

DIY Architecture as an Alternative for Antifragility

By Francesco Airoidi*

The paper highlights the need for designers to take a position on the current state of permacrisis, arguing that a renewed design culture must be grounded in the identification of adaptive spatial practices. These include alternative experiences addressing antifragility in different contexts and enabling designers to rethink their role: from experts of solutions to spatial agents who activate processes of commoning. By investigating a range of case studies, the research formulates a design-driven methodology capable of structuring processes of transformative participation towards architectural co-design. DIY – “Do It Yourself” – architecture, understood as an effective alternative spatial practice, becomes a fertile field for this investigation as it encompasses self-construction and spatial appropriation, often-informal forms of making that respond directly to local needs and capacities. These actions can emerge from communities themselves, demonstrating a fundamental intelligence that support designers in constructing more antifragile systems and environments. Through two public building projects situated in Sub-Saharan Africa as proofs of concept, the contribution aims to show how DIY architecture can produce not only physical improvements but also a heightened sense of awareness, empowerment, and critical spatial thinking among communities. With participation and co-design, people develop stronger relationships with their environment, gaining the ability to maintain, adapt, and reinterpret spaces over time.

Antifragility in Permacrisis

The crisis of relevance that architecture is currently facing is certainly a part of a broader set. It goes from environmental and climate emergencies to economic and financial issues, demographic declines, geopolitical and humanitarian problems in the Middle East and Africa, threats of war, widespread epidemics, and social unrest. The inability to address the urgent challenges of these issues and to understand the kind of fragility they embody, often leads to a sort of retreat within the discipline. In front of a context of “permacrisis”¹ – a neologism that captures a recurring pattern of catastrophic events and perfectly describes a fundamental characteristic of the contemporary society – architecture seems to have failed to take a clear stance. Data demonstrate it: according to the recent EU and UN reports, the construction sector is responsible for 39% of CO₂ emissions, 36% of global energy consumption, 33% of drinking water use, 50% of raw material extraction, and, of course, for the continuous consumption of land.² The perpetual succession of crises

*PhD Candidate, Politecnico di Milano, Dipartimento di Architettura e Studi Urbani - DASTU, Italy.

1. G. Brown, M. A. El-Erian, M. Spence, and R. Lidow, *Permacrisis: A Plan to Fix a Fractured World* (London: Simon & Schuster, 2023).

2. Global Alliance for Buildings and Construction, *2020 Global Status Report for Building and Construction*. UN Environment Programme. Available here: <https://globalabc.org>. [Accessed June 2026.]

reveals a failure of the contemporary economic model, with the potential to unveil alternative visions and ideas. It exposes latent vulnerabilities while simultaneously opening spaces for experimentation, collective action, and the emergence of new socio-spatial practices. The crisis, therefore, presents an opportunity to shift the paradigm, to redefine individual and collective spatial structures envisioning a new architecture for inhabiting the ruins of capitalism.

The above-mentioned data highlight how traditional design approaches often fail to address the instability of permacrisis and overlapping risks. This inadequacy is not operational in its nature: it reflects a broader difficulty of global society in understanding uncertainty as a structuring condition rather than an exceptional one. In fact, many contemporary outcomes in architecture and urban planning fields highlight the limitations of approaches that neglect local contexts, adopting emergency-driven logic instead of encouraging long-term processes of adaptation and common learning. Without a mindset shift in this direction within architectural practice and research, the effects on built environment could increase territorial fragilities, spatial and geographic inequalities, social alienation, and segregation. Acknowledging this situation means taking a step towards antifragility – in its inherently adaptive sense to disorder, as Nassim Nicholas Taleb³ describes it – accepting that architecture is not always the solution but, on the contrary, is often part of the problems.⁴

Considering these dynamics, the need of a renewed design culture becomes evident, an “architecture of permacrisis”⁵ sensitive to contemporary urgencies. It must be grounded in the identification of alternative spatial practices,⁶ including those developed in non-Western contexts where communities often rely on informal and adaptive strategies. Observing these issues enables designers to rethink their role, moving from experts who impose solutions to spatial agents⁷ who activate bottom-up processes of “commoning”.⁸

DIY – “do it yourself” – architecture becomes a fertile field for this investigation, as it encompasses self-construction and spatial appropriation, often-informal forms of making that respond directly to local needs and capacities. Whereas modern architecture has historically privileged efficiency and control logic, DIY approaches foreground adaptability, participation, experimentation, and incremental transformation. Their values reside in the cultivation of processes capable of evolving through feedback and on-field experience: within them, mistakes and unforeseen conditions are not treated as failures but as opportunities for adjustment and innovation. The perspective

3. N. N. Taleb, *Antifragile: Things That Gain from Disorder* (New York: Random House, 2012).

4. Fosbury Architecture, *Spaziale: Everyone Belongs to Everyone Else* (Milano: Humboldt Books, 2023).

5. F. Airoidi, “Towards an Architecture of Permacrisis: Theories and Practices of Co-Design in Contexts Subject to Natural Risks,” in *Oltreterrischio. From Resilience to Antifragility: Architectures, Practices, Communities* (ed.) E. Corradi (Siracusa: LetteraVentidue, 2025), 110.

6. C. Ward, “Alternatives in Architecture,” in *Architettura del dissenso* (ed.) G. Borella (Milano: Elèuthera, 1976), 19-26.

7. N. Awan, T. Schneider, and J. Till, *Spatial Agency: Other Ways of Doing Architecture* (London: Routledge, 2011).

8. A. Belfield, and D. Petrescu, “Co-design, Neighbourhood Sharing, and Commoning Through Urban Living Labs,” in *CoDesign* 2, no. 21 (2024): 171-194.

strongly resonates with the notion of antifragility, introduced to identify systems that do not simply resist shocks but can adapt themselves to front crises. Unlike resilient ones, which seek to absorb disturbances and return to a previous state, antifragile devices gain strength through exposure to any kind of risk and uncertainty.

Applied to architecture, antifragility suggests a shift away from the pursuit of static solutions towards the design of processes⁹ that can learn and evolve over time with an adaptive orientation. And a first research question arises here: can DIY spatial practices inform an architectural co-design culture sensitive to the permacrisis condition described above?

Within this discourse, alternative bottom-up actions often emerge from communities themselves, demonstrating forms of possible shared knowledge starting from tradition and common sense. Can this fundamental intelligence¹⁰ support designers in constructing more antifragile frameworks?

Starting from these questions, some approaches and techniques will be analyzed in international experiences of active community engagement, from the theoretical statements of the past to contemporary examples. These best practices show how participatory architecture can produce not only physical improvements but also a heightened sense of awareness, empowerment,¹¹ and critical spatial thinking among communities.¹² Through shared decision-making and hands-on participation, people develop stronger relationships with their living environment, gaining the ability to maintain, adapt, and reinterpret spaces over time – essential elements for antifragility.

The DIY Alternative

To begin this discussion, it is necessary to define some key concepts and contextualize DIY architecture in order to clarify its conceptual boundaries. They should be understood as related but not interchangeable: alternative spatial practices, self-construction, participatory architecture, and co-design.

Alternative spatial practices refer to the broadest category, encompassing bottom-up and community-based ways of transforming space that challenge conventional top-down models of architectural production. These practices may include temporary or incremental interventions, tactical urbanism, spatial appropriation, community-based transformations, and other forms of collective action through which people actively shape their environments. These practices may be informal – and often illegal – but are characterized by a high degree of adaptation, a fundamental attitude towards antifragility. Their defining characteristic is not a specific construction method, but a

9. G. De Carlo, “L’architettura della partecipazione,” in *Giancarlo De Carlo: L’architettura della partecipazione* (ed.) S. Marini (Macerata: Quodlibet, 1971), 71.

