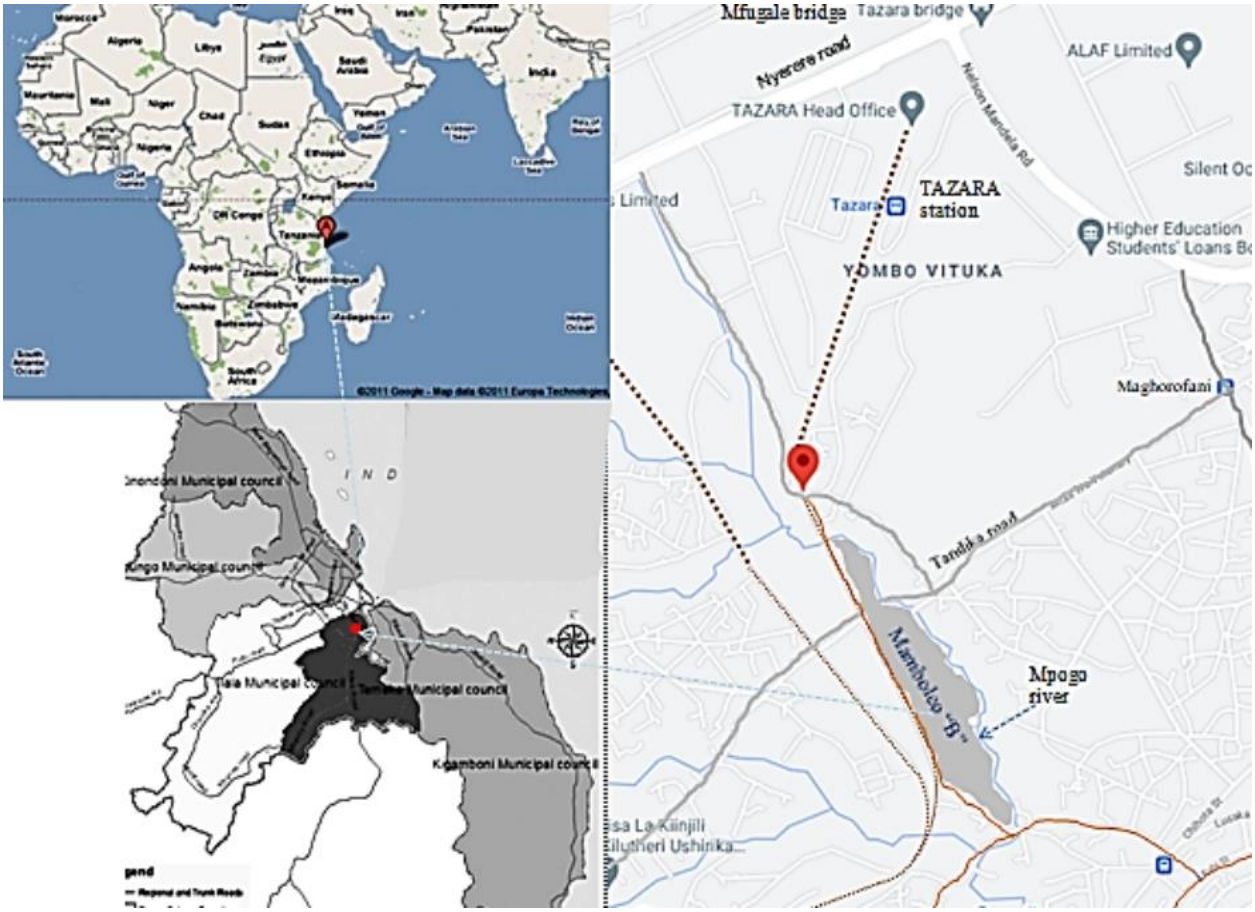

Figure 3. Location of Mamboleo "B" settlement in Dar es Salaam city.

The area of study was chosen since it is an informal settlement in which the production of dwelling spaces involves competing interactive layers of negotiation, appropriation and consensus in the utilization of spaces that provide a fertile ground for studying the informal process of making the socio-economic resilient urban forms. A multi-select questionnaire was used to collect information during the interviews. The interviews involved 79 respondents (Table 1). Snowball sampling was involved in selecting the individual dwelling owners, unprofessional and professional private practitioners who engage in the informal process of making the urban form. Individual dwelling owners were those living in the area, the unprofessional private practitioners were local masons and property brokers had no offices and no database was found anywhere, and the professional private practitioners comprised Architects, Planners and Engineers engaging in informal activities. Purposive sampling was used to select public sector officials as their offices are known. Snowball sampling usually finishes once a saturation point has been reached (Daher, 2023; Guest et al., 2020). The cases in this study were selected gradually in three rounds Reserved until a saturation point was reached. 36, 25, and 18 respondents were selected in the first, second and third rounds, respectively.

Table 1. Number and respondents' profiles from Mamboleo "B" case site

	Respondents	**Age**				**Gender**		**Employment**		**Occupation**								**Total**
		0 - 30	31 - 40	41 - 60	Over 60	M	F	EM	PE	C	MEO	T	LM	LB	A	P	E	
1	Individuals dwelling owners	-	1	14	11	19	7	0	26	-	-	-	-	-	-	-	-	**26**
2	Public sector officials	6	7	-	-	1	2	13	-	1	1	4	-	-	2	3	2	**13**
3	Professional Private practitioner	6	15	6	0	26	3	-	26	-	-	-	-	-	15	3	9	**27**
4	Unprofessional Private practitioners	4	6	3	-	13	0	-	13	-	-	-	8	5	-	-	-	**13**
	TOTAL	**12**	**22**	**34**	**11**	**6**	**14**	**13**	**61**	**1**	**1**	**4**	**8**	**5**	**17**	**6**	**1**	**79**

KEY: *M – Male; F – Female; EM-Employed; PE –Private employment; CP – Chairperson; MEO – Mtaa Executive Officer; TL – Tencell leader; LM – Local mason; LB – Land property broker, A – Architect; P – Planner; and E – Engineer.*

The authors developed six qualitative survey questions, which were administered through physical contact with the interviewees on the case study site. The survey questions were derived from two research questions:

