

Colonial modernism and architectural science: Historic developments in Sub-Saharan Africa

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Abstract: Formal architectural education in sub-Saharan Africa (excluding South Africa), founded at the height of tropical modernism, a link that embedded a scientific approach to architecture as a key part of the new curricula. Over the years, however, engagement with architectural science has all but vanished, little more than basic rules-of-thumb, which has raised concerns in face of growing awareness of the need for ESD in architecture and architectural education. Seeking answers, this paper interrogates the socio-political events following the Second World War than may have contributed to this state of affairs. The contextual realities of tropical modernism, with roots in the less palatable moniker, colonialism modernism, emerges as a key factor in this discourse. While tropical modernism was initially embedded in architectural education, its historic links to colonialism contributed to it, being jettisoned as part of the Africanisation of curricula as part of post-colonial ideological shifts. Being associated with tropical modernism, architectural science was thus relegating to the periphery of architecture programmes, and may partially explain the continued nonchalant attitude toward architectural science today. Any attempt to revisit this engagement naturally has to come to terms with this reality as an important step in engaging with discourse on architectural science education into the future.

Keywords: Colonialism; Tropical Modernism; Architecture Science Education, Africanisation.

1. Introduction

Across East Africa, academics are beginning to query the dearth of architectural science in architectural education (Oyaro, 2011; Olweny, 2013; Kimeu, 2015). While most schools of architecture do include 'Building Science' or 'Environmental Building Science' as part of their teaching repertoire, there is limited evidence of these being incorporated into students' design projects, and eventually into new buildings. How this came to be becomes an intriguing line of investigation, given architectural science as a discipline has strong links to Tropical Modernism and the founding of schools of architecture in sub-Saharan Africa during the 1950s. Investigating the developments surrounding Tropical Modernism, which replaced the less than palatable moniker, 'Colonial Modernism', may reveal some answers to this question. This paper is part of a re-reading of Tropical Modernism through a post-colonial lens, as

initiated by Lagae (2004), Le Roux (2004) and Uduku (2005). Revisiting the origins of Tropical Modernism and architectural education in sub-Saharan Africa, the paper seeks to understand the rise and subsequent demise of architectural science as a key component of architectural education across the region. This presents what (Okoye, 2002, p. 384) termed a “rich dilemma”, when looking at the future direction for architectural science; taking account of the troubling relations embodied within the Tropical Modernist canon (Le Roux, 2004), and could shed light on the absence of architectural science in contemporary architectural discourse across the region.

2. Tropical modernism

Tropical Modernism emerged after the Second World War as a response to “... climate conditions that were ‘uncomfortable’ to expatriate and westernised bodies ...” with architects seeking to devise ways to modulate “... the passage of heat and light between interior and exterior” (Le Roux, 2004, p. 439). It presented as a systematic attempt to deal with the climate conditions experienced in West Africa, but in so doing, disregarded indigenous approaches, as revealed by the following dialogue purportedly uttered by Maxwell Fry and Jane Drew, early proponents of Tropical Modernism in West Africa:

Maxwell Fry: ‘A Nigerian aesthetic? On what would it be based that is as solid as the plywood techniques, the old timber traditions of Finland?’

Jane Drew: ‘If a Nigerian genius were to be born, upon what deeply-felt indigenous art might it not feed – and be better digested, perhaps, than Picasso’s reactions?’ (Ihejirika, 2000, p. 185)

Such positions ensured disengagement with social aspects of architecture, encapsulated in the idea that there was nothing in the region worth considering as precedents (Okoye, 2002). This position was also critical in justifying the use of imported materials and technologies in the new buildings in the quest to tackle climatic conditions described by Fry as “enemies that could be overcome only through design.” (Liscombe, 2006, p. 197). This approach rejected earlier forays into architectural responses for the British West African colonies that “... spoke of the need to rely on existing architectural and design traditions” (Myers, 1998; 13), traditions which dictated that most daily activities took place outdoors, “with buildings only performing the function of shelter from more adverse elements such as rainfall, and as places to sleep at the end of the day” (Uduku, 2005, p. 402). The uptake of the tropical modernist aesthetic thus presented as a break with the past, installed a largely alien building typology as “the only valid and progressive form of architecture” across the region (Uduku, 2000, p. 50).