10. C. Ratti (Ed.), *Intelligens. Natural. Artificial. Collective* (Venezia-Milano: La Biennale di Venezia, Silvana Editoriale, 2025).

11. S. Gangemi, *Common Landscapes: Processi di educazione, partecipazione ed empowerment in paesaggi ordinari* (Macerata: Quodlibet, 2019).

12. S. Armondi, “Spatial Strategies for Getting Ready? The Weak Linkage Amid Preparedness and Urban Policy,” in *Cities Learning from a Pandemic: Towards Preparedness* (eds.) S. Armondi, A. Balducci, M. Bovo, and B. Galimberti (London: Routledge, 2022), 47-51.

different way of spatial production, grounded in local knowledge, situated needs, collective agency, and the capacity to front changing conditions.

Self-construction identifies a more specific material and operational practice in which residents directly participate in the built environment's transformation. Within this field, it can extend beyond the simple act of physically building, involving the acquisition and sharing of technical knowledge, the autonomous management of resources, and greater control over the processes through which space is produced. It therefore concerns not only who builds, but also the redistribution of architectural knowledge and decision-capacity, making construction itself a form of collective learning and community empowerment.

Participatory architecture, by contrast, refers primarily to an architectural approach in which non-expert actors are actively involved in the design processes alongside architects and other professionals. Participation does not necessarily imply that users physically construct the resulting spaces: it concerns their engagement in defining needs, negotiating priorities, contributing knowledge, and influencing design decisions. In this sense, participatory approaches, as we will see, historically challenged the traditional role of architects by introducing more negotiated relationships between specialists and non-experts.

Co-design can be understood more specifically as the methodological and relational framework through which different forms of knowledge and agency are brought together to collectively develop a project. It therefore places particular emphasis on the process of collaboration itself through "transformative participation":¹³ rather than simply consulting residents or incorporating their feedback, co-design involves different actors in an ongoing process of experimentation and shared learning. It can extend beyond a technical operative methodology too, becoming a broader framework for reconfiguring relationships between stakeholders and the spaces they collectively inhabit. Thus, while self-construction describes a specific form of material engagement and participatory architecture describes an approach to work with users in architectural processes, co-design regards the dynamics of spatial common production.¹⁴

These previous definitions are linked to what can be called DIY architecture, the main topic of the present research. The concept represents a summary of alternative spatial practices, conceived from communities and engaging all the possible actors – architects, client, users, and general public – in all the design phases – design, construction, and post-completion.¹⁵ These include adaptive experiences developed in different fragile contexts, often characterized by a bottom-up orientation rather than an above-given plan. But, to better understand what DIY architecture is, it is worth to explore some historical experiences from which it derives, and then some contemporary case studies as best practices of community-based transformations.

13. J. Till, "The Negotiation of Hope," in *Architecture & Participation* (eds.) P. Blundell Jones, D. Petrescu, and J. Till (London: Routledge, 2005), 21.

14. D. Petrescu, "Losing Control, Keeping Desire," in *Architecture & Participation* (eds.) P. Blundell Jones, D. Petrescu, and J. Till (London: Routledge, 2005), 43-63.

15. P. Jenkins, and L. Forsyth (Eds.), *Architecture, Participation and Society* (London: Routledge, 2010).

In architectural debate, a strong position on the value of self-deterministic spatial practices is attributed to Hassan Fathy, one of the first architects and authors who investigated the strong link between the innovation in tradition and self-construction activities. In his *Architecture for the Poor* he promoted the use of local building techniques and materials, engaging residents in the construction of their own future houses.¹⁶ Considered one of the early pioneers of assisted DIY architecture, Fathy demonstrated through his research in Egypt and North Africa that a revolution in the process – rather than in technology itself – is fundamental to design in contexts characterized by significant economic and social fragility, as well as natural and environmental challenges.

The 70s represent a fertile period for participatory design in Western architectural debate, with the work of Giancarlo De Carlo, Lucien Kroll, Ralph Erskine, and many others. Their cultural production and practice introduced the collaboration between experts and users as a structural component of the project, challenging the authoritarian role of the modern architect. The ideas of these pioneers of “participatory architecture”¹⁷ profoundly influenced the European discourse on co-design, translating community engagement into built forms. By working with open, incremental, and negotiated processes,¹⁸ they anticipated many contemporary co-design issues which are essential to understand DIY spatial experiences of nowadays.

John F.C. Turner is another central figure in the definition of modern alternative approaches, bridging the gap between the European ideological matrix – coming from the movements of 1968 – and non-Western experiences. He studied self-managed settlements in Peru, formulating the principle of “dweller control”: in *Freedom to Build*,¹⁹ he redefined the role of residents in building processes and houses’ managing, theorizing a full user control over the construction process. The concept is also revisited in his subsequent book, *Housing by People: Towards Autonomy in Building Environments*,²⁰ a work that profoundly influenced urban planning thought and housing policies, promoting a participatory approach to design and management of the built environment.

The concept of DIY architecture stems from the re-reading of some authors such as Yona Friedman, who spoke about a vision of architecture grounded in the capacity of ordinary people to actively shape their own environments, as written in *Utopies réalisables*.²¹ Rejecting centralized and expert-driven models, he argues that spatial transformation should emerge through the direct engagement of residents, who become participants in decision-making, and construction processes. This perspective lays the foundation for an understanding of DIY architecture not only as a technical practice of self-construction, but as an alternative way of producing space which is based on collective agency and shared learning.

16. H. Fathy, *Architecture for the Poor: an Experiment in Rural Egypt* (Chicago: The University of Chicago, 1973).

17. De Carlo, “L’architettura della partecipazione,” 1971, 37.

18. L. Kroll, *Bio, psycho, socio/eco. Ecologies Urbaines* (Paris: Éditions L’Harmattan, 1996); Till, “The Negotiation of Hope,” 2005.

19. J. F. C. Turner, and R. Fichter, *Freedom to Build* (New York: Macmillan, 1972).

20. Turner, *Housing by People: Towards Autonomy in Building Environments* (London: Marion Boyars Publishers, 1976).

21. Y. Friedman, *Utopies réalisables* (Paris: Éditions de l’éclat, 1974).

Architecture is no longer conceived as a finished object delivered by professionals, but as an open and evolving framework that communities can modify according to changing needs and conditions. These ideas are further developed in *Architecture de survie: Où s'invente aujourd'hui le monde de demain*,²² where Friedman introduces the image of the *architect sans diplômes* or “barefoot architect”,²³ a resident capable of designing and building through accessible knowledge and collective work. In this model, architectural expertise is shared and not monopolized, enabling people to acquire practical skills and control over their living environments. Self-construction thus becomes a process of knowledge production as much as spatial transformation, encouraging cooperation in local problem-solving.

As Colin Ward noted in the 1970s and 1980s, the architecture’s crisis of relevance calls for valid “alternatives”²⁴ based on social intelligence and self-organization: he interpreted inhabiting as an autonomous self-managed practice, linking architecture to anarchism and self-construction. He promoted the active role of communities in spatial production, exploring both its physical and immaterial aspects. The former can be found in the vernacular alternative, the ecological one, the adaptive one, the environmental one, and the unionist one; while the latter refers to counterculture and the issue of control. Thus, the reaction to an architecture of alienation²⁵ lies in the conception of spatial transformation as a social act, which moves from a reflection on participation to a definition of co-design that corresponds to an effective methodology for developing architectural projects in permacrisis conditions.

