



## The Regenerative Characteristics of Diébédo Francis Kéré's Architecture Examined from Steve A. Moore's Perspective on Regenerative Regionalism

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### ABSTRACT

**Purpose:** Since the late 20th century, regionality has emerged as an alternative to the limitations of the international style based on modernism, and the meaning of regionality is gradually expanding. This paper aims to examine how elements of regenerative architecture, including the sense of place and social value, can be implemented from the perspective of regenerative regionalism presented by Steve A. Moore, based on the architecture of Diébédo Francis Kéré. For such purpose, this study investigated the overall architecture of Diébédo Francis Kéré and selected seven works, including educational, medical welfare, and public residential facilities among his works completed in Africa. **Method:** The study first examined the emergence and flow of regionalism in architecture. Then, based on the elements of regenerative architecture presented in regenerative regionalism, the research frame was established. Third, based on the survey details of selected works, the study analyzed the characteristics of the regenerative architecture such as community participation, everyday life reflection and improvement, and ecological sustainability shown in the works of Diébédo Francis Kéré. **Result:** It was found that the elements of regenerative architecture were being implemented in Kéré's architecture through technical education, easy construction methods, improvement of infrastructure facilities, expansion of jobs, utilization of local materials, and sustainable design and construction methods.

### KEYWORD

Diébédo Francis Kéré  
Steve A. Moore  
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Regenerative Architecture

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## 1. Introduction

### 1.1. Background and Purpose of the Study

In the early 20th century, the emergence of modernism and internationalism marked a significant shift in architectural trends. These styles sought to embrace rationality and universal principles, utilizing newly available construction materials, mass production techniques, and innovative building methods facilitated by technological progress. Additionally, they aimed to globalize architectural practices by prioritizing purpose and functionality in design, departing from conventional architectural norms of previous eras. However, the concept of regionality, encapsulating social, cultural, and natural elements specific to a region, that was inherent in architecture underwent a gradual erosion during this period. Urban planning from the 1960s onwards predominantly prioritized efficient land utilization, sparking criticism for the resultant lack of distinct identity in today's cities and structures[1].

In response to this trend, discussions began to surface in the mid-20th century advocating for regionalism architecture, which

emphasizes cultural diversity and placeness. Over time, this evolved into the theory of regionalism architecture, which seeks to express and promote regional identity through various means. Especially notable is the rise of new movements in response to the heightened focus on sustainability from diverse angles since the 2000s. These movements seek to address sustainability from social and political angles, alongside the environmental considerations already inherent in regionalistic values. Similar transformations are evident in the Pritzker Architecture Prize, the foremost recognition in the field of architecture. Since the 2010s, a growing number of award recipients hail from third-world countries, primarily engaged in architectural endeavors in regions such as China, South America, and Africa, traditionally considered more remote. Their architectural creations showcase not only excellence in design but also reflect substantial research efforts and a commitment to conveying messages regarding social and regional significance throughout the construction process and beyond completion. In this analysis, Diébédo Francis Kéré, the inaugural African laureate of the Pritzker Architecture Prize, is explored for his proactive approach to fostering collaboration and involvement of local communities. By meticulously assessing the social, economic, and ecological dynamics of the region, he embarked on constructing essential infrastructure in his hometown. His

endeavors transcended mere architectural accomplishments, significantly influencing the regional community by instilling a sense of pride and catalyzing economic progress.

By focusing on Moore's concept of regenerative regionalism, which broadens the scope of regionality within modern architecture to encompass notions such as placeness, technological innovation, and socioecological relevance, this study thus aims to explore the practical application and functioning of the principles of regenerative architecture as delineated by Steve A. Moore, as demonstrated through the architectural works of Diébédo Francis Kéré.

## 1.2. Methodology and Scope of Research

This study aims to investigate the practical application of elements such as placeness and social values within the framework of regenerative regionalism proposed by Steve A. Moore, based on architectural creations of Diébédo Francis Kéré. The scope and method of this study are as follows.

First, this study comprehensively explores Kéré's architectural portfolio. Subsequently, it identifies seven projects pivotal in design innovation, serving diverse purposes within the realms of education, healthcare, and residential infrastructure in Africa. These selected works, characterized by their role as public infrastructure, form the scope of analysis regarding their connection to regional communities and sustainability.

For the research method, the examination of regenerative regionality, along with the blooming and dissemination of regionalism in contemporary architecture since the 20th century, draws upon previous research and the writings of architectural theorists. Subsequently, criteria for analyzing regenerative architecture are derived from the eight elements outlined by Moore through a review of relevant literature.

Second, an exploration of the background and features of Kéré's architectural projects is conducted to provide an overview and understanding of the structures under analysis.

Third, the structures are analyzed from the perspectives of community participation, reflection and improvement of everyday life, and ecological sustainability based on the exploration results to infer the regenerative architectural attributes exemplified within Kéré's architectural portfolio.