The new tropical modernist aesthetic also provided a *carte blanche* opportunity for the growing number of expatriate professionals to “implement a radical aesthetic” (Liscombe, 2006, p. 193) through their own interpretation of local conditions. Being synonymous with technology “... that mirrored or even represented the western world itself” (Cripps, 2004, p. 473), tropical modernism epitomised developmental progress in the colonies, exhibited through the use of new materials like reinforced concrete, aluminium, glass and asbestos. As use of these new materials and new techniques took hold, it was clear that a more detailed understanding of their performance under tropical conditions was needed, provided through the West African Building Research Institute (WABRI) set up in Accra, as an offshoot of the British Research Establishment (BRE). The need for support staff for these institutions was in part a catalyst for the new technical schools and universities in the region, effectively linking early architectural education in the region with a new aesthetic based on scientific rationalism, and a need to be more responsive to local climate conditions. This also linked tropical modernism with

the birth of formal architectural education in West and East Africa, tied to the education of professionals being rolled out across the region for the first time after the Second World War.

It was through these new educational institutions that Tropical Modernism had its greatest visual impact, through the numerous educational buildings built as part of the colonial spatial project, with buildings constructed to accommodate the new institutions acting as a key part of the educational (read civilising) mission. Further, these architectural endeavours had a significant influence on development at an "... economic, social, cultural and philosophical level ..." (Uduku, 2000, p. 46). Education itself was a key element in spreading the benefits of modernism and its principles. The use of education as part of colonial policy came late in the life of colonialism in sub-Saharan Africa, having been the privilege of religious missions, and much later by traders and the army. The colonial government only reluctantly came into education, considered "... when medical requirements, labour recruitment, and agricultural needs made officials aware of the lack of skilled manpower" (Beck, 1966, p. 116). Architectural education was only peripheral to this endeavour, emerging as a response to the need for local professionals, given the shortage of expatriates to engage in the large volume of work available as part of a post war construction boom. Pressure had also come from indigenous professionals disgruntled with their own architectural education in the UK, seeking to engage a new generation of professionals with contextual studies that had been promised as part of the post war 'Africanisation' efforts. The lack of educational endeavours directed to the needs of students from sub-Saharan Africa had earlier emerged as a challenge for architectural education in the UK, leading to the Tropical Architecture Conference held in London during 1953, with an outcome that defined later approaches to the education of architects for the tropics, and included a unit – Teaching in Developing Countries, offered by the Architectural Association. Architectural science formed a key part of the early architecture programmes, in West Africa, at the Nigerian College of Science and Technology at Ibadan (Nigeria), and later at the Kumasi College of Technology at Kumasi (Ghana); and in East Africa at the Royal Technical College, Nairobi (Kenya). Tied to the post war infrastructural developments, the Tropical Modernism canon was rapidly taken up as an architectural mantra during the late 1950s and 1960s in both architecture and architectural education.

Colonialism largely came to an end during the 1960s, however the immediate post-colonial period saw a continuation of the 'civilising mission' embedded in the colonial spatial project, and linked to the development agenda of post-colonial governments. Tropical modernist building typologies, with an "emphasis on abstract form rather than culturally specific symbolism [which] prevented the exclusive appropriation of its signification by the colonial or the colonized" (Liscombe, 2006; p. 200), was taken on as a basis for building the fledgling nations, all of which had diverse ethnic populations for which a single locally derived typology could have been viewed as another colonising element. This appropriation of Tropical Modernism by post-colonial governments, as symbols of the strength and vitality of their newly independent states, was significant in itself, an acknowledgement that the scientific paradigms embedded within this canon were indeed universally applicable, and could act as a unifying element in the post colonial world. This acted on two different levels: first, outward linked to the progressive ambitions of the new nations, many seeking legitimacy and international recognition through engaging with international recognised approaches within the modernist ethos, and; second, inward, providing a message to the country, that the new governments were indeed delivering on the promises they had made as part of the independence struggles, and keen to use the universality of Tropical Modernism as a means of unifying their far from homogeneous states (Hess, 2000; Myers, 1998). Indeed, as it pointed out by Potter and Potter (1984), we have to acknowledge that building:

... is part of nationhood. When a new nation comes into being, its historians are apt to refer to its creators and 'builders', and its leaders as 'architects'. Once independence is achieved, to be able to build is – as any postage stamp collector will vouch – one of the insignia of freedom, no less vital an element in national self-esteem than the possession of armed forces or one's own international airline. And the justifiable pride in building is all the more intense if a nation happens to have a local vernacular – and, best of all, local materials – that can be used and developed (Potter and Potter, 1984, p. 13).