From here, the dual material and immaterial dimension of DIY architecture becomes evident: on the one hand, the collective sphere of alternative transformations involves a shared spatial production present in certain aspects of contemporary design culture; on the other hand, the social dimension of self-managed processes calls for a reflection on the methods and possibilities for shaping effective practices of architectural and urban co-design. Before examining some contemporary best practices in these fields, we will explore this dualism through two interesting metaphors.

22. Friedman, *L'Architecture de survie: Où s'invente aujourd'hui le monde de demain* (Tournai: Casterman, 1978).

23. Y. Lari, A. Meadows, and P. S. Meadows, *Disaster Preparedness Manual* (Karachi: Heritage Foundation of Pakistan, 2013).

24. Ward, “Alternatives in Architecture,” 1976, 26.

25. Ibid, 19.



Figure 1. *Lucien Kroll, La Mémé, Bruxelles (Belgium), 1970-1976*
Source: Airolti 2025.

Zobeide: An Architecture of Desires

“Di là, dopo sei giorni e sette notti, l'uomo arriva a Zobeide, città bianca, ben esposta alla luna, con vie che girano su sé stesse come in un gomitolo. Questo si racconta della sua fondazione: uomini di nazioni diverse ebbero un sogno uguale, videro una donna correre di notte per una città sconosciuta, da dietro, coi capelli lunghi, ed era nuda. Sognarono d'inseguirla. Gira gira ognuno la perdettero. Dopo il sogno andarono cercando quella città; non la trovarono ma si trovarono tra loro; decisero di costruire una città come nel sogno. Nella disposizione delle strade ognuno rifece il percorso del suo inseguimento; nel punto in cui aveva perso le tracce della fuggitiva ordinò diversamente che nel sogno gli spazi e le mura in modo che non gli potesse più scappare.

Questa fu la città di Zobeide in cui si stabilirono aspettando che una notte si ripetesse quella scena. Nessuno di loro, né nel sonno né da sveglio, vide mai più la donna. Le vie della città erano quelle in cui essi andavano al lavoro tutti i giorni, senza più nessun rapporto con l'inseguimento sognato. Che del resto era già dimenticato da tempo.

Nuovi uomini arrivarono da altri paesi, avendo avuto un sogno come il loro, e nella città di Zobeide riconoscevano qualcosa delle vie del sogno, e cambiavano di posto a porticati e a scale perché somigliassero di più al cammino della donna inseguita e perché nel punto in cui era sparita non le restasse via di scampo.

I primi arrivati non capivano che cosa attraesse questa gente a Zobeide, in questa brutta città, in questa trappola.”²⁶

Within the *Città Invisibili*,²⁷ Zobeide is described as a city built by people coming from different places who shared the same dream. Unable to capture it, they began constructing an environment that reflected the trajectories of their visions. One by one, each new builder contributed to the city's growth adapting and extending its form according to their personal interpretations of the original image, until the urban fabric became the cumulative result of all the individual actions. So, Zobeide is not the product of a singular plan, nor the realization of a given design: it comes from the addition or modification of many situated decisions and shared desires gradually taking shape in the built environment.

26. “From there, after six days and seven nights, the man arrives at Zobeide, a white city, bathed in moonlight, with streets that wind around themselves like a ball of yarn. This is the story of its founding: men from different nations had the same dream; they saw a woman running through an unknown city at night, seen from behind, with long hair, and she was naked. They dreamed of chasing her. As they turned and turned, each one lost her. After the dream, they went searching for that city; they did not find it, but they found one another; they decided to build a city just as in the dream. In the layout of the streets, each one retraced the path of his pursuit; at the point where he had lost the fugitive's trail, he arranged the spaces and walls differently than in the dream so that she could never escape him again. This was the city of Zobeide, where they settled, waiting for that scene to repeat itself one night. None of them, neither in sleep nor while awake, ever saw the woman again. The city's streets were the ones they walked to work every day, no longer having any connection to the dreamt-of chase. Which, in any case, had long since been forgotten. New men arrived from other towns, having had a dream like theirs, and in the city of Zobeide they recognized something of the streets from the dream, and they rearranged the arcades and stairways so that they would more closely resemble the path of the pursued woman and so that at the point where she had vanished, she would have no way to escape. The first arrivals couldn't understand what drew these people to Zobeide, to this ugly city, to this trap.” I. Calvino, *Le città invisibili* (Torino: Einaudi, 1972), 43-44. (English translation by the author).

27. Ibid.

This passage offers a compelling metaphor for the architecture of desires, read with the Lefebvrian²⁸ and Deleuzian²⁹ conception of space as the “*produit social*”³⁰ of collective actions.³¹ It is the foundation of contemporary DIY architecture as a co-design practice, in which the built environment emerges from the direct intervention of its users rather than from the implementation of an externally directed plan. Like Zobeide, DIY practices are not primarily defined by formal coherence or control, but by their capacity to transform space through the engagement of those who use it. Self-construction, spatial appropriation, tactical interventions, collective maintenance, informal actions, and participatory making all belong to a constellation of practices that challenge the conventional separation between designers and users, specialists and non-experts, conception and execution. Within this idea, architecture is understood as an open and adaptive process through which communities actively shape their environments according to local needs, rather than as a finished object delivered by professionals which does not care about available resources and evolving aspirations.

The growing relevance of DIY architecture can be understood in relation to the broader context of contemporary uncertainty: social, environmental, economic, etc. Fragile communities increasingly confront conditions that exceed the capacity of conventional design approaches to provide timely and effective responses. Climate-related disasters, housing shortages, forced migration, economic precarity, infrastructural decline, and institutional fragmentation have exposed the limits of architectural models that depend on stability and centralized decision-making. Under these conditions, architecture’s traditional aspiration to control complexity often proves inadequate. DIY practices operate within uncertainty: they emerge where formal and institutional systems are absent, insufficient, inaccessible, or slow. Here, instead of waiting for external interventions, individuals and communities mobilize existing knowledge: they use local materials and social networks to directly transform space, working collectively. The significance of these practices lies in their ability to activate forms of agency and learning that strengthen communities’ cohesion and spatial awareness.

Of course, DIY architecture is rooted in local knowledge and direct engagement with material realities; it remains highly responsive to changing circumstances. Since it relies on distributed participation and not on centralized authority, it can accommodate multiple perspectives and forms of expertise; it develops incrementally, it allows for continuous testing, modification, and improvement. Most importantly, its protagonists are often communities themselves, and the production of space becomes inseparable from the production of social capacity.

Each act of building, repairing, adapting, or appropriating space contributes not only to the transformation of the physical environment but also to the accumulation of shared knowledge and collective spatial awareness, skills that can be used in future challenges. In this sense, the architectural outcome is only one dimension of

28. H. Lefebvre, *La production de l’espace* (Paris: Anthropos, 1974).

29. G. Deleuze, and F. Guattari, *L’Anti-Édipe: Capitalisme et schizophrénie* (Paris: Les Éditions de Minuit, 1972).

30. “Social product” (English translation by the author).

31. Lefebvre, *La production de l’espace*, 1974, 88.

the process: equally significant are the numerous networks that emerge through this kind of participation.

Returning to the image of Zobeide, what makes the city remarkable is not the perfection of its form but the way its form emerges from the accumulated actions of many individuals responding to a common desire. Its streets are traces of participation, while its structure is the sedimentation of collective agency. Likewise, alternative spatial transformations demonstrate that collective meanings can arise from processes that are distributed and open to continuous reinterpretation. Far from representing a marginal or informal domain outside architectural culture, these DIY practices reveal new ways of understanding how architecture is produced through its common conception of space. In doing so, they point towards a more adaptive and antifragile view of the discipline – one capable of deriving strength from uncertainty and generating forms of collective agency that extend beyond the built environment itself.