## 2. Regenerative Regionalism and Regenerative Architecture

### 2.1. Emergence of Regionalism Architecture and Critical Regionalism

The advent of mass production due to industrialization, coupled with advancements in construction materials and

technology such as steel, concrete, and glass, has fostered the emphasis on practicality and functionality in architecture. This emphasis laid the groundwork for the international style, which facilitated the globalization of architecture by liberating architects from the constraints of building locations, historical context, and geographical limitations[2]. However, this functional rationality in architecture came under criticism for loss of placeness, standardized construction methods, and lack of distinct identity, ultimately failing to accommodate the diverse range of human behaviors. Consequently, an increasing emphasis on regional characteristics gradually gave rise to the concept of regionalism architecture[3].

During the mid-20th century, Sigfried Giedion introduced the idea of "new regionalism" and coined the term "new regionalism approach" to address regional disparities by considering material needs, emotional fulfillment, and respecting the individuality of each region[4]. In the 1980s, Kenneth Frampton newly established the concept of regionalism through the lens of critical regionalism[5]. Specifically, Frampton advocated for the restoration of a loss of placeness by emphasizing a holistic approach to experiencing a place, its geography, urban context, natural surroundings, tectonic, and buildings. He argued that a place can authentically embody regional characteristics when it incorporates shared social values or sentiments. His proposed solution for finding a balance between universality and regional context in modern architecture involved a dialectical process of re-evaluating universal civilization through the concentrated values and spirits of specific regions, and then recombining them[6]. However, this approach can be seen as partial succession of modernism, rather than complete rejection, being interpreted as deliberately controlling specific regional characteristics and elements that are adopted globally; simultaneously, it has faced criticism for merely responding to secondary issues such as buildings that do not blend with their surroundings, viewing architecture as an image representation rather than addressing the underlying realities or root causes of problems. Additionally, it has been faulted for not adequately emphasizing the significance of social and political contexts in analyzing regional and urban phenomena[7]. Nevertheless, Frampton's critical regionalism emerged as a significant theoretical framework for interpreting architectural movements following the internationalist style. Its significance lies in sparking the development of diverse discussions on regionalism.

### 2.2. Concept and Characteristics of Steve A. Moore's Regenerative Regionalism

#### 1) Place and Technology

After extensive discourse on regionalism in the late 20th century, including the exploration of critical regionalism, Moore

introduced the concept of “regenerative regionalism” in 2005 where he emphasized ‘technology’ as a central element in regional architectural development, alongside the traditional focus on ‘place.’ Drawing from John Agnew’s theory,<sup>1)</sup> which delineates three components for understanding a place—‘location’ referring to a geographic area comprising the objective structures of politics and economy, ‘sense of place’ encapsulating the emotional aspects tied to a region, and ‘locale’ representing a mid-sized place bridging the gap between the former two—Moore introduced a more nuanced and comprehensive understanding of place, in which the framework incorporates a flexible concept that interconnects human and non-human elements across spaces of diverse scales. Moreover, an argument was advanced suggesting that technology serves as a fundamental tool for comprehending the architecture of a place in the modern era. This proposition is rooted in a study by sociologists Donald Mackenzie and Judith Wajcman,<sup>2)</sup> who view technology as an integral component of social systems, as well as Bruno Latour’s notion of a technology network.<sup>3)</sup> According to Latour, technology forms the basis of social networks by establishing spatial connections to human knowledge, practices, and resources. Thus, Moore considered spatial analysis of geography as a more accessible approach to understanding reality compared to historical analysis, which unfolds over time. He underscored the close relationship between technology and place by defining ‘placeness’ as the outcome of technological practice and spatial mechanisms. According to Moore, since a technology network serves as one of the spatial analysis mechanisms, it is a central element in interpreting and comprehending places inhabited by humans[8].

### 2) Nonmodern Thesis and Regenerative Architecture

Moore argued that Frampton’s critical regionalism maintains a modernist viewpoint. Instead, he proposed the ‘nonmodern thesis,’ which is founded on Bruno Latour’s concept of ‘nonmodern.’<sup>4)</sup> The concept of ‘modern’ often creates a clear distinction between humans and nature. However, humans and nature actually share many commonalities. Therefore, humans cannot simply dominate nature; rather, they exist as ‘pseudo subjects’ or ‘pseudo-objects’ within it. By embracing this non-modern perspective, the human system can creatively engage in the natural system’s circulation, thus fostering a positive environment that enhances the quality of life for all. Drawing upon John Tillman Lyle’s concept of the ‘regenerative system,’<sup>5)</sup> Moore viewed this state as more than simply reducing energy consumption and entropy from a simplistic technological standpoint. Instead, he saw it as an effective participation in the natural energy flow. Moore then defined the concept of regenerative architecture by considering the social and political

aspects of an ecosystem. He also asserted that this represents a cultural perspective aiming to engage humans in the democratic reproduction of spaces that enhance their well-being, while also fostering a deeper comprehension of the interactive relationship between technology and place[8].