Tropical Modernist thus came to simultaneously symbolise the essence of the colonial and the post-colonial, which has come to impact on the very essence of architecture and architectural education across much of sub-Saharan Africa, not least the contradictory claims of "acknowledging the importance of local knowledge, customs and social practices as well as topography and climate" (Liscombe, 2006, p. 194).

3. Tropical modernism in architectural education

Initially, the architecture programmes inaugurated across the region were geared to graduate technicians to work under RIBA registered professionals. These were the Diploma in Architecture stated at the Nigerian College of Science and technology at Ibadan, (now the University of Ibadan) in 1952, and a similar programme at the Royal Technical College, Nairobi (now the University of Nairobi) in 1956. These programmes were upgraded to full degree status shortly after – in 1955 in Ibadan, and 1960 in Nairobi in response to a growing demand for fully qualified architectural professionals, which became even more apparent after independence (Anon., 1969). Although Ghana had gained independence in 1957, the country was also keen to forge its own locally grown architecture school, building the first purpose built school of architecture in 1958 as part of the Kumasi College of Technology, Kumasi (now the Kwame Nkrumah University of Science and Technology).

An important contributor in the establishment of architectural science within architectural education across West and East Africa, was the Architectural Association (AA), in part helped by links it had been built with the London School of Tropical Medicine and Hygiene, and the British Research Establishment (BRE), the latter serving as an aid to "... mainly British Architects in West Africa who needed technical advice on materials and environmental design for the tropics" (Uduku, 2005, p. 398). This link extended into education, with the founding of the AA School of Tropical Architecture in 1954, a response to the need for architects versed in the specific needs of the tropics, and who were also capable in engaging in teaching. Many graduates of that programme subsequently found their way to sub-Saharan Africa assisting in the development of new architecture programmes, most prominent of these being the 'rebooting' of the architecture programme at the Kwame Nkrumah University of Science and Technology (KNUST) under leadership of Michael Lloyd. As part of this endeavour, a number of academics and graduates of the AA were seconded to KNUST; including Fergus Nichol, who spent some time there during the 1960s, no doubt influencing his development of the Adaptive Thermal Comfort Model. This link with the AA helped make KNUST the epicentre of architectural education in West Africa during the 1960s and 1970s, and arguably across sub-Saharan Africa, as an offshoot of the AA Tropical School (Uduku, 2005). In East Africa, the link was less direct, with the University of Liverpool responsible for transforming the Diploma in Architecture at the Royal Technical College Nairobi into a fully-fledged architecture programme. As part of this project, Steven Szokolay was seconded to Nairobi, possibly a

consequence of his education under Koeningsberger at the AA, and having completed the Teaching in Developing Countries course offered by the AA (Lu, 2010).

Built around the ideals of Tropical Modernism, these new architecture programmes played an important role in defining the direction of post-colonial architectural education, and post-colonial built environments, more so as a key role involved an evangelising mission, defining architecture in the context of region, and espousing the values and virtues of architecture as a profession, given that it was being introduced to the region for the first time (Potter and Potter, 1984). The new curricula were biased toward architectural science, in line with recommendations of the 1958 Oxford Conference on Architectural Education, which embraced building science as a vital component of architectural education (Chang, 2016). In the context of sub-Saharan Africa, this was also in a belief that this would ensure the acceptance of architecture, based around the provision of comfort:

A large proportion of the theoretical studies must be devoted to the study of architectural science. Architecture in Africa, to be acceptable to the community in terms of comfort conditions, must be designed on a sound scientific basis. Much of this knowledge must rely on controlled experiments with actual buildings in the countries concerned. It is therefore, vital that every school should have an architectural science laboratory with the appropriate equipment (Danby, 1969, p. 31).