A. What were the significant activities in making the urban form?

B. What tools and actions were involved in carrying the activities of making the urban form?"

Research question A was decomposed into five interview questions: *What activities* were performed in various stages of your plot development? *Who was involved* in each stage of your plot development? *What was the motive* behind the performance of the activities of each stage in the development of your plot? Research question B was decomposed into three interview questions: *What tools were used in carrying out the activities of making the urban form? What rules were employed in performing the activities of making the urban form?* and *how was labour distributed amongst the actors performing the activities of making the urban form?*

2.1. Data analysis

Data was collected through texts, narratives, maps, images, and photos. Text information was analysed using thematic analysis with the assistance of NVIVO version 12, a qualitative data analysis software. The questionnaires used in this study were administered in Kiswahili (a local native language) thus, the analysis process began with the translation of the scripts to English and later PDF – a format that is compatible with NVIVO 12. The scripts in PDF format were then uploaded into an NVIVO-12 file. The key elements of the Cultural Historical Activity Theory (CHAT) namely, the activities, actors, tools, rules, community, distribution of labour and motives, were used as pre-codes in the first cycle of the coding process. Some of the anticipated responses acquired from researchers' experiences, pilot study, assessing of previous studies and even guessing, were put as nodes in cycle 2 of coding. The excerpts that fit the developed codes were then identified and attached to the codes created. The keywords were then searched through query and displayed in the forms of tables and charts, that were used to complement the results presentation.

3. Results

This study sought to examine the processes through which the socio-economic resilient urban forms are informally created. Thus, the results are presented based on six scenarios which were set to execute enquiries for acquiring empirical data as follows:

(i) The activities are performed in various stages of plot development.

(ii) The actors are involved in each stage of plot development.

(iii) The motives behind the performance of each stage of plot development.

(iv) The tools used in carrying out the activities of making an urban form.

(v) The rules employed in performing the activities of making an urban form.

(vi) The Distribution of labour amongst the actors performing the activities of making an urban form.

3.1. The activities involved in various stages of plot development

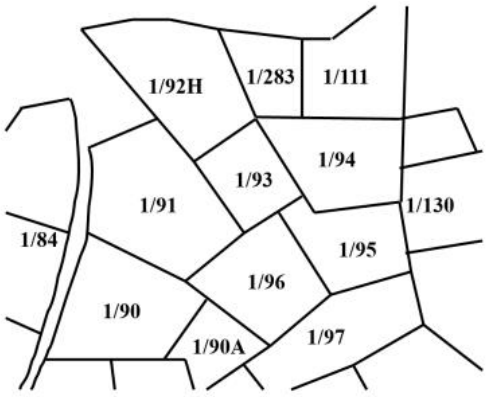

Figure 4. Plots of varying shapes and sizes in Mamboleo "B. (Source: URT, 2006)

The stages of plot development in the area of study entailed the activities of defining boundaries of plots; creating circulation paths; constructing new dwellings; making extensions, additions and alterations to starter houses; disposing land; controlling access to spaces; and installing services. The first activity was defining the plot boundaries. In delineating land parcels' boundaries, landowners were key players. Based on their varying interests, needs, and preferences they produced plots of varying shapes and sizes (Figure 4).

The second activity was the creation of circulation paths. This activity began with the indigenous people of this place. These people had created their circulation paths to enable them to move between their farms and their residences (Unubini) though others lived in the area. They also provided them with access to other areas of importance like the Tanzania - Zambia Railway Authority (TAZARA) station, and Temeke area. After people began to settle in the area, they began to create sizeable paths capable of allowing at least a single car to pass through to serve them and the people living in the consolidated build-up parts. In addition to path creation, a longtime resident of Mamboleo 'B' asserted that:

> *"In 1975, we had agreed collectively to leave space for circulation to allow passage of vehicles such as ambulances which could come to pick sick people to hospital or carrying luggage for newcomers to reside in the area and the like. This was possible by that time as houses were scattered and land was available, but now it is difficult as you can see".*

Figure 5 shows the circulation path that was created by this resident and her fellow dwellers which existed since the year 1975. Kungule Road (Figure 6) is a circulation path that was formed by adopting naturally occurring rainwater drainage channels. When it rains, this road becomes submerged by water and is hence used as a rainwater drainage channel but during the dry season, it is used as a road connecting Mamboleo "A" settlement with other settlements.

Figure 5. Circulation path created by a longtime resident and her fellow dwellers in 1975 in Mamboleo "B" (Source: URT, 2006)

Figure 6. Naturally formed circulation path in Mamboleo "B" (Source: URT, 2006)

The third activity was the construction of new dwellings. Having acquired land parcels in the area, some landowners constructed farmhouses while others constructed new dwellings. The resident mentioned above built her house in 1975. She further noted that:

> *"Apart from agriculture, the government required us to build houses and reside here to guard our independent railway against vandalism and sabotage which was prevailing during that time."*

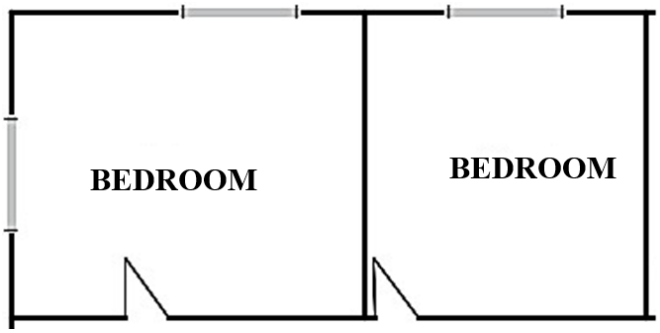

Figure 7. Plan of a starter house (Source: Field observations, 2021)

It was observed from interviews and map analysis that 19 (73%) out of 26 residents that responded, constructed starter houses before they started extending them to the current houses, they live in. Developers were building starter houses that could accommodate the family at that particular time and extended more rooms when the family size grew. During the interviews with the dwelling owners at this place, one dweller indicated that his starter house was single-banked with two rooms to accommodate his family of two children and a wife (Figures 7 and 8).

Figure 8. Exterior View of the Starter House Depicted in Figure 7 (Source: Field observations, 2021)

Dwelling construction continued in tandem with the activities of making extensions, additions and alterations in buildings. The fourth activity was the extension of the starter houses or the addition of houses on a plot to form a dwelling compound. The dwelling owners continued to make extensions on their original or startup units or add more dwelling units on their land parcels to form dwelling compounds. The Google map of this area supplemented with unstructured interviews at this place revealed three dwelling compounds that continued to grow with time. More dwelling units were added to accommodate other members of the family like uncles, aunts, nephews, grandchildren and others (Figures 9 and 10).