### 2.3. Establishing the Research Framework through Eight Elements of Regenerative Architecture

Moore outlined a framework for regenerative architecture, aiming to translate regionalism into practices adaptable to contemporary circumstances through regenerative and sustainable architectural approaches. The objective is to establish a connection between human and non-human elements by integrating the human system with the natural flow of the region, thus enhancing the residents’ quality of life through regenerative regional architecture. This approach veers away from overly relying on historical interpretations of regionalism and instead promotes understanding architecture within the social and material contexts of everyday life, rather than merely from

Table 1. Eight elements of regenerative architecture and the establishment of the analysis frame

No.	Keyword Contents	Ecological sustainability		
		Reflection and improvement of daily life		
		Community participation		
1	Regenerative architecture assembles social settings to construct regenerative technologies rationally and democratically for the humans and nonhumans that inhabit a place.	◎		○
2	To participate in the tectonic history of a place, regenerative architecture empathizes with the local citizens and reflects their daily lives.	○	◎	○
3	Regenerative architecture emphasizes the construction of a process that can participate in ecological construction based on integrated cultural and social activities.	○		◎
4	Regenerative architecture relies upon technologies that reveal the manner of their making to magnify local labor knowledge and local ecological conditions.	◎		◎
5	Regenerative architecture will construct the technologies of everyday life that engage citizens in the decision-making process.	◎		○
6	Preferring the reproduction of life-enhancing practices rather than aesthetic commentary, regenerative architecture recognizes that the repetitive material practices of construction do more to influence the operation of society.		◎	○
7	Regenerative architecture will enable places by facilitating democratic consideration of the ecological conditions of the place.			◎
8	Regenerative architecture prefers the development of life-enhancing practices through the creation of critical places that can become regenerative only through the production and reproduction of democratic and life-enhancing practices.	◎		○

\* ◎ : Highly Relevant, ○ : Relevant

aesthetic perspectives rooted in high culture. Moreover, it calls for regenerative architecture to be reconceptualized as political practices and implemented through widespread technological advancements. These discussions are implied in eight elements<sup>6)</sup> of regenerative architecture that Moore established through the Nonmodern Manifesto.

Table 1. presents the common keywords extracted by analyzing the eight elements. Drawing from the descriptions provided above, Moore's regenerative architecture can primarily be classified into community participation, reflection and improvement of everyday life, and ecological sustainability. These elements serve as the research framework for this study.

### 3. Analysis of Diébédo Francis Kéré's Architecture

#### 3.1. Background and Characteristics of Diébédo Francis Kéré's Architecture

Diébédo Francis Kéré was born in a small village in Gando, Burkina Faso in 1965. During that period, Gando faced a shortage of fundamental infrastructure such as schools, with even basic amenities such as drinking water and electricity absent. Kéré reminisces about Gando as a place where "everyone in the village looked after their children," turning the entire village into a playground and fostering a strong bond with the local communities. Moreover, the experience of "building a house together" left a profound imprint on his future endeavors, emphasizing community participation as paramount. At the age of 7, Kéré became the first child from his village to leave for the city of Tenkodogo to pursue formal education. He recounted this experience as being confined in a cement structure with inadequate lighting and enduring extreme weather conditions alongside 100 other students. Influenced by his early experiences, he explored methods to create environments that prioritize basic comfort, utilizing effective lighting and implementing strategies to mitigate solar heat in his architectural designs[9]. Kéré initially worked as a carpenter in Burkina Faso but relocated to Berlin in 1985 to pursue further studies on a scholarship. During his time there, he focused on roofing and furniture construction while completing his secondary education. He enrolled at the Technical University Berlin in 1995 and graduated with a degree in architecture in 2004.

Recognizing his privilege in receiving a quality education, Kéré felt a sense of responsibility and subsequently founded a non-profit organization, the Kéré Foundation e.V., to initiate fundraising efforts. Collaborating with residents of Gando, he completed his inaugural architectural project in 2001: the Gando Primary School. Building on the success of the Gando Primary

School, Kéré founded Kéré Architecture in 2005 and embarked on designing educational and medical facilities across different regions in Africa, spanning Burkina Faso, Kenya, Mozambique, and Uganda. Concurrently, he showcased diverse architectural projects in Germany, the United Kingdom, and the United States. His architectural style was shaped by his early experiences growing up in the community of Gando and attending schools in Tenkodogo. This foundation was further enriched through his professional training in carpentry and architecture in Berlin. However, his pinnacle of success was achieved upon returning to his hometown and collaborating with local community members. His creations are driven by purpose rather than mere architectural symbolism and prioritize processes over finished products. They are acclaimed for authentically capturing the essence of regional communities through distinctive building features, programs, construction methods, and materials[10], showcasing innovative potentials in modern architecture.

#### 3.2. Selection and Analysis of Works

To analyze the features of regenerative architecture evident in Kéré's designs, the study scrutinized seven architectural projects, including educational, medical, and welfare facilities, all of which were public constructions situated in various African regions, notably Burkina Faso. Each characteristic was then analyzed by focusing on three key concepts – community participation, reflection and improvement of everyday life, and sustainability – extracted from eight elements of Moore's regenerative architecture, along with basic information about each structure. Table 2. presents the analysis results.





