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Relationships between Design and Adaptive Capacities in Informal Settlements: the Reconstruction of the Toi Market in Kibera (Nairobi)

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Abstract

Design and urban development studies typically explore the challenges of - and opportunities for - spatial transformation in informal settlements. Yet, critical aspects of this transformation, such as adaptation and effective adaptive capacities are most often addressed through other bodies of knowledge, generally linked to climate change and resilience. Therefore, an important knowledge gap still exists regarding the relationships between design (individual or collective deliberate transformation of space) and adaptation in informal settlements, where various socio-economic and environmental stressors, deprivations, and small-scale disasters represent ‘normal’ living conditions. In response, this study aims at bridging this gap and analyses the current and potential role that design plays in enhancing adaptive capacities in slums. Based on a conceptual framework that includes Norris’ (2008) model of adaptive capacities, and Simon’s (1996) and Rapoport’s (2003) approaches to design, this research draws results from 30 interviews with community leaders and 20 semi-directed interviews with members of the Toi market in Nairobi, as well as mapping techniques. Findings show that the interaction between design and the development of adaptive capacities creates a positive-feedback process that reinforces both. This has conceptual and practical implications: from a theoretical viewpoint, these results bridge a gap between the two bodies of knowledge; from the practical viewpoint, they highlight the importance of design in slums’ adaptive processes, thus providing new tools that may lead architects and urban planners to adequate plan interventions in these contexts.

Keywords: Adaptation, Adaptive Capacity, Design, Informal Settlements.

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Introduction

Informal settlements are mainly known for their inhabitants' conditions of poverty and vulnerability to: evictions and demolitions, social conflicts, crime and violence, pollution and disasters. In fact, lack of access to security of tenure, education, infrastructure and services exasperates social marginalization, and undermine people's survival, freedom (Sen, 1999) and opportunities for development (Sachs, 2005; Sen, 1999). Yet, robust local networks, and creative, organizational capabilities allow for survival capacity, progressive consolidation and gradual improvement in most slums (Pamoja Trust, 2008; The Economist, 2012; Weru, 2004). Even though literature about slums' spatial organization is copious, there still insufficient empirical and theoretical knowledge about informal processes of consolidation and upgrading (Dovey and King, 2011). This knowledge gap is considered among the main causes of poor urban policies (Arefi, 2011; Elsheshtawy, 2011; Samper, 2012) that still encourage slum demolitions and fail to reduce their spread. Little is still known about *how* slum dwellers undertake processes of design (that is, individual and collective deliberate practices of spatial organization) in relation to adaptive responses. Therefore, our study integrates design and adaptation theories to investigate the case of the reconstruction of the Toi market in Nairobi. It is structured around a theoretical and an empirical question: 1) What are the potential links between adaptation and design theories in the context of informal urbanism? 2) What processes and mechanisms of design and adaptation were undertaken by individuals and groups for the reconstruction of the Toi market?

Adaptation, Design and Informal Settlements

Even though both design and adaptation explain the complex relationships between humans and their environment, they typically represent two separated bodies of literature. On the one hand, adaptive capacities within the resilience and climate change literature typically refer to the ability to undertake adaptation measures to reduce vulnerabilities in the face of climate threats and other unexpected hazards. Similarly, adaptation is widely used in the Built Environment field to analyse post-disaster reconstruction strategies and solutions. In fact, informal settlements are commonly regarded under the lens of vulnerability (Khosla, 2013; UNHSP, 2007), conceptualized as the combination of exposure to external stresses and sensitivity to them (Gallopín, 2006), mainly determined by poverty (UNHSP, 2007). These approaches, however, often overlook that self-organising dynamics of adaptation in informal settlements serve other purposes too (Ensor et al., 2014) - we will get back to this argument later. On the other hand, even though design is seen as a tool to improve living conditions in vulnerable contexts (UNHSP, 2007), it is often considered as a technical process enhanced by public policies and conducted by professionals.