The focus on architectural science however, proved to be a double-edged sword: providing a means to quickly engage with the perceived requirements of the rapidly developing post-colonial societies, but ironically providing only marginal links to social and cultural conditions of the places in which the new programmes were located. For the most part, this was a consequence of architectural education itself being based on “foreign pedagogy and its associated cultural ethos, only partially modified to local conditions” (Liscombe, 2006, p. 194), and for the new programmes, still embodying key principles of the colonial spatial project, and this contributing to the paradox that was early post-colonial architecture. This paradox made a significant contribution to the eventual demise of architectural science as a key element of architectural education across the region (Myers, 1998; Cripps, 2004), more so during the second decade after independence.

4. The Post-colonial, and the demise of tropical modernism

Initially embraced as the architectural style of choice by post-colonial governments, tropical modernism, and its embedded scientific principles, shaped many urban areas across the regions. However, a significant shift occurred with the founding of the Organisation of African Unity (OAU) – now the African Union - established in Ethiopia in 1963, and largely with the wider independence movement and fight for self determination across sub-Saharan Africa. A consequential outcome of this galvanisation of Africanism, was a healthy cynicism to anything remotely linked to the colonial era (Myers, 1998), inevitably leading to post colonial governments seeking to redefine what it meant to be African in a post-colonial world (Sian, 2007). This was reflected in writings by novelists such as Wole Soyinka in West Africa, and Ngũgĩ wa Thiong'o in East Africa, questioning the appropriation of modernism in representing the future of Africa, something they regarded as symbolic of colonised minds (Akwang, 2012). Modernism as the vision for the future, a future that was very much like the past, thus came into question. Ironically, questions of this universal applicability of modernism had been questioned much earlier, a result of the general lack of specific design solutions to meet the growing needs of budding professionals in the region, leading them to push for a more ‘appropriate’ architectural education.

Even by the time Fry and Drew completed their educational commissions in 1955-56, the African voice and gaze were only minimally present in the African architectural profession. Non-African paradigms predominated in the education system intended to facilitate Africanization (Liscombe, 2006, p. 2008)

Realignment of social and political ideologies during the 1960s inevitably affected the nature of education, contributing to the eventual demise of tropical modernism as a post-colonial endeavour, and as part of architectural education. Changes were made to the architectural curriculum not only to cater for the ideological shift; dispensing with anything perceived as colonial content. Consequently, the mantra of Tropical Modernism was jettisoned, and for the most part, so was architectural science, although a key aspect was retained, but largely in stand alone courses: an emphasis on science and knowledge as the basis of education, related to a belief that "... knowledge in its pure form [was] considered apolitical and universally relevant ..." (Bouman, 2001, p. 9). In the multi-ethnic nations of the post-colonial era, this was critical, as knowledge could easily translate across cultural divides, and therefore was considered as an important unifying element in the culturally diverse countries. The radical changes implemented were broad sweeping, dispensing with whatever was regarded as the continuation of a colonial ethos. Within architectural education, a new nationalist curriculum was implemented at the University College Nairobi in a newly branded school the Faculty of Architecture, Design and Development. Coincidentally these moves came at the height of the cold war, with African nations aligning themselves either with the West, or the Soviet block. In East Africa, Kenya aligned itself with the West, while Tanzania and Uganda aligned with the Soviet block, with the inevitable ideological tensions spilling out into the educational realm, ultimately resulting in the dissolving of the multi-country University of East Africa in 1970 (Kithinji, 2012). This had an immediate impact on architectural education in the region, with students from Uganda and Tanzania barred from programmes in the now independent University of Nairobi. Both Uganda and Tanzania struggled to make up lost ground, seeking setting up schools to cater for the lack of access the programme at Nairobi, although it was not until 1989 that Uganda set up its own programme at Makerere University, and 1996 for Tanzania at the University of Dar-es-Salaam.