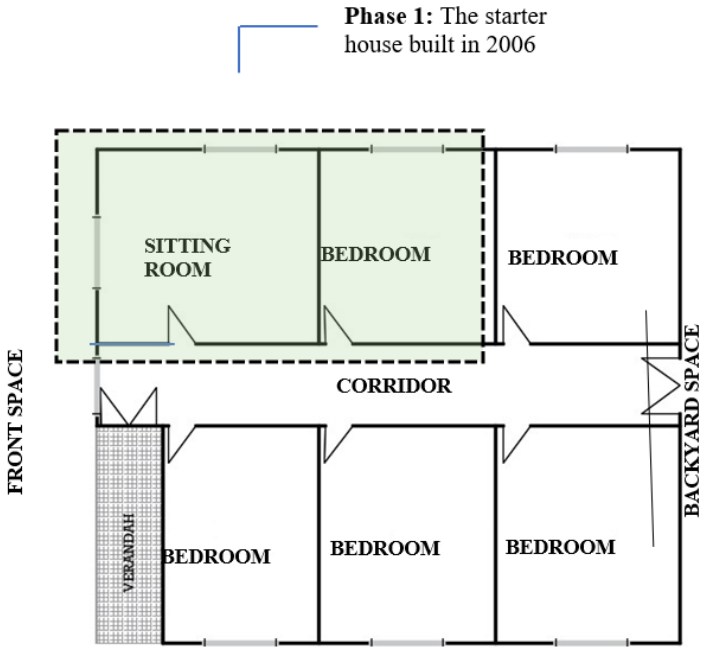

Figure 9. Layout of a Starter House Extended in 2021 (Source: Field observations, 2021)

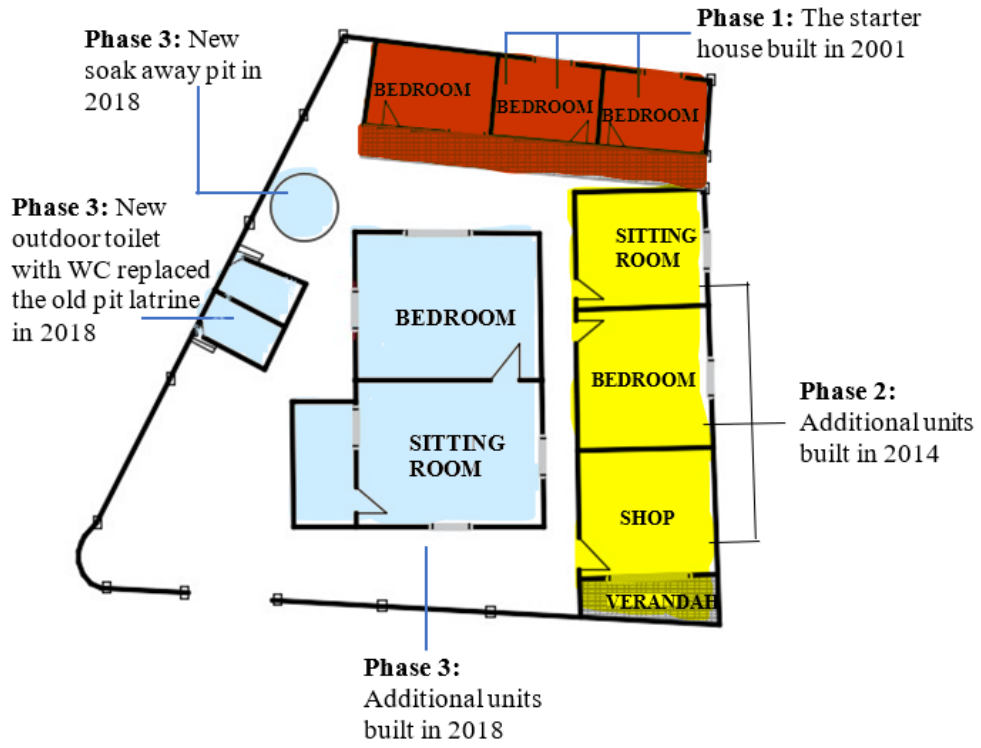

Figure 10. Phased extensions and additions to a residential property in 2021, Mamboleo 'B' (Source: Field observations, 2021)

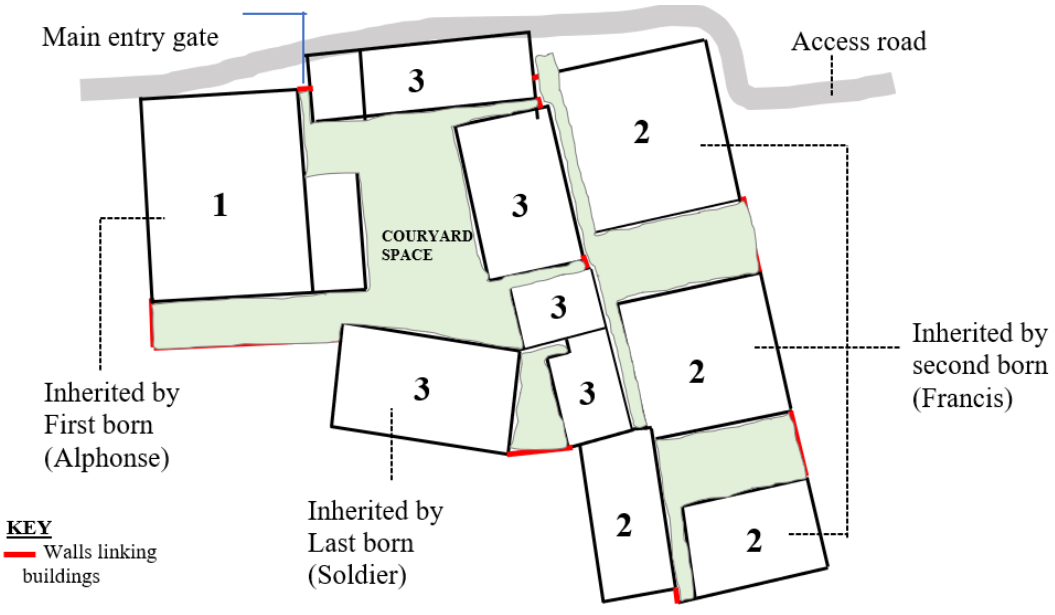

Figure 11. Land distribution map showing inheritance-based parcels in a residential development (Source: Field observations, 2022)

The fifth activity was the disposal of portions of land parcels to bring in more people in a certain area, hence forming housing clusters with dwelling compounds under the ownership of different individuals. Land disposal was done by selling and offering land to some people as an inheritance or a gift. The Google map of this area which was supplemented with unstructured interviews made at this place revealed 3 housing clusters formed by the original landowner selling his land on a piecemeal basis. The first housing cluster emerged after one of the residents offered some portions of his land parcel to his sons as an inheritance. Figure 11 provides a summary of the description given by one of the sons.