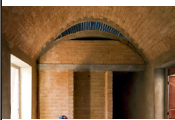


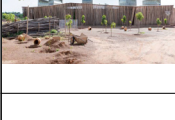



### 4. Characteristics of Regenerative Architecture Demonstrated in Diébédo Francis Kéré's Architecture

Trying to address insufficient infrastructure in his hometown, Diébédo Francis Kéré endeavored to create socially, economically, and ecologically sustainable environments through architectural initiatives centered on education, healthcare, and environmental concerns. Based on such purpose, Kéré's architecture incorporates the characteristics of regenerative architecture proposed by Moore, such as community participation, reflection and improvement of everyday life, and the pursuit of ecological sustainability.

#### 4.1. Participation of Community Members

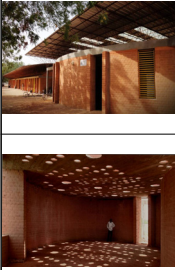
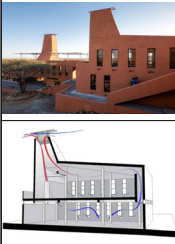
Moore placed significant emphasis on community participation, highlighting the social and political dimensions within a regenerative system to enhance the quality of life. His

Table 2. Eight elements of regenerative architecture and the establishment of the analysis frame[11]

Project Summary	Image	Architectural Features	Regenerative keywords (Analysis criteria)		
			Community Participation	Everyday life and social influence	Sustainable and Ecological value
<p><b>Gando Primary School</b> / 2001 / Gando, Burkina Faso / 520m<sup>2</sup> / Education</p>	  	<ul style="list-style-type: none"> <li>Built to expand the sparse network of schools in the area and addressed two characteristic problems of local buildings such as poor lighting and ventilation.</li> <li>Three rectangular modules connected by a single roof make up the basic structure of the building, and each one of them accommodates one classroom for fifty students.</li> </ul>	<ul style="list-style-type: none"> <li>The support of the community and funds contributed to the success of the project.</li> <li>To involve the local community in its construction, it adopted a simple design adapting traditional construction methods in innovative ways and using materials easily available locally and it became the first model for community participation.</li> </ul>	<ul style="list-style-type: none"> <li>The success of the project increased the school's student population from 120 to 700.</li> <li>The pride of community and the collective knowledge of construction began to spread and inspire Gando, new projects such as teachers' housing and a library have been promoted to further support sustainable development in the village.</li> </ul>	<ul style="list-style-type: none"> <li>Using clay-cement hybrid brick, which is abundantly available in the region, easy to produce, traditionally used in building, and provides thermal protection against the hot climate.</li> <li>Natural ventilation system with a dual structure of the easy-to-construct lightweight roof and separated brick ceiling.</li> <li>A garden to educate and supplement the diet.</li> </ul>
<p><b>Gando Teachers' Housing</b> / 2004 / Gando, Burkina Faso / 440m<sup>2</sup> / Housing</p>	 	<ul style="list-style-type: none"> <li>Building for teachers appointed to Gando Primary School.</li> <li>Consists of six modular units arranged in a wide arc shape reminiscent of the traditional Burkinabè compound and expandable in a variety of ways as needed.</li> </ul>	<ul style="list-style-type: none"> <li>To involve the local community in its construction, it adopted a simple design adapting traditional construction methods in innovative ways and using materials easily available locally.</li> </ul>	<ul style="list-style-type: none"> <li>The simplicity of the design and minimal use of purchased materials make the model easily adoptable and adaptable by members of the community who plan on building or extending their own homes.</li> </ul>	<ul style="list-style-type: none"> <li>Use of sustainable materials in innovative ways such as adobe walls rendered with a protective layer of bitumen and granite foundations reinforced with cement.</li> <li>Openings between walls and vaults for natural ventilation and daylight.</li> </ul>
<p><b>Dano Secondary School</b> / 2007 / Dano, Burkina Faso / 370m<sup>2</sup> / Education</p>	 	<ul style="list-style-type: none"> <li>Commissioned based on the Gando project.</li> <li>Consists of three classrooms, a computer room, an office, and a covered semi-basement amphitheater for various uses.</li> </ul>	<ul style="list-style-type: none"> <li>Carried out in collaboration with young people trained in previous projects in the region.</li> </ul>	<ul style="list-style-type: none"> <li>Through this working model, the local workforce gained a newfound appreciation of traditional building materials and further experience, training, and education.</li> </ul>	<ul style="list-style-type: none"> <li>The regional laterite stone main body with excellent thermal mass.</li> <li>Unique roof and ceiling structures that can control indoor climate and sunlight naturally.</li> </ul>
<p><b>Lycée Schorge</b> / 2016 / Koudougou, Burkina Faso / 1,660m<sup>2</sup> / Education</p>	 	<ul style="list-style-type: none"> <li>Consists of nine modules arranged radially around a courtyard and creates a loosely defined amphitheater, which accommodates informal gatherings as well as assemblies and celebrations for the school and wider community.</li> </ul>	<ul style="list-style-type: none"> <li>Laterite stone and eucalyptus wood, which can be easily available and processed locally were used as materials to enable residents to participate in the construction.</li> </ul>	<ul style="list-style-type: none"> <li>Using eucalyptus that make desertification for construction replaces the cut trees with environmentally beneficial species.</li> <li>The stripping down of eucalyptus bark for construction became a new income for the region</li> </ul>	<ul style="list-style-type: none"> <li>Unique roof and ceiling structure that allows for natural ventilation and indirect lighting.</li> <li>Furniture made from recycled local hardwoods and steel offcuts from the roof construction.</li> </ul>
<p><b>Léo Doctors' Housing</b> / 2018 / Léo, Burkina Faso / 950m<sup>2</sup> / Housing</p>	 	<ul style="list-style-type: none"> <li>Provides housing for volunteers and resident staff at the Leo Surgery Clinic.</li> <li>Consisting of five modular accommodations arranged along a courtyard.</li> </ul>	<ul style="list-style-type: none"> <li>Operated by Operaren, a non-profit organization.</li> <li>Utilization of local volunteer workforce during the construction process and operations.</li> </ul>	<ul style="list-style-type: none"> <li>A local infrastructure facility for local medical support, regional medical exchange and resident staff and volunteers for Leo surgery clinic.</li> </ul>	<ul style="list-style-type: none"> <li>Natural indoor climate control through double structured walls and roof.</li> <li>Utilization of rainwater and prevention of pests through water space and natural water storage system.</li> </ul>