Ersilia: An Architecture as a Social Act

“A Ersilia, per stabilire i rapporti che reggono la vita della città, gli abitanti tendono dei fili tra gli spigoli delle case, bianchi o neri o grigi o bianco-e-neri a seconda se segnano relazioni di parentela, scambio, autorità, rappresentanza. Quando i fili sono tanti che non ci si può più passare in mezzo, gli abitanti vanno via: le case vengono smontate; restano solo i fili e i sostegni dei fili.

Dalla costa d'un monte, accampati con le masserizie, i profughi di Ersilia guardano l'intrico di fili tesi e pali che s'innalza nella pianura. È quello ancora la città di Ersilia, e loro sono niente.

Riedificano Ersilia altrove. Tessono con i fili una figura simile che vorrebbero più complicata e insieme più regolare dell'altra. Poi l'abbandonano e trasportano ancora più lontano sé e le case.

Così viaggiando nel territorio di Ersilia incontri le rovine delle città abbandonate, senza le mura che non durano, senza le ossa dei morti che il vento fa rotolare: ragnatele di rapporti intricati che cercano una forma.”³²

If Zobeide can be read as a metaphor for the material dimension of collective spatial production, Ersilia reveals the less visible social infrastructure upon which every co-design approach depends. This second *città invisibile*³³ shifts attention

32. “In Ersilia, to establish the relationships that underpin city life, the inhabitants stretch wires between the corners of houses, white, black, gray, or black-and-white, depending on whether they signify kinship, exchange, authority, or representation. When there are so many wires that one can no longer pass through them, the inhabitants leave: the houses are dismantled; only the threads and their supports remain. From the mountainside, camped with their belongings, the refugees from Ersilia gaze at the tangle of taut threads and poles rising up in the plain. That is still the city of Ersilia, and they are nothing. They rebuild Ersilia elsewhere. They weave a similar figure with the wires, one they would like to be more complex and yet more regular than the other. Then they abandon it and carry themselves and their homes even farther away. Thus, traveling through the territory of Ersilia, you encounter the ruins of abandoned cities, without the walls that do not last, without the bones of the dead that the wind rolls about: webs of intricate relationships seeking a form.” Calvino, *Le città invisibili*, 1972.

33. Ibid.

from the built environment to the network of relationships that makes collective action possible in the first place: in Italo Calvino's image, the people stretch strings between houses to represent bonds of exchange, kinship, cooperation, and mutual dependence. As these connections proliferate, the web becomes denser than the city itself, eventually prompting residents to abandon the settlement while leaving behind that sustaining pattern of relationships. This suggests that the true essence of the city resides not in its physical structure but in the social ties that continuously redefine it.

The significance of spatial transformations does not lie only in the tangible environments they produce, nor in the social interactions they encourage, but in the reciprocal relationship between the two dimensions. Every collectively built structure is simultaneously the outcome of cooperation and a catalyst for further social exchange; every act of space-making contributes to the creation of shared knowledge, collective identities, and forms of mutual support. From this perspective, DIY architecture extends beyond the construction of buildings and infrastructures to encompass the production of socio-cultural capacities.

Processes of self-construction and spatial appropriation generate opportunities for learning, negotiation, and collaboration, enabling communities to develop competencies that remain valuable after the completion of physical intervention too. The built environment becomes thus both the material expression and the continuous reinforcement of collective agency. Especially in contexts increasingly characterized by uncertainty and overlapping crises, these relational dimensions acquire particular importance: what allows communities to adapt is often the existence of networks capable of mobilizing knowledge and work. Like the strings of Ersilia, these connections are frequently invisible within conventional representations of architecture, yet they constitute a fundamental form of infrastructure.

By highlighting the inseparability of spatial and social production, Ersilia complements the metaphor of Zobeide, suggesting that the transformative potential of DIY architecture can be found not only in its capacity to produce alternative spatial transformations, but also in its ability to cultivate the collective relationships through which those spaces can exist, transform, and stay.

From DIY Architecture to Co-Design: Contemporary Best Practices³⁴

Read in relation to Zobeide, Ersilia completes a broader understanding of DIY architecture. The former illustrates how collective desires can materialize through bottom-up dynamics; the latter reveals the relational processes by means these acts acquire meaning. Together, the two *città invisibili*³⁵ can be interpreted as the sides of the same coin: one representing the production of space by society, the other the production of society through its space. This dual perspective is particularly relevant for understanding practices such as self-construction, community-based

34. The selection of best practices is based on the criteria explored so far: first and foremost, the coexistence of the two dimensions represented by Zobeide and Ersilia; and the adoption of DIY architecture practices.

35. Calvino, *Le città invisibili*, 1972.

building processes, tactical urbanism, incremental transformations, and other forms of alternative spatial transformation.

In contemporary disciplinary discourse, several influential experiences demonstrate how the lessons embedded in DIY architecture can be translated into structured co-design frameworks that actively integrate both spatial making and collective agency. These approaches can position self-construction as a model for rethinking the role of architecture – and architects themselves – in contexts marked by uncertainty, inequality, and environmental risk. Doing so, they redefine design not as a unidirectional act of authorship but as a process of “negotiation”³⁶ through which communities and professionals co-produce adaptive spatial systems.

An interesting example is provided by the work of Yasmeen Lari and her concept of *Barefoot Social Architecture*. Operating in contexts exposed to recurrent disasters and resource scarcity, Lari with the support of the Heritage Foundation of Pakistan developed construction systems that rely on local materials, cheap solutions, traditional techniques, and community participation. Her approach does not simply distribute building knowledge but reconfigures it as a collective asset embedded within social structures.

“One of the most important aspects is the involvement of the population in the educational and training dimension of risk prevention, so the *Disaster Preparedness Manual* was intentionally written in English and Urdu to make it easy for the entire population to understand. The manual illustrates good practices to be undertaken ‘before, during and after’ the disaster, where ‘before’ (prevention) is central in the planning and organization of villages, through proper preparation that starts from site location, defining safe escape routes, and using suitable construction techniques.”³⁷

Residents, in this experience, are trained to become active builders of their own environment, acquiring skills that allow them to respond autonomously to future crises. The resulting architecture is therefore not only materially sustainable but also socially self-reinforcing: each intervention strengthens the community’s capacity to act, adapting and (re)building. In this sense, Lari’s work directly translates the Ersilia-Zobeide dialectic into DIY practice, where spatial production and relational networks mutually sustain one another, generating conditions of antifragility through common learning.

A different but complementary trajectory can be observed in the work of Alejandro Aravena and *ELEMENTAL* practice. Their famous incremental housing model explicitly embraces incompleteness as a design strategy: they provide a structural framework that residents can gradually complete and modify according to their needs and resources.³⁸ This approach recognizes that dwelling is not a static condition, but an evolving process shaped by economic capacity, family structures, and culture. The initial architectural intervention establishes a spatial scaffold, while the subsequent transformations are driven by people themselves. This process

36. Till, “The Negotiation of Hope,” 2005, 27.

37. E. Corradi, “The Future Underpinned by the Past,” in *Yasmeen Lari: an Architect* (eds.) F. Berlingieri, E. Corradi, C. Cozza, and I. Forino (Milano-Torino: Pearson, 2021), 36-37.

38. A. Aravena, and A. Iacobelli, *Elemental: Incremental Housing and Participatory Design Manual* (Ostfildern: Hatje Cantz Verlag, 2016).

embeds social intelligence into the built environment: users become co-authors of their housing conditions, and the city evolves through distributed acts of construction as in Zobeide metaphor. The model thus institutionalizes DIY logic within a professional design framework, transforming incremental self-construction into a scalable and policy-relevant strategy which generate social value – like in Ersilia image. This reframes vulnerability too, not as a deficit to be eliminated but as a condition through which adaptive capacities can emerge over time.