In order to bridge the gap between these two bodies of literature, we adopt Norris's (2008) definition of adaptive capacities and the theory of design. For Norris, community resilience is a positive trajectory connecting four sets of network capacities to adaptation: economic development; social capital; information and communication; and community competence. Adaptive capacities are thus resources with dynamic attributes represented in terms of functioning levels. Community adaptation is typically assessed through population psycho-



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pathological well-being: mental and behavioural health, functioning, and quality of life. Norris' model aims at integrating physical and social resilience by also considering effective organizational responses. More recently, Fayazi and Lizarralde (2013) have emphasized this integration and propose an adaptive capacity framework which incorporates three additional dimensions: the Natural Environment, the Built Environment, and Governance.

Since the 1960s, design is seen as a deliberate process of transformation that results from a natural inclination to adapt our immediate environment (Simon, 1996). Simon regards it under the problem-solving paradigm in which decision-making, organization, and action, are constrained by our cognitive capacities (or 'bounded rationality'). Contrary to "natural sciences", design, is an "artificial action" that relates functions, goals and adaptation. Simon also emphasises the importance of aspiration levels: our bounded rationality allows us only to make decisions in a world of constraints, and thus, designers must accept achieving 'satisficing' (his term) results. Satisfaction can therefore be evaluated by confronting aspiration levels with actual levels achieved (Simon, 1996, p. 30). However, according to Hatchuel (2001), creativity and social interaction also play a critical role allowing to shift from the problem-solving paradigm to the design paradigm and to emphasize the collective dimension of decision-making and action to attain a goal. Finally, from an anthropological perspective, Rapoport sees the design of human settlements as the result of 'an order depending on local cultures'. In this view, design is a process relating individuals, the built environment and settings of activities. The built environment is better understood by analysing the characteristics of individuals and social groups and the mechanisms of mutual interaction between them and the environment - including cognition, meaning, affection, evaluation and action (Rapoport, 2003). For Rapoport "function" can be understood in four forms: the function itself; how it is carried on; the system of activities linked to the main function and the latent function (or meaning) that is culture specific. This last concept suggests links with Simon's concept of aspiration levels that Colman (Colman, 2015) sees as a target for future achievement based on hopes, desires, and ambition.

Seen through the lenses of these concepts, slum dwellers are 'designers'. They continuously conduct, collectively and individually, decision making processes and organization, gradually transforming their settlements' physical space to adapt to different constraints and respond to their own aspirations.

Research Methods

The previous concepts provide us with a theoretical framework useful to analyse the results of a fieldwork conducted in May 2011 in the Toi market in Nairobi - and ultimately to answer our research questions. Thus, spatial organization at the individual and collective level is analysed through the lens of adaptive responses to risks and adverse events within the constraints that "bound" decision-making and action. They are confronted with the dimensions of function and aspiration levels. More specifically, the fieldwork aimed at understanding the Toi market's transformation over the years, notably, the reconstruction conducted in 2008, as well as the role

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of design according to local traders' perceptions and aspirations. Information was collected through twenty semi-structured interviews with vendors and leaders, several informal conversations with market leaders, observation, mapping techniques, and drawings of the market and its stalls. In total, 31 commercial activities located in different sections were mapped. Interviews targeted representatives of different groups, an equal number of men and women, and new and established activities. A comparison of the market's layout before and after the reconstruction aimed at understanding changes in spatial organization. The 'old market' was documented during previous fieldworks conducted in 2004, 2007, and 2008.