\*Images @ KéréArchitects.com

Table 2. Eight elements of regenerative architecture and the establishment of the analysis frame[11] (Continued)

Project Summary	Image	Architectural Features	Regenerative keywords (Analysis criteria)		
			Community Participation	Everyday life and social influence	Sustainable and Ecological value
<b>Gando Primary School Library</b> / 2018 /Gando, Burkina Faso / 640m <sup>2</sup> / Education		<ul style="list-style-type: none"> <li>Located between the two school buildings previously constructed.</li> <li>The traditional clay pots set in the roof's structure ensure natural illumination and ventilation.</li> </ul>	<ul style="list-style-type: none"> <li>Active community participation based on the experience of Gando primary construction and use of ceramic pots locally manufactured.</li> </ul>	<ul style="list-style-type: none"> <li>Supporting and promoting local craft practices by use of ceramic pots, locally manufactured for centuries which we have incorporated as building elements in innovative ways.</li> </ul>	<ul style="list-style-type: none"> <li>For the ceiling, the pots were sown in half and a concrete slab was cast around them to allow natural light to filter down, creating a dynamic pattern on the ground. The stack effect in the ceiling naturally ventilates the inner space.</li> </ul>
<b>Startup Lions Campus</b> / 2021 / Turkana County, Kenya / 1,416m <sup>2</sup> / Education		<ul style="list-style-type: none"> <li>Placed along a natural slope and secured a view of the environment through the rooftop terrace.</li> <li>The ventilation tower was inspired by the towering mounds built by termite colonies.</li> </ul>	<ul style="list-style-type: none"> <li>Active collaboration and participation of the local community in the decision-making and construction process.</li> </ul>	<ul style="list-style-type: none"> <li>Prevents the outflow of local youth and improves youth unemployment by providing high-level education and training and international employment opportunities.</li> </ul>	<ul style="list-style-type: none"> <li>Use of maintenance-saving technologies such as unique natural ventilation and equipment cooling systems.</li> <li>Use of local materials.</li> </ul>

\* Images @ KéréArchitects.com

goal was to foster a cultural perspective that encourages comprehension of the reciprocal relationship between technology and place.

Kéré initiated projects aimed at enhancing basic infrastructure in Gando, addressing the scarcity of essential amenities such as educational and medical facilities in the area. Notably, he actively promoted resident participation throughout all project stages, from initial planning to construction and post-management. This approach was inspired by his childhood experiences of collectively building houses in the village. To make effective use of the non-skilled labor force available in the region, he innovatively utilized locally available materials and devised construction techniques that did not rely on machinery or equipment. This enabled nearly all parts of the buildings to be easily constructed by the hands of residents. As a result of this process, residents acquired construction skills and knowledge of building maintenance, while a new regional economic structure emerged through a collaborative approach to accessing fields of expertise.