Figure 2. Yasmeen Lari, *Qatar Pavilion at the 19th Venezia Architecture Biennale (Community Center in Pakistan), Venezia (Italy), 2024-2025*

Source: Airolti 2025.

A third important reference is the work of Doina Petrescu and the *atelier d'architecture autogérée* (aaa),³⁹ which explicitly situates co-design within the broader field of commons-based urbanism. Through projects such as *R-Urban* in the Paris region, aaa develops infrastructures for local resilience grounded in collective management, shared resources, and participatory governance.⁴⁰ These initiatives integrate physical interventions – gardens, recycling units, cooperative spaces – with social and organizational frameworks that enable long-term collective care. Here, architecture becomes inseparable from processes of self-organization and civic engagement, in a DIY-friendly dimension. Petrescu's theoretical contribution is particularly significant in articulating the role of desire, care, and everyday practice as productive forces in spatial transformation. In this perspective,

39. aaa atelier d'architecture autogérée (Ed.), *Making Rhizome: A Micro-political Practice of Architecture* (Paris: AAA, 2011).

40. Ibid.

co-design is not limited to a methodological tool but becomes a political framework for reconfiguring relations between users and institutions.

“Driven by desire, participatory design is a ‘collective bricolage’ in which individuals (clients, users, designers) are able to interrogate the heterogeneity of a situation, to acknowledge their own position and then go beyond it, to open it up to new meanings, new possibilities, to ‘collage their own collage onto other collages’, in order to discover a common project.”⁴¹

These three examples are part of a much broader panorama of co-design practices that base their methodology on DIY approaches, informal processes, self-construction, and spatial appropriation. These aspects are most prominent in the work of architects where they are already well-established in common practice – such as *Grupo Al Borde*, Rafael Iglesia, Solano Benitez, Eugenio Ortúzar and Tania Gebauer, Nivaldo Vieira de Andrade,⁴² Diébédo Francis Kéré, *Semillas Peru* by Marta Maccaglia, Eko Prawoto, Hsieh Ying-Chun, and many others around the world. In Western contexts, some similar approaches can be found in interesting experiences like Italian *Camposaz*, *Orizzontale* with *La Rivoluzione delle Seppie*, *Laboratorio di Architettura Partecipata*.

Proofs of Concept

Especially in contexts characterized by uncertainty, resource scarcity, and overlapping crises, DIY practices demonstrate how community-based spatial transformations can strengthen collective self-determination and generate adaptive capacities that grow through experience. In this sense, every DIY process can be understood as an antifragile architectural action: it does not seek stability through control, but it cultivates the ability of communities to learn from disasters, adapt to change, and transform conditions of vulnerability into opportunities for collective empowerment.

The proofs of concept (PoCs) chosen to stress the themes of this contribution come from a design-driven research experience on self-construction carried out during 2022 and 2023, two public building projects situated in Sub-Saharan Africa. Next to the main research topic of architectural alternative strategies for antifragility, the peculiarity of the context called into play some specific issues too: poverty and scarcity of resources, ongoing socio-economic and political crises, hunger and thirst, natural risks, and climate change. The permacrisis scenario is exemplary here, where extreme environmental and social conditions stress the contemporary urgencies. Both the projects consider spatial composition – on the one hand – as a vehicle to develop a narration of new meanings given by place transformation; and participatory processes or DIY architecture – on the other hand

41. Petrescu, “Losing Control, Keeping Desire,” 2005, 58.

42. F. Calabrese, “Autocostruzione e architetture sperimentali al limite,” in *Ananke*, no. 72 (2014): 87-100.

– as an alternative spatial practice towards antifragility conditions for communities and territories.

The Design-Driven Research Methodology

To actively investigate all these topics, the work adopts a research-by-design approach, using two PoCs developed as situated cases to investigate how DIY architecture can inform architectural co-design in conditions of risk and uncertainty. Rather than treating the projects as conventional case studies, the research uses the design process itself as a means of inquiry, examining how material and immaterial dimensions – Zobeide and Ersilia ones – of people engagement can generate adaptive capacities to permacrisis condition.

The community engagement process was conceived as an integral component of the design methodology. In both PoCs, the involvement of workers and future users was considered across the design and construction phases, with particular attention to the sharing of technical expertise, local knowledge, and common-sense solutions. This process was supported, on the one hand, by accessible visual communication tools intended to establish a common language between architectural specialists and non-expert participants; on the other hand, meetings and workshops were explicitly conceived as moments of participatory learning, extending the role of the community beyond consultation towards an active contribution to the imagined building cycle.

The research material consists primarily of design and process documentation generated through the PoCs, including architectural drawings, diagrams, material and construction studies, and the design of self-construction processes. These materials are read together to identify how experimentation helps to advance antifragile strategies within design culture. The analysis is therefore qualitative and interpretative, focusing on the relationships between spatial outcomes and the processes through which they can be produced.

Finally, the PoCs – with all the limitations that an unbuilt project may entail within such a significant practical scale – are evaluated with an antifragility framework derived from the theoretical discussion developed in the first part of the paper. Rather than measuring antifragility as a fixed performance value, the analysis identifies its presence through four interrelated dimensions: adaptability, understood as the capacity of spaces to respond to changing conditions; common learning, referring to the circulation of knowledge through participation and on-site practice; collective agency, concerning the ability of communities to participate and act in design dynamics; transformability, which is about the capacity of spaces and processes to be modified and reinterpreted. These dimensions provide the analytical lens through which the two PoCs are compared with case studies and the theoretical *corpus*, allowing the research to assess not only the physical characteristics of the proposed architectures but also the social and relational infrastructures that may enable them to evolve in response to uncertainty. This framework works with the paper's understanding of antifragility as systems' adaptation capacity.

Baghere Children's House

The architectural design of a Children's House in the Senegalese village of Baghere is the first proof of concept of this research, and revolves around the idea of child-friendly spaces and the centrality of the theme of play, focusing on the role of the latter in health rehabilitation and nutrition education.

The figure of the square, taken as a compositional matrix for its clarity of reading and simplicity of construction, is recognizable in many architectural elements of the project, such as the inner courtyard, the roofing elements, and the proportions of the elevations.



Figure 3. *Baghere Children's House, Project View of the Main Elevation*

Source: Airoidi F, Alinovi S, Arcieri E, Borghi L, 2022.

The functional program spaces – administration room, archives, storage, bedrooms and playgrounds – are distributed around a defining compositional line: an inhabited wall that runs through the building and accommodates services, play objects, educational spaces and equipment. It represents the place of childhood, housing some swings, a slide, playgrounds, green walls with edible crops, a kitchen for nutrition education and a pantry for storing supplies with a pedagogical function. Its layout – which ranges from the didactic garden in the entrance courtyard to the space for meals and recreation at the exit – is a metaphor for the path of food from the earth to the table that accompanies the visitor in the experience of the space and can guide the youngest children in a rehabilitation that is both sanitary and educational.