Results

The Toi market is an important informal marketplace in Nairobi, formed in the early 1980s through the unauthorized occupation of a 3.5 hectares publicly owned piece of land. It includes about 2,400 stalls built without permits, thousands of unlicensed businesses, and various community services. The results validated that adaptation in the Toi market responds to day-to-day stressors caused by poverty, fragile and unsafe structures, negotiations with local authorities for legalization, environmental pollution, and lack of tenure, infrastructure and services. Additional sudden stressors such as evictions and demolitions, floods, winds and fires periodically destroy the structures. A fire caused by the 2008 post-election conflict totally destroyed the market, affecting more than 2,000 businesses. Since then, the space has been continuously transformed through adaptation mechanisms that respond to economic, social, political, environmental and cultural needs and aspirations. The 2008 reconstruction was carried on through a design process conducted by a team of market members with sporadic support by an architect provided by Jami Bora, a Kenyan Community Based Organization (upon request of the market committee). Jami Bora -that intervened only in the aftermath of the destruction - also provided construction materials, mainly wood and iron sheets, while the construction was conducted by market members. The results reveal relations between design and adaptation practices under six distinctive dimensions: community competences, built environment, economic development, social capital, information and communication, and aspiration levels.

Design, Adaptation and Community Competences: Evictions in the Toi market started soon in the 1980. In response, traders formed self-help groups to advocate for their rights' recognition. A market committee was also established to carry on decision-making processes to negotiate with local authorities and improve the market area. In 2007, a redevelopment project for the market was proposed by an Italian no-profit association, with the aim of obtaining international funds. The market committee hence established a planning team that included some members of the committee, and members of Muungano group (slum dwellers Kenyan federation in Toi market). This team undertook a survey and mapping of the market stalls. This was fundamental to integrate all the existing businesses and avoid exclusions and social conflicts. An architect of the association guided the survey, and later organized for the committee a visit to a formal market in Nairobi, in order to better understand its spatial organization. The 2008 fire destroyed the survey and mapping documents and the redevelopment project had to be put aside. Nevertheless, the



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vendors looked at the disaster as “an opportunity to change and make a better market” and decided to rebuild the market by planning a new layout. Jami Bora provided a technician that drew the plans according to the ideas and principles proposed by the planning team. Finally, a task force that included the planning team and members of other groups, was mandated to plan, oversee construction, achieve reconciliation and avoid conflicts (G. Okwaro, 2011, interview). The planning team developed specific competences through design and planning and adopted adaptation measures. For instance, they adopted principles of distribution used in formal markets, and accommodated existing businesses by adapting to spatial constraints such as the market inextensible boundaries. The team also decided about pathways’ dimensions to allow the moving of handcarts and people in all sections. Economic and spatial constraints determined the types of stall modules. During the process boundaries and activities were surveyed. Eventually pathways’ dimensions were standardised into two types. Later on, during meetings held to discuss the project, it was observed that people who normally did not participate (notably women) got attracted by models and drawings and engaged in discussions; design activities also kept unemployed men occupied. Design and reconstruction processes enhanced community competences in terms of awareness, decision-making and collective action. Moreover, they strengthened the advocacy process for market legalisation by the Parliament, thus contributing to a collective vision for the market future.

Design and the Built Environment: The reconstruction profoundly changed the market structure; an orthogonal layout substituted the previous dense agglomeration of irregular stalls (figs. 1, 2). The new configuration adapted to two spatial constraints, the existing six accesses and two main axes of distribution North-South and East-West. It also had to maintain the main public spaces, the wholesale area and a space for community meeting, and had to avoid conflicts of interest over those areas among groups. Moreover, vendors had to adapt to new locations within the area, to adapt to new distribution needs (clothes, vegetables, metal works) and to requirements from new members. For example, new food kiosks were included inside the sections (they were previously located in the periphery). Some traders lost their stalls during reconstruction and had to adapt becoming hawkers in the market.

The design process also had to meet specific groups’ needs, in order to reach consensus and participation. The groups of Women and the Youths, for instance, obtained a space for holding meeting and activities. The new stalls for sales are rectangular modules of 2x2 and 3x2 metres; and modules of 10x12 metres are used as food kiosks. Sections are distributed in rows and the pathways’ dimensions permit handcarts’ and people’s transit. The new market is better ventilated and most stalls receive natural light. Five public light poles have been installed along the major pathways, increasing security and deterring vandalism. According to one of the interviewees : “the new market is better, before you could not even identify sections and stalls, now there is a proper planning for the roads, and security has improved”. However, another one says: “the first market was congested but accommodated more traders”. Now traders have to adapt to a stricter regulation concerning the use of the spaces. Many traders believe that these



new measures enhance visibility and accessibility while strengthening the governance power and organization.