The initial project, Gando Primary School (2001), was funded through the foundation's fundraising efforts and benefited from the active participation of residents. Community members were engaged in brick production using locally available clay and in the leveling process of walls and floors. Lightweight roofs, constructed with a rebar framework, were lifted and installed without the need for specialized equipment. The success of the Gando Primary School project prompted further expansions, including the construction of Gando Teachers' Housing (2004)

and the Gando Primary School Library (2018). This success story extended to neighboring areas with projects such as the Dano Secondary School (2007), Lycée Schorge School (2016), and Léo Doctors' Housing (2018). Through this iterative process, the experiences gained by residents from earlier projects were accumulated and refined, subsequently influencing and benefiting ensuing projects and adjacent regions. Moreover, as the projects progressed, various applicable technologies were introduced, such as the arch-type roof (teachers' housing), corrugated ceilings (Dano Secondary School), a double wall made of Eucalyptus trees (Lycée Schorge School), and a cooling system utilizing a ventilation tower (Startup Lions Campus). As illustrated by the pot-shaped roof in the Gando Primary School Library, the methods and extent of community involvement diversified, proving to be a valuable resource for promoting economic development and sustainable construction practices in the region.

As such, the community participation evident in Kéré's projects serves as a notable example of the practical application of regenerative architecture principles. Through this approach, community members actively contribute to enhancing regional environmental conditions using everyday technology within a social network framework, thereby becoming deeply involved in the construction history of the place.

#### 4.2. Reflection and Improvement of Everyday Life

The objective of regenerative architecture is to facilitate the process of reflecting on and enhancing the daily lives of residents

within the context of their everyday experiences through democratic participation. Kéré's architectural endeavors sought to enhance the daily lives of communities by establishing fundamental infrastructures such as educational and medical facilities. It can be inferred that the inadequate educational conditions Kéré experienced during his youth motivated him to design schools for his initial project in Gando. His aim was to craft comfortable and pleasant indoor environments by drawing inspiration from nature.

The successful construction of Gando Primary School resulted in a fivefold increase in the number of students in the region within a few years. Consequently, the lives of residents saw a significant improvement, as the expansion of the school, along with the construction of teachers' housing and a library, became a vital community facility. Particularly, residential projects including Gando Teachers' Housing or Léo Doctors' Housing minimized reliance on external materials and adopted easily constructible designs. This approach aimed to enable community members involved in the projects to utilize similar designs for their own homes, whether constructing new ones or expanding existing structures.

Kéré also positively influenced the lives of residents through the materials and landscaping utilized in his architectural designs. He created a mango tree garden in the playground of Gando Primary School to provide additional lunch resources for students. Additionally, he established mango farms across the Gando region, drawing from educational resources on sustainable agriculture. Moreover, the pot-shaped roof of the Gando Primary School Library contributed to the promotion and expansion of the local craft industry[12]. Lycée Schorge School was constructed using Eucalyptus trees indigenous to the region, thereby generating employment opportunities for local women who were involved in peeling the bark. Kéré revitalized the local economy while ensuring the environmental sustainability of his projects. Through his technological interventions, which mirrored everyday life, he instilled practical values of regenerative architecture, ultimately enhancing the daily lives of community members.

### 4.3. Ecological Sustainability

The ecological sustainability aspect of regenerative architecture involves the preservation and regeneration of an ecological system as part of a place's environment system, surpassing mere structural durability or technical eco-friendliness. Kéré offered architectural solutions that integrated local construction materials, traditional building methods, and contemporary engineering techniques. These solutions efficiently address and leverage regional environmental and climatic conditions, all

within the constraints of limited resources and infrastructure. These traits are demonstrated in the roof, ceiling structure, and wall designs, which are tailored to manage and utilize natural resources like light, air, and rainwater. Kéré utilized affordable and readily available corrugated steel sheets as roofing material. Acknowledging the material's high thermal conductivity, it was installed separately from the ceiling to facilitate the escape of warm air through gaps or perforations. This arrangement effectively blocked radiant heat and promoted natural ventilation. This roofing and ceiling structure gradually evolved as his projects advanced. In his initial project, Gando Primary School, natural ventilation was achieved by discharging hot air through holes in the ceiling constructed of clay bricks, while cool air flowed in through louvered windows, resulting in comfortable indoor conditions. In Gando Teachers' Housing, the curved ceiling facilitated the upward flow of heated air above the living area to improve comfort, while gaps between the ceiling and walls allowed for natural ventilation and indirect natural light. At Dano Secondary School, the interior was illuminated by diffused sunlight through a plaster ceiling resembling draped cloth. The roof extending lengthwise shielded the walls from sunlight and rainwater, lowering indoor temperatures, enhancing durability, and optimizing exterior space utilization. At Gando Primary School Library, traditional pots made of local clay were used as a component of the ceiling design. This not only added practicality but also created an innovative indoor environment. Sunlight filtering through circular openings produced dynamic patterns on the floor, enhancing the space aesthetically. Inspired by the towering mounds constructed by termite colonies, a two-story ventilation tower was implemented as an equipment cooling system at Startup Lions Campus. This innovation allowed for the expansion and application of a natural stack effect in professional facilities.