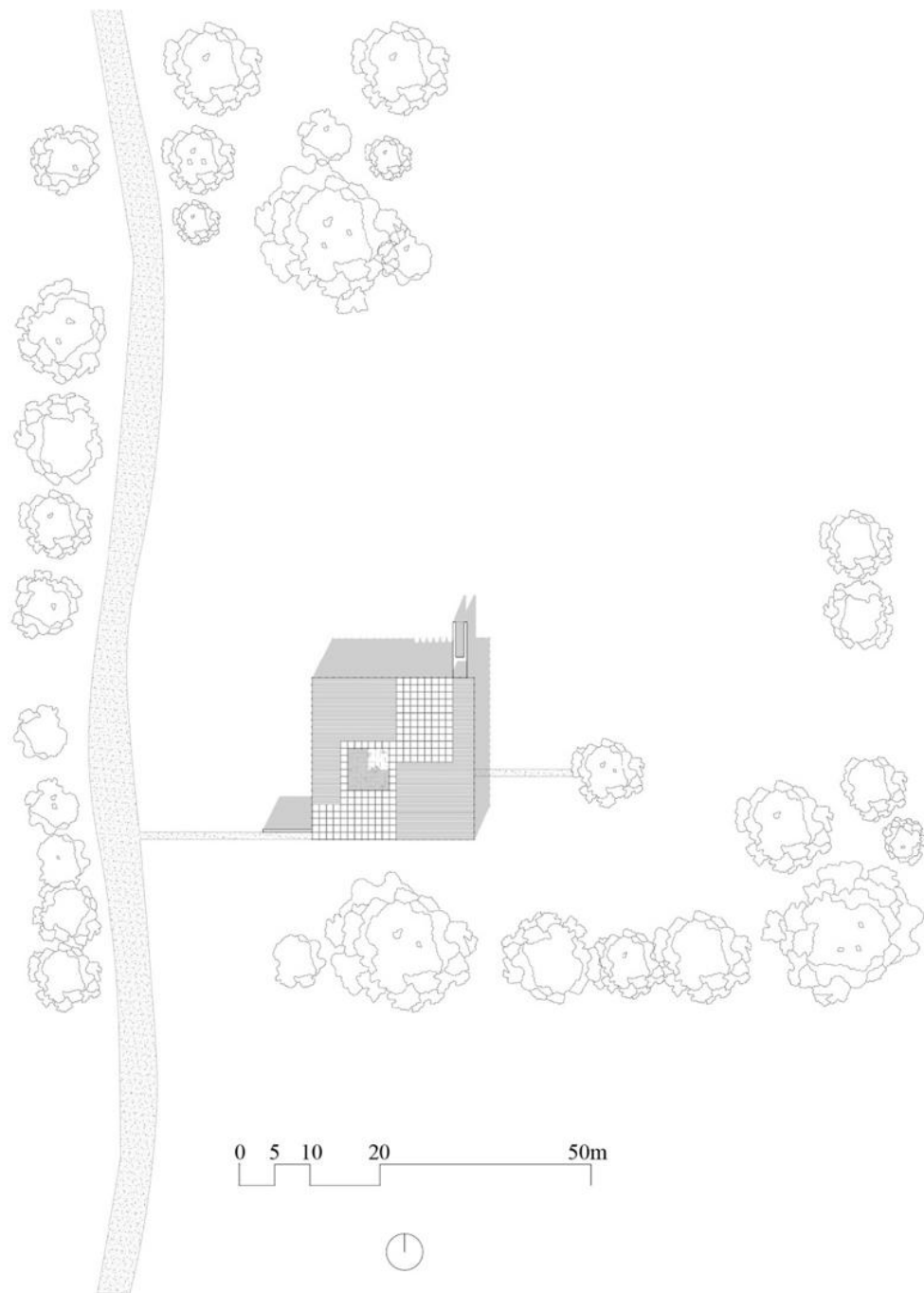


Figure 4. *Baghere Children's House, Masterplan*
Source: Airoldi F, Alinovi S, Arcieri E, Borghi L, 2022.

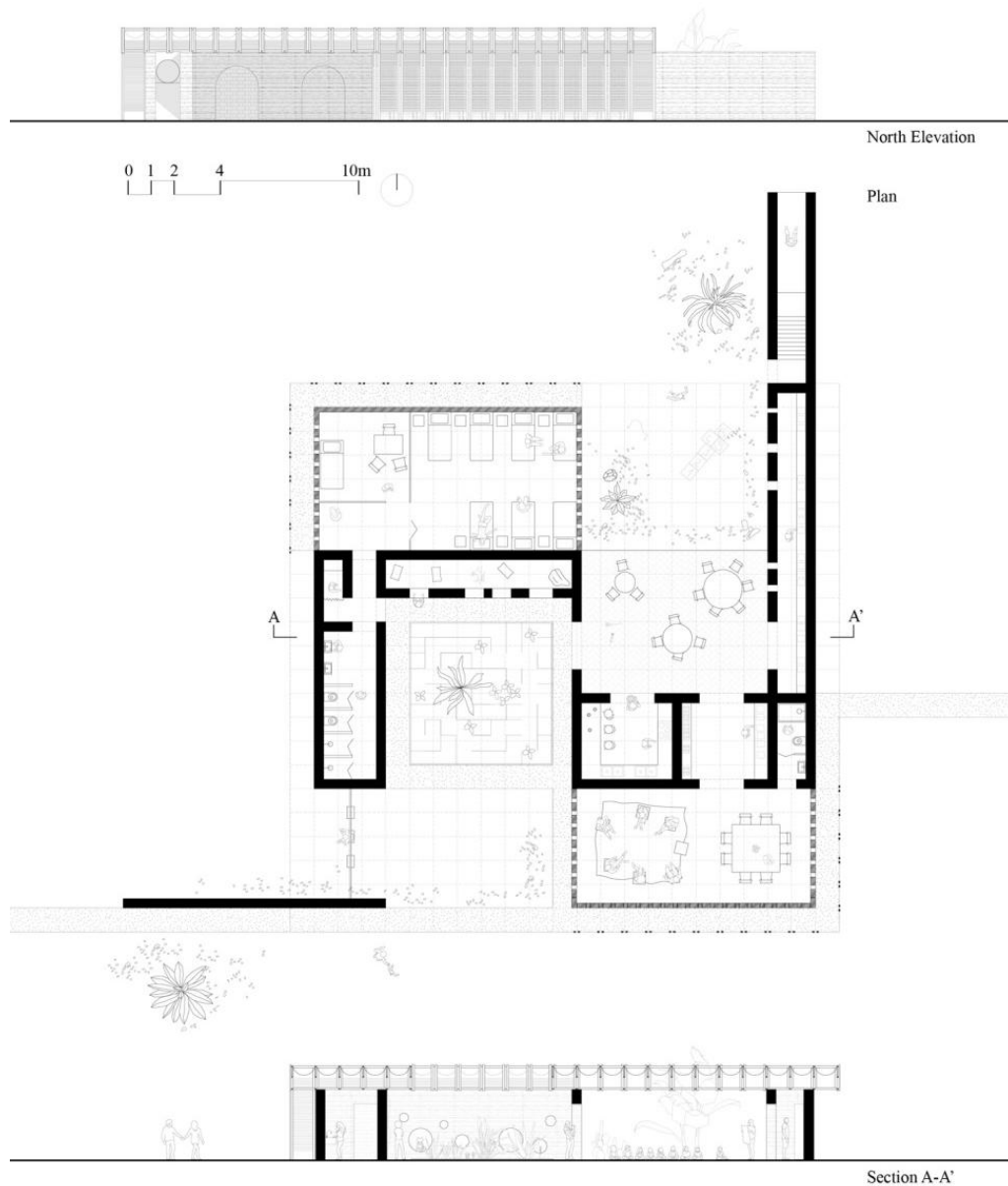


Figure 5. *Baghere Children's House, Plan, Section, and Elevation*

Source: Airoldi F, Alinovi S, Arcieri E, Borghi L, 2022.

The dialectical relationship between the geometry of the square plot and the broken line of the inhabited wall makes evident the differences between what is static and regular – or what is program – and what is dynamic and irregular – or what is play –, allowing the design of a two-level reading layout: the children's space overlaps with the other users' one, generating distinct but always communicating streams of people.