Figures 1a, b: Toi market before and after the reconstruction.



Figures 2a, b: Toi market before and after the reconstruction.

Design and Economic Development: The market started with a small group of traders selling vegetables. Today, it provides a tremendous variety of wholesale and retail goods and services. During reconstruction, accommodating several different functions became necessary to attract clients, guarantee income and maintain affordable products. Design also had to consider the limited economic resources, while achieving increased accessibility to allow for goods and clients to reach all of the sections. Thus, adaptation was required to transform physical conditions and create additional opportunities, while keeping economic priorities. Incorporating modular stalls allowed vendors to extend their businesses or include a second source of income. Moreover, through design, vendors personalized their stalls and incorporated roof extensions to protect products and clients, increasing selling opportunities (see figs. 3 and 4). Many of them also used



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stands of various heights to accommodate different goods. One of the vendors said: “projects help generate future income [...]; for instance, traders must pay night security to avoid stall occupation and protect their stocks, there are not gates in the market, and stalls have neither partition walls nor doors; a good design thus reduces security expenses”. He added: “it is important to have a good design that can increase profitability”.

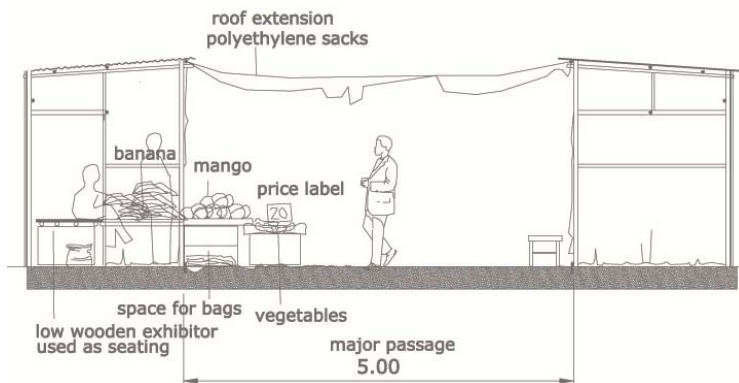


Figure 3. Roof extensions and public ways occupation by stands; Figure 4. Different spaces to stock goods.

Design and Information and Communication: Information and communication played a significant role due to the sense of community and of place enhanced by the reconstruction design process. Information flows adapted to the governance structures that determine differences in power and control. Governance is largely dominated by two major groups, the Toi Market Committee, and the Toi Market Slum Dwellers Federation (plus two smaller groups the “Young” and “Women” groups). After several discussions between these groups the Women got only a small plot to build a meeting hall, while the Toi market committee rebuilt its office in a two storey, stronger structure. This group is in charge of negotiations with local authorities and has established a strong control over the market physical and social structure. Its power has been significantly strengthened by the reconstruction process. Since reconstruction occurred in the aftermath of ethnic violence, many traders that had to leave the area during the crisis remained isolated and could not participate in the stalls’ redistribution, losing a good position in the market. Others lost their stalls and had to adapt to go back to Toi market as hawkers.

Design and Social Capital: The traders belong to various tribes and form a heterogeneous population. Collective design, while proposing spatial arrangements that met different interests and needs, strengthened the sense of place attachment and sense of community. According to one of the traders; “a (design) project is when different people, a group of people, or the society as a whole, is doing something as a common interest, it has a positive effect to the owners of the project and the entire community. A project is very important. If you do not implement it when it comes to your mind it can be done in the future. It gives a moral thinking that you have to work

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on something as a community for future implementation”. Another respondent said: “Projects bring people together, help people discuss and discourage single initiatives; it is a source of interaction”, though “it is not easy, technicians have to assist to explain drawings”. Moreover, the majority of interviewees identified themselves as “Toi market vendors” rather than by tribe. The public lighting system that has been included in the new market has also improved safety condition, especially for women. One added: “security in the market area is done by Masai guards, paid by the market committee. If stalls have a good design with partition walls and doors we won’t pay security”.