The sixth activity was the control of physical access to space. The controls were done by either completely providing access to the public or partially or completely limiting access to the public. Free access took place by leaving the dwelling compounds unfenced (Figures 12-14). Access was provided to the public for the accommodation of temporal activities like paths, performance of religious or political activities and meetings. During the interviews, one dwelling owner revealed that he provided free access to the public to strengthen existing social ties between his family and members of the community. In one interview, a family member mentioned:

> *"Our father warned us against preventing people from passing through our area either by putting up fences or in any other way to respect the need to live 'socially' and please God".*

Figure 12. Free access in a one dwelling compound 2021 in Mamboleo "B" (Source: Field observations, 2021)

During an interview with one of the long-lived residents, it was observed that there are three unbuilt spaces (Figures 15 A-D) which are normally used for the performance of cultural dances. These unbuilt spaces used for public activities are owned by private individuals.

Figure 13. Free access in a multiple dwellings compound without a 'courtyard' 2021 in Mamboleo "B" (Source: Field observations, 2021)

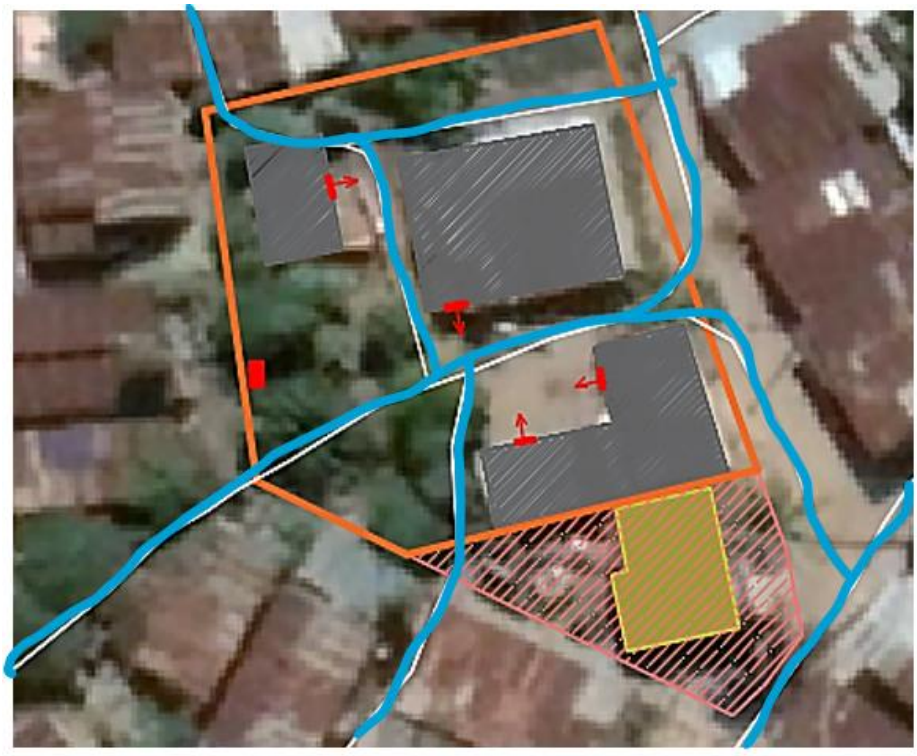

Figure 14. Free access in a multiple dwellings compound with a 'courtyard like space' 2021 in Mamboleo "B" (Source: Field observations, 2021)