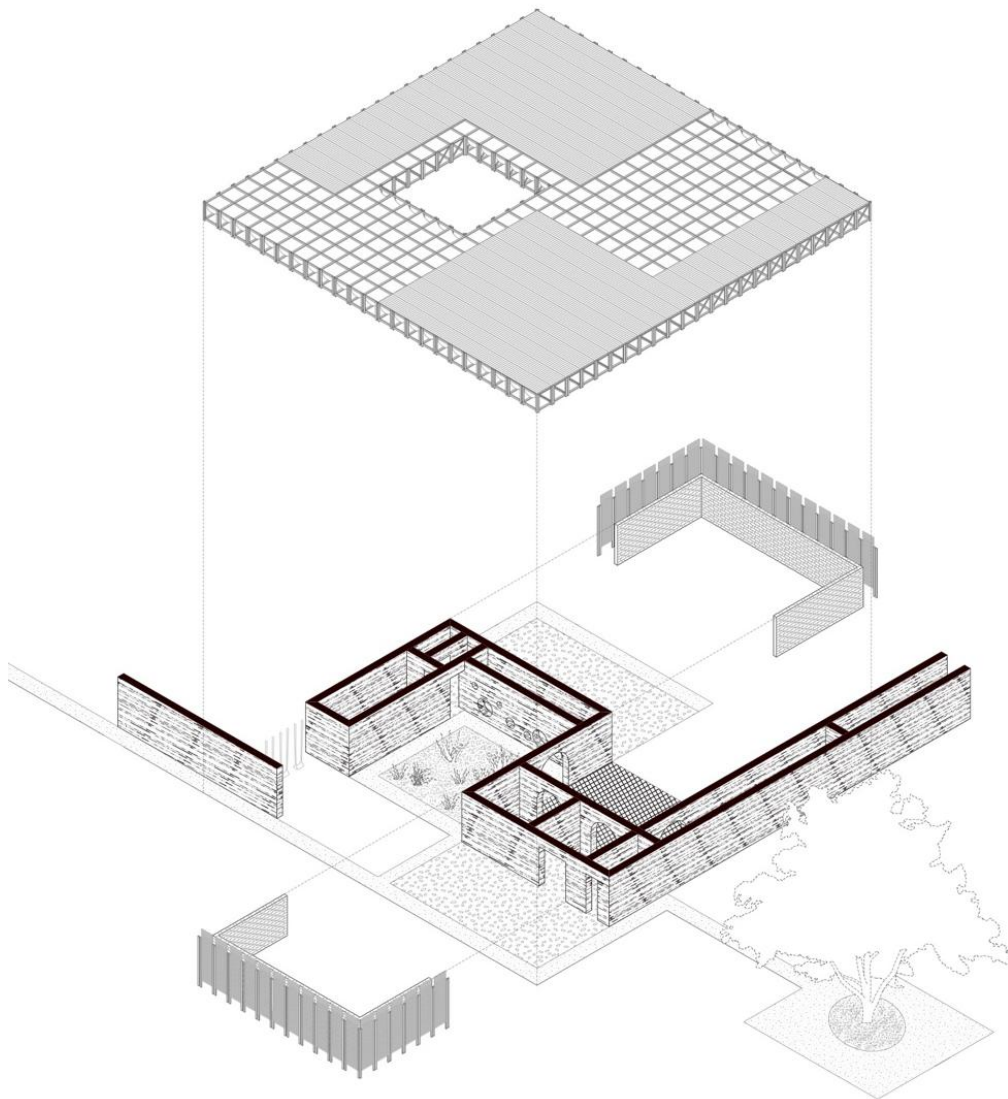


Figure 6. *Baghere Children's House, Axonometric Diagram*

Source: Airoldi F, Alinovi S, Arcieri E, Borghi L, 2022.

A characterizing element is the roofing too, designed according to the above-mentioned regular matrix and consisting of a cubic lattice of 1m^3 wooden beams supporting thin sheet metal plates and offering a possibility of natural ventilation through its section. The task of imparting a hierarchy to the fronts is fulfilled by fabrics hung between the beams, which are configured as U-shaped elements and shelter the non-waterproof areas from the sun.

The extraordinariness of the inhabited wall is not only a matter of design in plan, but it is also perceived in elevation: it is the only element of the composition that reaches directly to the roof, while the rooms of the functional program are lowered and designed through a different technology, with special attention to the effects of light on space.

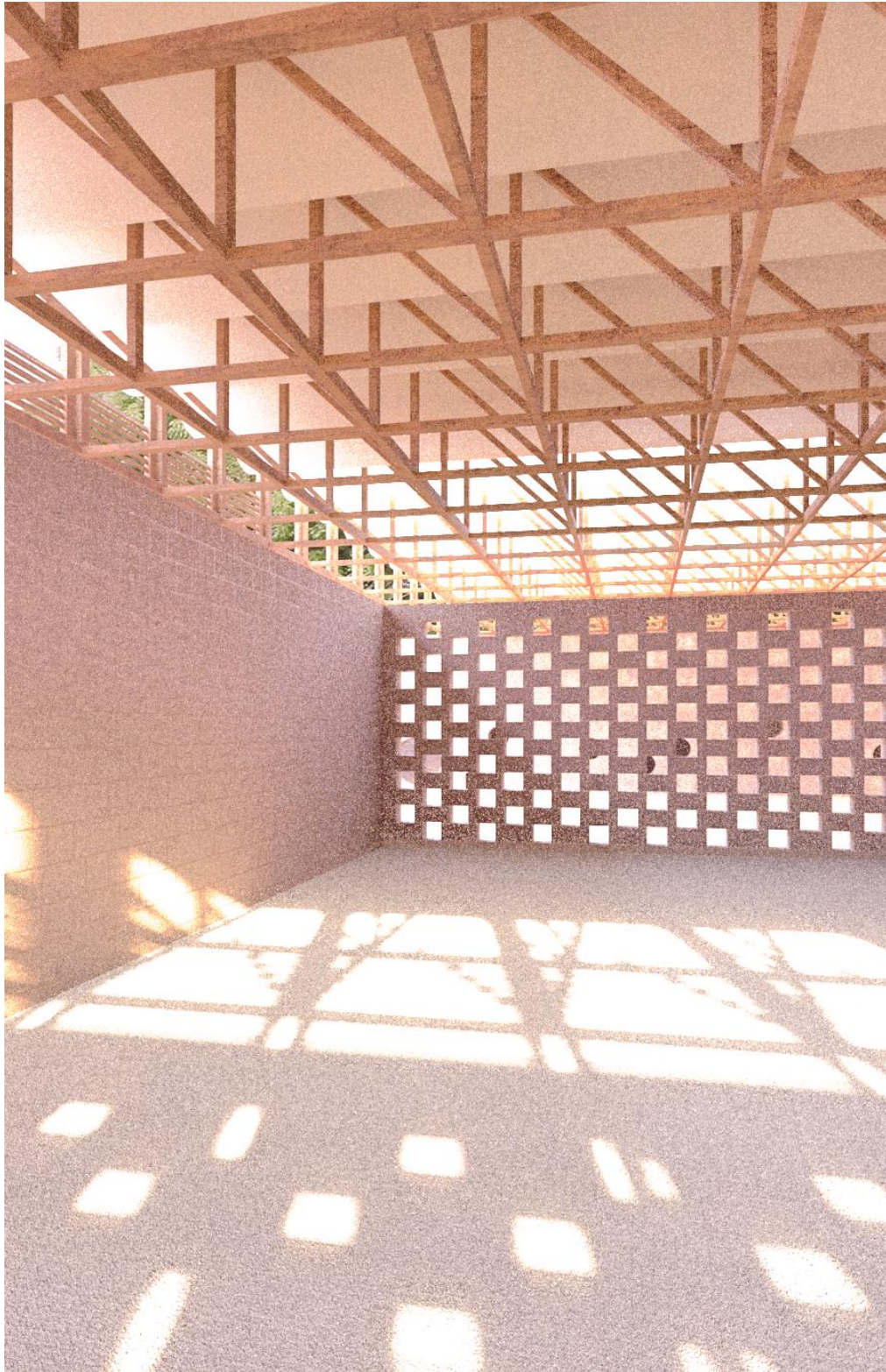


Figure 7. *Baghere Children's House, the Roof and the Effects of Light*
Source: Airoidi F, Alinovi S, Arcieri E, Borghi L, 2022.