In Gando, where resources are scarce, the use of locally available natural materials was a crucial architectural element. Kéré enhanced the strength of bricks by combining cement with clay, a readily available material in the region, for use in building houses. These blocks have been commonly employed in Kéré's projects due to their ease of production and their ability to naturally regulate indoor temperature. They absorb heat during the day and release it at night, owing to their excellent heat storage capabilities. In the construction of Gando Teachers' Housing, a protective layer was formed on the exterior walls by mixing and applying plant extract and cow dung.

Finally, the incorporation of Eucalyptus trees in several projects, such as Lycée Schorge, originated from the idea of utilizing new construction materials indigenous to the region while maintaining the balance of the local ecosystem. Eucalyptus

trees, initially planted extensively for reforestation purposes, exhibited remarkable durability and appealing colors. However, their rapid absorption of moisture from the soil also contributed to the desertification of the surrounding area. Kéré incorporated a dual screen composed of Eucalyptus trees into the exterior wall to shield against direct sunlight and create an additional area for outdoor activities. This method encouraged the utilization of Eucalyptus trees in construction and initiated a reforestation initiative by replacing felled trees with diverse tree species, thereby fostering a more balanced regional ecosystem[13].

#### 4.4. Regenerative Architecture Characteristics of Each Project

Table 3. presents a summary of the regenerative characteristics observed in each of Kéré's architectural works. The analysis's findings revealed that both indirect and direct participation and collaboration within local communities were evident in all the examined projects. Notably, a higher level of participation was noted in projects undertaken in Gando compared to those in other regions. This heightened participation can be attributed to the successful completion of the first project in Gando, which served to inspire subsequent projects and foster voluntary participation based on the accumulated experiences. Moreover, community participation was particularly significant in the construction of fundamental educational facilities such as primary schools.

Reflecting and improving everyday life had a greater impact in the case of directly bringing economic benefits, as seen in Lycée Schorge where new employment opportunities were generated using Eucalyptus trees, or in Gando Primary School Library where the local handcraft industry and production were

stimulated. Additionally, it was notable in enhancing the residential environment, as observed in Gando Teachers' Housing or Léo Doctors' Housing. Lastly, all projects utilized readily available natural materials from the region and were engineered to achieve diverse indoor environments through natural ventilation and sunlight. These technologies progressed and improved over time, ultimately fostering positive transformations in the local ecosystem.

## 5. Conclusion

In conclusion, this study investigated the practical implementation and operation of regenerative architecture elements by examining Diébédo Francis Kéré's works within the framework of Steve A. Moore's concept of regenerative regionalism. Moore's framework emphasizes placeness, technology, and socio-ecological significance, alongside the expanded notion of regionalism exhibited in modern architecture. Initially, the study delved into the emergence and trajectory of regionalism as a counterpoint to the internationalist architectural style in the modern era, particularly after the 20th century. Subsequently, it defined its research framework, centering on community participation, reflection of everyday life, and ecological sustainability based on the elements of regenerative architecture proposed in Moore's regenerative regionalism.

The regenerative characteristics of Kéré's architectural works can be analyzed as follows: First, Kéré fostered the involvement of local communities from the outset of his projects and offered training in construction techniques for residents. He advocated for construction methods utilizing readily accessible materials and equipment, empowering residents to undertake projects independently based on their skills. The construction technology and expertise acquired by the residents in this process were perpetuated through subsequent projects and gradually disseminated to a broader audience, thereby substantially enhancing the overall quality of life in the region.

Second, he developed models employing locally available materials and straightforward designs for constructing fundamental infrastructure, addressing the region's deficiencies. Consequently, community participants could readily adopt and adapt these models for other purposes. Moreover, he incorporated indigenous artifacts like pots into architectural designs to bolster local craftsmanship, thereby fostering employment and advancing education and regional industries through his architectural endeavors. This pivotal role contributed to the enhancement and enrichment of daily life within the

Table 3. Characteristics of regenerative architecture by project

Project / Year	Community Participation	Everyday life and social influence	Sustainable and Ecological value
Gando Primary School / 2001	◎	◎	◎
Gando Teachers' Housing / 2004	◎	○	◎
Dano Secondary School / 2007	◎		○
Lycée Schorge / 2016	○	◎	◎
Léo Doctors' Housing / 2018	○	○	
Gando Primary School Library / 2018	◎	◎	○
Startup Lions Campus / 2021	○		◎

\* ◎ : Highly Relevant, ○ : Relevant



communities.

Third, given the limited resources and infrastructure, Kéré maximized the use of locally abundant natural materials in the area, employing them in engineering designs to create comfortable indoor environments through sustainable ventilation and lighting. The implementation of a unique ventilation system, tailored to the local climate and vegetation, the introduction of innovative construction materials, and the enhancement of plant diversity have organically enhanced the regional ecological environment.

Finally, these attributes are further substantiated by several factors including the accumulation of community experience, integration with daily life, and generation of additional economic advantages, as well as technological advancements with the progression of projects.

This study analyzed how the traits of regenerative architecture, as delineated by Moore's concept of regenerative regionalism, are put into practice through Kéré's architectural portfolio. However, as this study is centered on a local community in Africa, future research could explore how the traits of regenerative architecture are implemented within more technologically advanced modern societies.