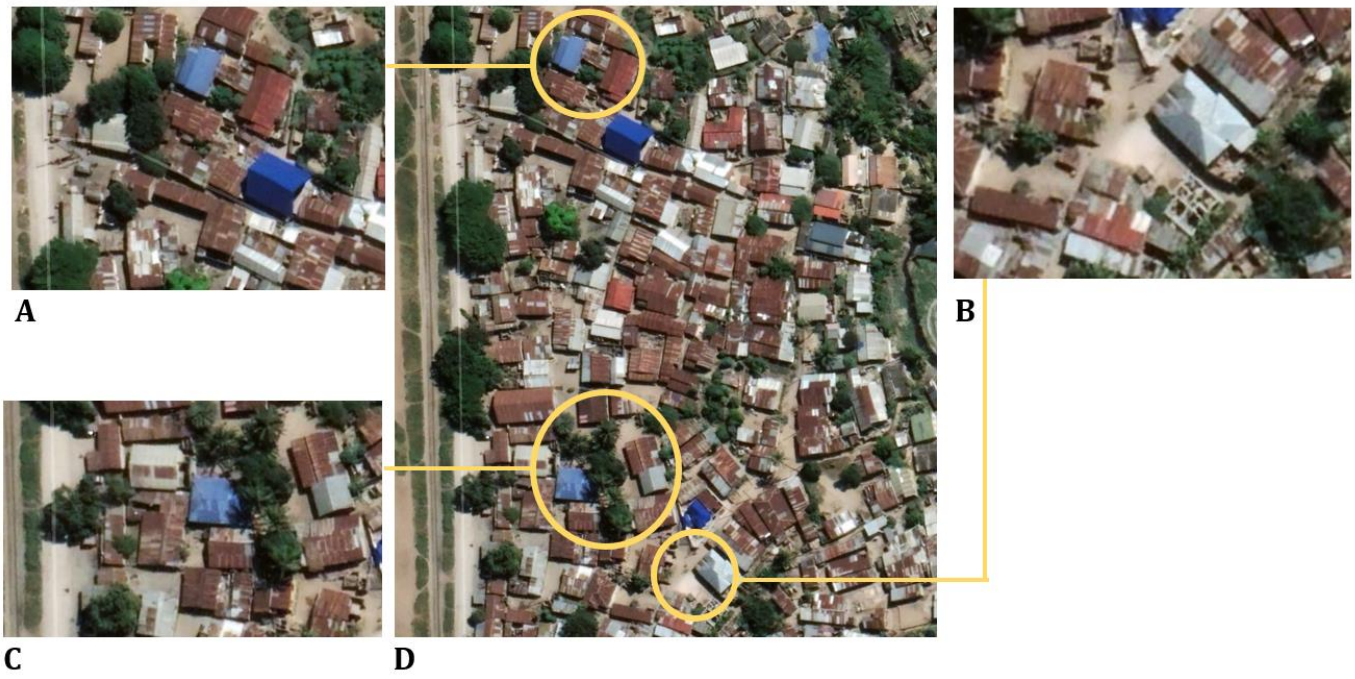

Figure 15-A. Makonde cultural activities like Unyago and Sindimba (Source: Field survey, 2021)

Figure 15-B. Mr Kabumaye's compound is used for the Ngoni cultural dance (Mandilo) (Source: Field survey, 2021)

Figure 15-C. Mr Mjume's dwelling compound space is used for Zaramo cultural activity called Unyago (Source: Field survey, 2021)

Figure 15-D. Part map of Mamboleo "B" area (Source: Google map, 2022)

Figure 16-A. Dwelling compound with multiple accesses (Source: Field observations, 2021)

Figure 16-B. Entry to Happy's father's compound (Source: Field observations, 2021)

Figure 16-C. Dwelling compound with multiple accesses (Source: Field observations, 2021)

Partial access to space is normally done by fencing the dwelling compounds while allowing entry and exit through the gates or putting an operable gate to circulation paths particularly spaces left between buildings. When partial access is provided in dwelling spaces, landowners may allow public activities like religious congregations, cultural activities or paths to have access. Figures 16 A-C show fenced dwelling compounds in which other people are allowed to pass on their way to other places.

This study also observed two segments of circulation corridors that allow partial access (Figures 17 and 19). Access or movement in these circulation parts is controlled by the owners of the adjoining buildings. Figure 18 shows a gate installed jointly by Mr Bushiri and Mr Nangonga to control access and movement to the public. During interviews with Mr Nangonga's daughter together with her mother (Mrs Nangonga), their narrative was as follows:

> *"We decided to instal the gate for security concerns. We shared the cost of construction and operation of the gate with our neighbour (Mr. Bushiri). Mr Bushiri bore the cost of the construction of the gate whereas our father Mr Nangonga took the burden of managing the operation of the gate. Mr Nangonga's son is the one who operates the gate. He opens the gate at 6:00 a.m. and closes it at 10:00 p.m.".*

Limit of access to space was also observed in this area. Limiting access is done by putting a barrier at the entry point of a circulation corridor. The barrier can be a solid wall to link the adjacent buildings (red line segments in Figure 9).

Figure 17. Entry to Happy's father's compound (Source: Field observations, 2021)

Figure 18. Entry to a controlled access at Mr Nangonga's place. Source: Field observations, 2021

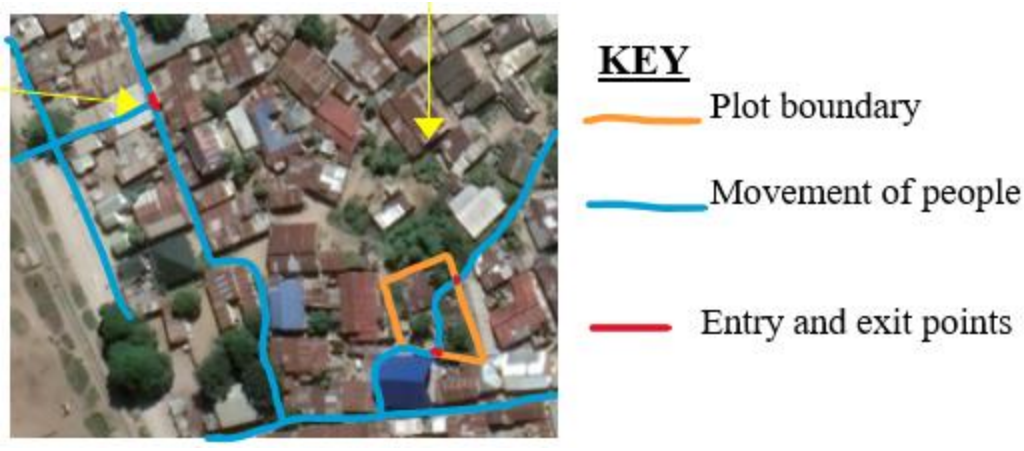

Figure 19. Entry to Happy's father's compound (Source: Field observations, 2021)

The seventh activity was the installation of building services. In this place, there are no government water services. Residents rely mainly on privately managed boreholes and one shallow well with a hand pump constructed by Temeke Municipal Council. The interviews carried out revealed that 23 out of 26 dwelling owners get water from the boreholes. Mamboleo "B" sub-ward has a reliable power supply and the Tanzania Electricity Supplying Company (TANESCO) is the major electricity service provider in this place. However, there are still some houses which are not connected to the service. During an interview with respondents in this area, it was observed that about 22 out of 26 dwellers have connected power to their dwellings.