Design and Aspiration levels: Design plays a role in enhancing the idea of a better future that guides people in keeping hope and working for a change. One of the respondents explains: “I think about the future, we have hopes in the future, we look for a modernized market, recognized by the government [with] nice infrastructure, nice buildings, [good] security; a market important for Nairobi and the region. We now get customers from Uganda and Tanzania; we hope to be the most important market”. This aspiration for a ‘modern’ market was expressed by many other interviewees and enhanced the reconstruction design process promoting collective action. But if design represents an opportunity for building upon collective aspirations, it is also seen as a tool for promoting individuals’ motivation and organizational capacities, as another respondent said: “Projects motivate people; long-term projects are more important, they give you time to pay back the loan and organize yourself”; in addition design is recognized as a way for boosting negotiation processes “[we want] a permanent market that has all basic needs provided: cleaning by the Nairobi City Council, security of tenure, and no evictions. We want to be recognized [because] people do not invest in the business for fear of eviction. The design for development is positive, the negotiation go ahead”.

Conclusions

Design and adaptation were analysed in the Toi market according to decision-making and actions of physical transformation in the face of exceptional stressors. Members’ perception of design and aspirations for the future were revealed. Relations between design and adaptation were found in six dimensions that emphasize cultural aspects. Adaptation responses influenced the design process and vice-versa. Design for reconstruction was seen as an opportunity to change an old, overcrowded system. It promoted a sense of community and sense of place, improved security, accessibility and visibility conditions. This study also brings out the actual and potential role of design in adaptation processes, in terms of increasing income opportunities, solving social conflicts, building knowledge and awareness and responding to aspirations at the individual and collective level. Yet, the Toi market community still lives in poor environmental conditions because of lack of resources and political neglect. When seen as an adaptation strategy, design is critical to empower slum dwellers at multiple levels. Proper design tools and methods that incorporate adaptive capacities recall attention and build awareness, promote inclusion and communication, help determine common objectives, help respond to aspirations and create a common vision of the future that, together, can boost real change.



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Author's Biography



Georgia Cardosi is a Ph.D. candidate and research assistant affiliated with the IF Research Group at the Université de Montréal. She has been research assistant at La Sapienza University Faculty of Architecture and has been working as architect in Italy. She has achieved two Masters diplomas of Architecture at Polytechnic of Milan and McGill University, developing project research about and fieldworks in Nairobi's slums. She has worked as a volunteer architect in the Toi market, carrying out various project activities with the community. Her research concerns urban informality and processes of spatial organization, adaptation and development in slums. Ultimately, she aims at understanding what the role of design is in the face of contemporary urban challenges.



Mahmood Fayazi is a Ph.D. candidate affiliated with the IF Research Group at Université de Montréal's School of Architecture. He has solid experience in research, implementation and management of post-disaster reconstruction projects. He has been involved in important projects after earthquakes in Iran including: Bam, 2003; Zarand, 2004; Lorestan, 2005; and Semnan, 2009. He also worked from 2008 to 2012 at the Research Department of the Housing Foundation Organisation, responsible for providing affordable houses for low-income families and survivors after disasters. He has a Master's Degree from the University of Shahid Beheshti and has taught at the University of Azad and Tehran in Iran.



Gonzalo Lizarralde is Professor at the Université de Montréal. He has extensive experience in consulting for architecture and construction projects and has published important research in the fields of low-cost housing and project management. Dr. Lizarralde has taught at the University of Cape Town (South Africa); McGill University, Université de Montréal, and Universidad Javeriana (Colombia) and has given lectures in universities in Europe, the U.S. and Latin America. Dr. Lizarralde is the director of the IF Research Group (grif) of the Université de Montreal, which promotes studies about planning and development processes related to reconstruction projects.