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## References

- [1] K. Frampton, *Toward a critical regionalism: Six points for an architecture of resistance*, In: T. Docherty, editor, *Postmodernism*, London, UK: Routledge, 2016, pp. 276-277.
  - [2] S. Carta, *Meaning of regionalism*, In: C3 Editorial Department, editors, *C3 magazine no. 301*, Seoul: C3 Korea, 2009.09, p.29.
  - [3] S.H. Song, *A study on the diversity of regionalism in modern architecture, followed by a paradigm shift*, *Journal of the Architectural Institute of Korea Planning & Design*, 27(12), 2011.12, pp.227-234.
  - [4] S. Giedion, *Architecture, you and me: The diary of a development*, Cambridge, MA: Harvard University Press, 1958, pp.138-151.
  - [5] K. Frampton, *Modern architecture*, London, UK: Thames and Hudson, 2007, pp.314-327.
  - [6] Y.H. Lim, *Study on modern meaning of regionalism and relationship with its sustainability*, *Journal of the Architectural Institute of Korea Planning & Design*, 29(1), 2013.01, pp.123-131.
  - [7] S.B. Kim, K.H. Kim, *Limitation and current significance of Kenneth Frampton's critical regionalism*, *Journal of the Architectural Institute of Korea Planning & Design*, 27(8), 2011.08, pp.217-224.
  - [8] S.A. Moore, *Technology, place, and nonmodern regionalism*, In: V.B. Canizaro, editor, *Architectural regionalism: Collected writings on place, identity, modernity, and tradition*, New York: Princeton Architectural Press, 2007, pp.432-442.
  - [9] The Pritzker Architecture, *Diébédo Francis Kéré*, <https://www.pritzkerprize.com/laureates/Diébédo-francis-Kéré#laureate-page-2421>, 2024.03.11.
  - [10] The Pritzker Architecture, *Diébédo Francis Kéré receives the 2022 Pritzker Architecture Prize*, <https://www.pritzkerprize.com/laureates/Diébédo-francis-Kéré#laureate-page-2446>, 2024.03.11.
  - [11] Kéré Architecture, *Work*, <https://www.kerearchitecture.com/>, 2024.03.11.
  - [12] *Arquitectura Viva*, *Gando library*, <https://arquitecturaviva.com/works/biblioteca-de-gando-10/>, 2024.03.11.
  - [13] Kéré Foundation, *Exploring local materials and methods*, <https://www.kerefoundation.com/en/practices/resources>, 2024.03.11.
- 1) Refer to the following. John Agnew, *Place and politics*, Boston: Allen&Unwin, 1987, pp.28.
  - 2) Refer to the following. Donald MacKenzie and Judith Wajcman, 'Introductory Essay' in *The Social Shaping of Technology*, Philadelphia: Open University Press, 1985, pp.3.
  - 3) Latour considered an economic explanation as the most efficient means of defining the origins and attributes of modern society and technology. Refer to the following. Bruno Latour, 'Visualization and Cognition: Thinking with Eyes and Hands' in *Knowledge and Society: Studies in the Sociology of Culture Past and Present*, JAI Press Inc., 1986, pp.1-40.
  - 4) The term 'nonmodern' of Moore is cited from the following. Bruno Latour, *We have never been modern*, Cambridge, MA: Harvard University press, 2012.
  - 5) Lyle's definition of a regeneration system means continuously replacing energy and materials necessary for operation via regenerative means. Refer to the following. John Tillman Lyle, *Regenerative Design for Sustainable Development*, New York: Wiley, 1994, pp.10.
  - 6) The eight elements of regenerative architecture defined by Moore are as follows. 1. Humans act as participatory agents within both human communities residing collectively in a specific place and within the broader network of non-human elements. This interaction shapes a social environment facilitated by regenerative technology and architecture, fostering a social network that accommodates diverse forms of life. 2. The architecture should reflect the everyday life of community members and be designed to resonate with them, enabling their participation in the construction's historical narrative. 3. Emphasizes the involvement in the ecological composition through integrated cultural and social activities within a region, rather than focusing solely on individual objects. 4. Pursues a technology that elucidates production methods aimed at enhancing labor knowledge and improving environmental conditions within a region, while also respecting eco-friendly values. 5. Constructs technology intertwined with everyday life through the engagement of residents and democratic processes. 6. Practical values with significant impacts on social operation through shared and technological intervention, ultimately improving daily life. 7. Enables human involvement in the environmental system of a location, encouraging their participation in preservation and regeneration efforts, extending beyond considerations of structure durability and technological sustainability. 8. Builds democratic places allowing production and reproduction, aimed at enhancing the quality of daily life, rather than focusing solely on historically significant monumental places. Refer to the following. Steven A. Moore, 'Technology, Place, and Nonmodern Regionalism' in 'Constructing a new agenda', Princeton Architectural Press, 2010, pp.442.