3.2. The actors involved in each stage of plot development

A variety of players were involved in making the urban forms as there was no restriction on the kind of people involved in carrying out the activities. The interviews with the landowners revealed that the location of plot boundaries when delineating plot boundaries was established by the people who sold them land (land sellers). However, other people, such as the adjoining neighbours and the sub-ward government officials were involved as witnesses in the exercise to avoid conflicts in plot boundaries. It was also revealed during the interviews with the public sector officials that the officials engage in plot demarcation to authenticate the plot boundaries' locations and ownerships. The interviews with the unprofessional private sector practitioners indicated that 9 (69.23%) out of 13 were involved in the plot demarcation activity. Six (6) out of the nine (9) were engaged in solving the plot boundaries' related conflicts, whereas three (3) out of nine (9) were engaged in marking plot boundaries. In creating circulation paths, the key actors involved were the people in need of moving between this and other places. In the construction of new dwellings, the key factors involved depended on the developers' wishes, including financial capabilities and the nature of the house to be built. However, it was observed that plot owners, local masons, material suppliers and local artisans were key players in most of the dwelling construction activities at this place. During interviews with the dwelling owners, it was revealed that 21 (80.77%) out of 26 were engaged in all stages of construction. That is, they prepared drawings and constructed their dwellings by themselves. Other stakeholders acted as mediators of dwelling construction activities in this place. These included: the dwellers, the brokers, formal municipal authority officials and practitioners like the architects and planners who were also involved in some cases. These mediators advise developers on aspects such as the means of reducing construction costs, and spatial aspects like building size, shape and choice of construction materials. During the interviews, it was observed that only two (9.52%) out of 26 landowners indicated that they engaged experts in the construction of their dwellings. The actors in the installation of services were mainly seen to involve the dwelling owners, service providers like Dar es Salaam Water and Sanitation Company (DAWASCO) and Tanzania Electricity Supply Company (TANESCO), and the local government officials particularly the sub–ward administration officials like the *Mtaa* Executive Officers (MEO) and the sub – ward chairman. Control of access to space was mainly seen to involve the owners of the unbuilt spaces.

3.3. The motives behind the performance of each stage of plot development

The motives for carrying out the activities of making an urban form differed amongst individual developers. In delineating plot boundaries, land owners aimed at clearly defining the boundaries of their land parcels to avoid plot boundary-related conflicts such as land grabbing. However, some were demarcating plot boundaries to subdivide plots of varying shapes and sizes for sale to generate income. During the subdivision of the plots,

landowners involved their adjoining neighbours and government officials at the sub-ward level as witnesses to avoid potential conflicts relating to plot boundaries in future. The creation of circulation paths was an unplanned activity carried out by the landowners and other people using the circulation paths and the intended goal was to get access to their farms. In the construction of new dwellings, developers at this place built residential houses for the accommodation of their families before engaging in other construction of rental houses. During interviews and observations, it was observed that buildings were originally meant for residential accommodation purposes. In time, the owners of the houses, especially those situated along major circulation paths began to change some of the rooms to accommodate business activities such as shops to cater for the rising economic needs. Installation of services and control of access to places were mainly meant to maintain security. During interviews with Mr Nangonga's daughter together with her mother (Mrs Nangonga), they revealed that they decided to install the gate for security reasons to control petty theft.

3.4. The tools used in performing the urban form-making activities

To facilitate the activity of urban form-making, various tools were involved in carrying out plot development. During the delineation of plot boundaries, the landowners needed time, land to be subdivided, ideas, and physical objects for marking the boundary lines. Physical observation revealed that physical objects like second-hand tyres, poles, hedges and foundation walls were the tools used to mark plot boundaries. In some densely built-up parts where the boundaries are less obvious, an imaginary middle line running between the eaves of houses served as plot boundaries. In the creation of circulation paths, hand tools like hoes, and slashers were used. In carrying out the dwelling construction activity the actors required finances, land, and construction ideas. It was observed that developers obtained funds for construction from a variety of sources such as petty trading and loans from relatives and friends. During construction, clients needed a piece of land, finances and building materials. The land may be with or without a formal title. During interviews, it was observed that none of the residents had a formal title to their land.

Table 2. Number of developers using construction drawings in Mamboleo "B"

	Number of responses	**Percentage of responses**
1: Drawings prepared by the developer	2	7.69%
2: No drawings were engaged	19	73.08%
3: Drawings prepared by Local masons	3	11.54%
4: Drawings prepared by Architects	2	7.69%
Total	26	100%

The quality and quantity of construction materials also depended on the developers' financial ability. There were no restrictions on the quality or standards of building materials used in construction as the case is in the formal areas where building materials need to be of recommended standards. The architectural drawings and experts were involved based on the developers' preferences and financial capabilities while others did not

involve them at all. In the latter case, dwelling construction takes place with or without any pre-conceived. There were also no restrictions on engaging technical experts in this place. The landowner may decide to hire or not hire an expert to prepare his/her drawings before commencing the actual construction activity on site and even supervise his/her construction. In the latter stages, the owner may do the construction work himself or with the help of other people like local masons or family members. During interviews, it was observed that 68.85% of the land owners (Table 2) didn't use plans or drawings from experts, instead, the design of the building emerged during construction.

3.5. The rules employed in performing the urban form-making activities

The activities of making an urban form were generally governed by informal norms and less formal regulations or controls as the case is in the formal traditions of production of space. For example, land disposal activity was observed to take place on a piecemeal basis. The interviews with the dwelling owners disclosed that all of them bought their land parcels from individuals who sold some portions of their land parcels to them. It was observed that dwelling construction takes place in an incremental fashion. The interviews revealed that 19 (73%) out of 26 of the owners constructed their dwellings in an incremental fashion. However, it was observed that in one case construction took place spontaneously. During interviews with the owner of the plot, she said that her neighbour requested her to allow him to erect a temporary kiosk for business activities with the agreement that he would demolish it whenever the owner needed the piece of land. However, contrary to their unwritten agreement the neighbour constructed a permanent shelter instead of the temporary kiosk as per agreement. The construction of this kiosk took place within a single day. This signals the evil intention of land grabbing.

3.6. The distribution of labour amongst the actors performing the urban form-making activities

The construction activity was carried out by the developers and the local craftsmen. Such a situation is dictated by the developers' financial capability. This also depended on the nature of activities since they were not restricted by the formal traditions of the production of space where the duties and responsibilities of the skilled labour are stipulated within their contracts and regulations of engagement. Thus, any actor could assume a duty based on his capabilities and in agreement with the client and the local craftsmen. For example, interviews with local masons revealed that two (2) out of 12 masons, prepared building drawings for their clients among other duties. Dwelling owners played a crucial role in providing resources such as funds and materials to facilitate the activity. Local masons carried out the actual construction on site with the assistance of unskilled labourers though not all developers engaged the local masons. Generally, the activities which needed skills were normally left to specific skilled people whereas other activities which did not need skills were left to the unskilled labourers.