A key challenge for architectural science in the context of architectural education in sub-Saharan Africa, among other things was a failure to come to terms with its colonial roots. Tropical Modernism, to which architectural science relates had been branded as being part of the colonial spatial project and thus has been discarded as part of post-colonial realignment of programmes, geared to portray more nationalistic agenda. While some fundamental scientific elements had been retained within the new curriculum, having been reframed in order to advance political and ideological goals left programmes as little more than the mere transmitter of knowledge. The ideological imperative effectively served to stifle the role of the university in research and the advancement of knowledge, the very basis for the founding of the science based institutions in the first place. Further, proliferation of post-colonial coups d'état contributed to the demise of scientific exploration, contributing to a suspicion of the educated elite, particularly university instructors, who were viewed as contributing to the unfulfilled post-independence promises. The coups d'état also created knowledge gaps, overtly evident in the delayed completion of EXTEL House in Kampala, originally designed by Richard Hughes in the early 1970s. When the building was eventually completed during the 1990s, it had lost its prominent horizontal solar shading elements, replaced by sheer glass curtain walling in part linked to contemporary trends, but also failure to acknowledge the function these horizontal elements were designed to serve. Although Kenya did not experience a successful coup d'état, the ultimate demise there was cemented by a series of academic strikes during the 1980s and 1990s, which saw the few educators who had received some

education and training in architectural science emigrate – seeking greener pastures overseas, thus relegating architectural science to the periphery of the architecture curriculum.



Figure 1: EXTEL House As Design (source: R. Hughes)



Figure 2: EXTEL House As Built (source: Author)

What then could be the future of architectural science in the context of the changing fortunes of the post-colonial? The ahistorical and Eurocentric values embedded in the tropical modernism, were key factors that contributed to the demise of this architectural canon, leaving the architectural space open for new explorations. The Africanisation and nationalism movements that ensued during the early post independence years stood out as an opportunity to explore indigenous architecture of the region through the various lenses available, including architectural science. Limited explorations were made based around form and materials, with little attention to building performance, be it social, cultural or environmental. Sadly, these explorations have not yielded significant results, and raising more questions than answers with regard to how architectural science could be appropriate to drive new explorations in tropical architecture in the region. A review of the established architecture programmes across East Africa today, there is still limited engagement with architectural science within architecture programmes, specifically in relation to: Environmentally Sustainable Design (ESD); Environmentally Conscious Design (ECD), and; Energy Efficiency (EE) (Olweny, 2013). This could in part be a legacy of the nationalist agenda, but also reflects views of education as being the application of a strict set of rules, and reinforcing the notion that architecture itself is responding to fixity (Olweny, 2016). This could also be a backlash to the imposition of foreign approaches to the detriment of tradition, with a return to tradition itself being a questionable approach, as it effectively requires an erasing of a significant portion of human endeavours, framing any new knowledge as being invalid. While there may be a desire to reengage with architectural science within architectural education, a key challenge is presented by the very nature of architectural education, described by Till (2005) as a prison yard, with “[...] an outer fence policed by the values of the profession and an inner fence policed by the authority of the school” (p. 167).

5. Conclusions

Regardless of the origins of Tropical Modernism, it is difficult to overlook the value and contribution this architectural canon had contributed to architecture and architectural education across Africa, and to the science of buildings across the globe. The contribution of tropical modernism to architectural science knowledge as a discipline was certainly unprecedented, contributing to what Hess (2000) termed a 'constructed community', in this case a construction of what came to constitute 'appropriate' architecture for the tropics. Shifts in post-colonial ideologies however ensured that tropical modernism, and architectural science as a key part of architecture and architectural education fell out of favour. This left a significant void within architecture and architectural education only just being recognised, and evident through the continued lack of ESD, ECD and EE within contemporary architecture curricula in East Africa. The future of architectural science regardless of the past is increasingly viewed with optimism, coming with a realisation that the potential demand for accommodation over the next fifty years may well exceed the existing building stock, thus having a dramatic impacting on resource consumption. Professionals are increasingly turning to the principles that had previously been abandoned, seeking answers that could enable architecture to address some of the contemporary challenges that are increasingly coming to the forefront of the development agenda. This is seen in a recently held workshop in *Machakos, Kenya at which the Machakos Declaration for Sustainability in Architectural Education* (UN-Habitat, 2016) was signed. This declaration seeks to engage schools and practitioners in thinking about ESD, ECD and EE, not because they are trending concerns, but because they present a means by which architecture can respond to the contextual challenges faced in the region, and which the Africanisation mission of the early post colonial period had sought to achieve. A key challenge remains, with the question of how the past principles be salvaged from their colonial past and interlinked with contemporary architectural discourse? Architectural science may yet emerge as a defining element in the future of architecture and architectural education in East Africa.

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