4. Discussion of results

The results revealed that the informal process of creating a socioeconomic resilient urban form comprises alternative values and activities for adapting the socio-economic systems in transforming space through multiple pathways apart from the formal traditions of production of urban form as noted by Davidson (2010). The flexibility of activities gives the developers the freedom to engage in a variety of activities to achieve their

needs, interests and preferences. This supports the view that informality and resilience have common features related to solutions and survival strategies. The activities of urban form-making through the dwelling owners' freedom to apply affordable means to renovate, convert, adjust, extend or retrofit their buildings, plots and circulation spaces is the evidence that the urban form provided the opportunity to efficiently react to changing socio-economic needs and hence heighten its physical resilience. This responds to Feliciotti's (2018) assertion that components of urban form geometry can influence how places can preserve unique identities, adapt to new needs and innovate. The study indicates that new activities could be added to the existing ones whenever needs arise. For example, the landowners could alter their plans to develop land parcels and opt to sell some of their land portions to solve financial challenges. The freedom to manipulate space was mainly facilitated by the absence of restrictive formal rules which could have limited the flexibility of production and utilisation of spaces and thus jeopardise the achievement of resilience in the urban form. A certain level of freedom of access to space allowed various social and economic activities to take place in the unbuilt spaces as long as permission was directly or indirectly given by the owners. Dwelling owners were also capable of engaging any actor in the construction activities without regard to the formal and restrictive requirements and could streamline the informal building process in terms of time, cost, quality and culture. As noted by Sharifi (2018), these practices reflect resilient urban forms as they result from a system nested in a network of interconnected spatial and socio-ecological systems characterised by socio-economic and environmental conditions whose elements are constantly changing. Further, the involvement of actors of varying interests in access to land parcels, formation of plots of varying sizes and shapes, construction of buildings of varying functions and flexibility in changing house functions between residential and commercial to accommodate economic challenges reflect the achievement of urban resilience in the economic and social dimension as noted by Smith et al. (2013). Diverse avenues of informal land ownership offer extensive access to unbuilt spaces for public use including socio-economic activities such as open markets and cultural performances which contribute to the preservation of the community's cultural heritage, hence strengthening the social resilience. The control of physical access enabled the urban form to be manipulated in response to changing levels of spatial access from public, and semi-public to private use. This further control of physical access enabled the dweller to enhance the security of the area with time and hence improve its accessibility, spatial and safety systems which satisfy urban resilience in all social, economic and environmental dimensions as noted by Smith et al. (2013).

The tools and the rules employed in performing the activities, the division of labour, subdivision and supply of pieces of land, the stability of land ownership without formal title, the relaxed rules for construction of dwellings and laxity in choice of technology contributed to making the urban form resilient. Further, the user-based determination of materials and building standards which appeared to encourage innovation amongst developers and allowed users to maintain their satisfaction based on their evolving needs are some of the factors which made the built environment easily adapted by their users and thus reduced the physical, environmental, social and economic shocks as noted by Smith et al (2013) and Altun and Tezer (2019) characteristics which are key to their survival.

Generally, the study revealed that the informal system determined the actors' activities in urban form-making in incremental approach, spatial configuration and the nature of land use. The dwelling owners are mainly involved in the distribution of spatial activities, and the engagement of professionals, nonprofessionals, craftsmen and government officials at the plot level whereas more actors may be engaged at a cluster, block, neighbourhood and urban level. The distribution of labour creates a hierarchy which balances the private, semi-public and public spatial requirements which determines the level of resilience in the urban form. The motive

behind the practices in transforming the urban space appears to be central to the dwelling owners while accommodating the spatial requirements and catering for the semi-public and public urban space. The tools utilized included time, land, ideas and physical objects which were shared among the actors. Informal rules and values allowed the dwellers to adopt relevant methods and strategies for land access, subdivision, ownership, development, and use and as such ensure resilience of the urban form commensurate to the socio-economic conditions.

This study faced some limitations specifically when collecting information from the case site. The first challenge was obtaining permission to conduct research from Temeke municipalities. The process took a lot of time and slowed down the work, so after receiving the permission we had to do the work intensively. Secondly, scheduling interviews with some residents required lengthy follow-ups due to their busy schedules; some interviews had to be conducted late when people returned from work. Thirdly, during the empirical investigation at Mamboleo "B", some residents, particularly those residing along the TAZARA railway, were in a land ownership dispute with the TAZARA administration. Obtaining their land ownership documents was too difficult and took time because the documents were personal and were linked to the TAZARA conflict that was going on during that time. An attempt was thus made to convince the respondents that the researchers were in no way connected to the TAZARA authorities. This means that only a few sample ownership documents were available. The fourth challenge arose from the choice of language for communication with some respondents, particularly the residents of this area. Swahili was the only language common to most people, so the questionnaires and responses, especially from individual homeowners and non-professional participants such as the individual dwelling owners, local masons, and property brokers, were to be translated into Swahili. Thus, more time had to be allocated to translate the questionnaires from English to Swahili and then responses from Swahili back to English before they were uploaded into Nvivo 12 data analysis software.

5. Conclusion

The study of Mamboleo B entails that the activities of acquisition, control of access, transformation, installation of services and shaping of plots are key to an informal making of socio-economic resilience in an urban form. The variety of informal activities among different actors allowed them to engage in diverse avenues to deal with differing economic and other socio-economic challenges relevant to a resilient urban form. In this way, the bottom-up approach becomes the adopted option in the socio-spatial systems for shaping urban space. The informal making of resilient urban forms was characterised by the conceived freedom of actors to take necessary action to control, shape, use, develop and transform the land parcel. Informal rules and norms guided the land rights, sharing of space use, negotiations in shaping urban spaces and incremental system of urban development. Formal attempts by the responsible authorities to guide development were seen to lack the capacity to deal with the informal process of production of space and failed to exploit the dynamics associated with the informal system and turn the perceived informal uncertainties into a relatively positive course of action. This anomaly is attributed to the failure to grasp the lessons from actors, activities, rules, tools and division of labour applied in the whole process of informal making of the socio-economic resilient urban form. Socio-economic resilient urban forms are of much value in urban design due to the inherent support of the socio-economic conditions of dwellers. Thus, it is unwise to leave them unguided since the settlements may be disrupted and eventually become chaotic. The informal attributes contributed by this study can be utilised to inform and strengthen the formal prescriptions to provide a certain amount of harmony and necessary order

and hence achieve an enhanced resilient urban form. While this study has primarily focused on the informal system of production of resilient urban forms, it may be taken as a relevant example for extracting lessons to complement the formal rules, regulations and standards in creating the formal socio-economic resilient urban forms. Thus, the study results may be used to inform the formal traditions of production and management of processes of production of urban forms. Based on the findings and observations, this study suggests some recommendations or practical steps that can be taken to harness informality for resilience as follows:

1) Urban planners and policymakers could shift their perspective of informality from viewing it as a problem to be eradicated, to recognizing it as a potential in creating resilient spaces. They should embrace and capitalize on the opportunities presented by informality and its associated processes of production of space. The professionals must also recognize that not all urban residents can afford formal planning tools such as urban planning regulations, laws, and spatial development control guidelines. Therefore, they should create new accessible spatial development tools for both those who can and those who cannot afford them. These tools could be a combination of formal and informal methods that allow developers to connect with the actors they need according to their needs, interests, and preferences. This enables them to maintain the quality of processes and create spaces without hindrance. The potential actors could involve individuals who are not part of the formal system, such as local masons, brokers, and other unskilled labourers. As an illustration, they could permit the local masons to create basic designs for their customers in informal settlements. The examination of the plans may be completed at the sub-ward level, and specialists might be made accessible on occasion. The land and property brokers could also be permitted to help resolve disputes regarding plot boundaries and dwelling occupation.
2) To make urban forms more adaptable to change, planners and politicians should adopt adaptive techniques that influence the conditions under which urban areas alter, instead of specifying a particular configuration. This suggestion corroborates Rauws, (2017) who suggested that, on offering a general framework for urban transformation without defining a particular future configuration of actors relations to generate possibility spaces that allow an area to respond to and profit from a range of possible directions of development. He further argues that this approach will also open up development frameworks for the 'unplanned', spontaneous ways in which cities and neighbourhoods adjust to and co-evolve with changes at various levels of society such as Technological innovations, grassroots movements or demographic trends. In this regard, the hybrid tools to be developed by the urban planners and designers, need to embrace some of the positive informal rules of production of space that are normally characterised by the dynamic qualities of informality such as the negotiations, sharing, variations, incrementalism, spontaneity, and adaptability in performing the space production activities. The tools could somehow give room to landowners to use their land parcels as economic assets to serve them whenever the needs arise; ease the transfer of land rights, give room to sharing of space utilisations, carry out negotiations during land transactions instead of fixing land prices; and allow variations and free use of spaces, non - timely incremental, spontaneous, and adaptive dwelling construction activities - as these offer life – support to dwellers of informal areas.
3) To make urban forms more responsive to change, urban planners and policymakers could use adaptive approaches to planning that focus on influencing the changing conditions of urban areas rather than defining a specific desired form. This suggestion corroborates Rauws, (2017) who suggested that, on offering a general framework for urban transformation without defining a particular future configuration

of actors relations to generate possibility spaces that allow an area to respond to and profit from a range of possible directions of development. He further argues that this approach will also open up development frameworks for the 'unplanned', spontaneous ways in which cities and neighbourhoods adjust to and co-evolve with changes at various levels of society such as Technological innovations, grassroots movements or demographic trends. The hybrid tools developed by the urban planners and policymakers could adopt some positive informal rules of space production, characterized by the dynamic characteristics of informality like negotiations, sharing, variations, spontaneity and adaptability. The tools could also somehow give the landowners a room to use their land parcels as economic assets, to serve them whenever economic needs arise. Further, the tools could facilitate the transfer of land rights, provide space for sharing land, negotiations during land transactions instead of agreeing on land prices, variations, free use of premises and early spontaneous and adaptive housing construction as they offer life support to residents of informal areas.

4) Urban planners and policymakers could also think of devising or adopting adaptive planning and design tools like the continuum land tenure systems and the community land trusts (CLTs) which have greater power to protect the interests of residents against the negative impacts of formalisations and the rise in land values such as the outright gentrification, risks of evictions and rise of living standards. They could also allow the use of a variety of building construction materials, technologies and styles affordable to the majority of the local population living in such areas instead of proposing materials of quality and standards the dwellers can't afford. The tools could also harmoniously allow an actor to perform others' duties so long they are capable. For example, they could allow local masons to prepare simple house plans for their clients in informal areas. Checking of such plans could end at the sub–ward level where experts could be made available occasionally. The land and property brokers could be engaged in solving the conflicts relating to plot boundaries and dwelling occupations respectively. Further, Urban planners and policymakers need to be aware of the changing goals of owning a piece of land and constructing a dwelling in informal urban areas. They need to offer room to landowners to use their land parcels and dwelling units as economic assets, convenient piecemeal land subdivisions and selling of land and the change of use of buildings to accommodate new functions the dwelling owners wish. The Urban planners and policymakers could in collaboration with other stakeholders like professional bodies such as the Architects and Quantity Surveyors' Registration Board (AQRB), Contractors' Registration Board (CRB), and Engineers' Registration Board (ERB) devise a mechanism for intervening in the informal practices and spaces without jeopardising their resilience. For example, due to most residential dwelling structures in these areas being simple, they could recognise and a bit lower the qualifications of professionals eligible to practice in such environments. Instead of using a registered architect, they could register for example the professionals with vocational education certificates and allow them to practice in such areas. Aspects like the project registration and consultancy fees could also be lowered to offer a room to people in such areas to afford them.

5) The other spatial professions particularly the Architects, should intensively use their design and construction expertise and abilities to engage with the dynamic processes and spaces to produce resilient spaces or built environments that allow their users to maintain their satisfaction by changing their physical characteristics according to their evolving needs. The professionals in association with Urban planners and policymakers could create a model of harnessing the positive aspects of informality in enhancing the resilience of urban forms.

Policies like these may be adopted from countries with informal processes governed by dynamic structures similar to those guiding the local urban transformation processes. To produce and manage socio-economic resilient urban forms successfully, detailed studies on proper ways of adapting some of the structures, norms, values and rules involved in the informal process of making the socio-economic resilient urban forms have to be done appropriately. Further studies are needed to be able to generalize a policy framework of making the socio-economic resilient urban forms in other countries with similar characteristics like those of Mamboleo B in Tanzania.

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