Finally, at the planimetric level, it was chosen to work with the road adjacent to the site by placing the building close to the pre-existing vegetation on the Southern side, in order to take advantage of its shading and micro-climatic capabilities. Facade shielding and thermal comfort are indeed key topics, representing sensitive issues which architecture fronts through technological choices in roofing and vertical closures. The selection of materials was therefore dictated not only by their cost and on-site availability, but also by the possibility of composing spaces appropriate to the type of climate and users.

Chosen Materials

The main material features of the project are the mass and continuity of the inhabited wall, the fragmentation of the sleeping area and administration rooms, and the volume and lightness of the roof.

First, the desired effect for the inhabited wall is obtained through the use of red clay-based *pisé* earth, which contributes both to characterize the special element in plan and elevation, and to offer adequate thermal inertia performance. In the second case, the use of stabilized clay bricks for the construction of the rooms, in addition to offering a wall thickness that considers the thermal properties, gives the possibility to hierarchize the compositional elements and to control the light through the position of the blocks.



Figure 8. *Baghere Children's House, View from the Main Entrance*

Source: Airoldi F, Alinovi S, Arcieri E, Borghi L, 2022.

Finally, the roof represents the element on which technological reflection has been most concentrated, because it not only constitutes a shelter from precipitation but also performs the tasks of natural ventilation and shielding of the vertical walls.

Table 1. *Baghere Children's House, Estimated Costs of Materials*

Material	Quantity	Total Costs (Euro)
Fondations – Local stone	46 m ³	0.00
Playwall – red clay-based “pisé”: earth	120.5 m ³	17,409.36
Extra walls – red clay (couplings)	1 m ³	136.34
Extra walls – Stabilised clay bricks (20x30x15cm)	9 m ³ (1048 bricks)	733.83
Floor – concrete	37.8 m ³	680.40
Floor – stabilised earth	6.9 m ³	106.03
Floor – gravel	18.8 m ³	197.82
Roof – Sheet metal corrugated (2x0.8m)	230 m ² (144 sheets)	690.00
Roof – Fabric	551.6 m ²	827.60
Roof – Fraké wood beams (100x5x8cm)	2,000 elements	6,000.00
Roof – Fraké wood pillars (300x5x8cm)	216 elements	648.00
Roof and ground – Metal plates and screws	301.4 kg	452.06
TOTAL		27,881.44

Source: Airoldi F, Alinovi S, Arcieri E, Borghi L, 2022.



Figure 9. *Baghere Children's House, View from the Back*

Source: Airoldi F, Alinovi S, Arcieri E, Borghi L, 2022.

The technology identified is a cubic grid in modules of 1 m³ of *fraké* wooden beams, between which some strips of fabric are positioned that allows shelter from the sun's rays. The described structure supports modules of corrugated sheet over the indoor spaces. The same wood essence is used in the vertical shielding elements of the rooms too, hosting uprights and transoms inside the lines designed by the roof. The flooring instead, deserves a separate discussion: in order to dialogue with the presence of different species of vegetation inside the courtyard and with the type of natural soil that in some cases penetrates the perimeter of the building, a differentiation between the covered and waterproof spaces was opted for, treated with indoor concrete cast on site, and the accessory spaces, conceived in solid stabilized and draining earth.

Self-Construction Process

The use of traditional construction techniques, mixed with more innovative ones, allows to achieve goals of sustainability, ease of execution and cost saving. The project is expected to last 3 months and a half, considering a team of 10 people, working 8 hours per day. The entire design phase is intended as developed with workers and future users, sharing expertise and common sense.

The first construction phase concerns everything at the base starting with the foundations; these require 1m-deep excavations, under the layout of the bearing walls, to be filled with local stones laid dry which will ensure stability and drainage for the structure. Subsequently the ground must be levelled and the wooden floor formwork arranged: this will enhance the moisture resistance of the structure and define the walking surface from the ground, which will later be made with an electro-welded metal grid and concrete castings separated by expansion joints. Next comes the construction of the inhabited wall. The red clay-based *pisé* earth, sparsely wetted to avoid later cracks, must be placed inside a wooden formwork. It is important to arrange the material through a succession of multiple layers: the stratification of the clay wall is a very long job that can take up to 2 months and a half; the reason is that each layer of clay must be compressed and dried to support others. Then, brick walls are built by staggering each block in order to create a holed wall.

The second phase involves the lightweight wooden roofing. This consists of multiple 1 m-long *frakè* wood elements that are screwed together; this allows them to be partially assembled on the ground and then anchored to the load-bearing walls when the latter have reached his bearing capacity. The final two steps to complete the roof are: weaving strips of local fabric between the roof elements and assembling the corrugated sheet over the 230m² living spaces.



Figure 10. *Baghere Children's House, View from the Inner Central Space*
Source: Airoldi F, Alinovi S, Arcieri E, Borghi L, 2022.

The effectiveness of these practices depends, however, on the presence of a common expressive language, shared between the architect-specialist and the residents. The understanding of it passes through the training of the reader and the simplification of the codes: for this reason, digital graphics are conceived as an important resource, constituting an effective method of representation and communication to the non-experts of architectural design and a tool for prefigure ways of adaptation.

Alongside the self-construction process, the research aimed to communicate the project to future users in a simple and effective way. This helped to develop insights into spatial awareness before, during, and after the classic design phase. To this end, a series of drawings was produced to convey the theme of play: the graphic style adopted – deliberately pop – bridges the gap between visual culture and everyday communication.

This strategy made it possible to envision a shared language between designers and community, a central topic for the development of co-design processes. Some examples of this kind of research are presented in the next page, produced using simple lines and shapes trying to draw the building features of the playing space.



Figure 11. *Baghere Children's House, the Communication Project*

Source: Airoldi F, Alinovi S, Arcieri E, Borghi L, 2022.

Senegal River Primary School

The architectural design proposal for a primary school in a rural Senegalese village – the second proof of concept – starts with a concept of DIY architecture as the beginning of participatory education, stressing the role of self-construction as a didactic practice for community towards spatial awareness and social cohesion.

School is conceived in the proposal as a device of learning in all the design phases: from the planning meetings and workshops to the post completion temporality, considering collective effort by future users as fundamental for the imagined building cycle.



Figure 12. “Senegal River” Primary School, *Project View of the Main Elevation*

Source: Abagnale R, Airolidi F, Ambrosi A, Ballarani G, Borghi L, 2023.

The organic form of the building, understood as a characterizing compositional element, alludes to the course of the Senegal, Gambia and Casamance rivers: it can be read in plan as a dynamic reference to the waterways or in elevation – especially in terms of the materials used – as a relationship with place deeply rooted in the territory. The river is a source of life for settled populations, of economies and ecosystems for social forms, of knowledge for future generations.

It is possible to express metaphors of these themes in the narration of the project through many architectural elements: the red clay-based *pisé* earth wall supports the fluid form of the classrooms and workshops spaces; the stepped courtyard and the circular volume represent two river bends housing the employee areas and a common open space; the roof stress and follows the development of the object giving it character.

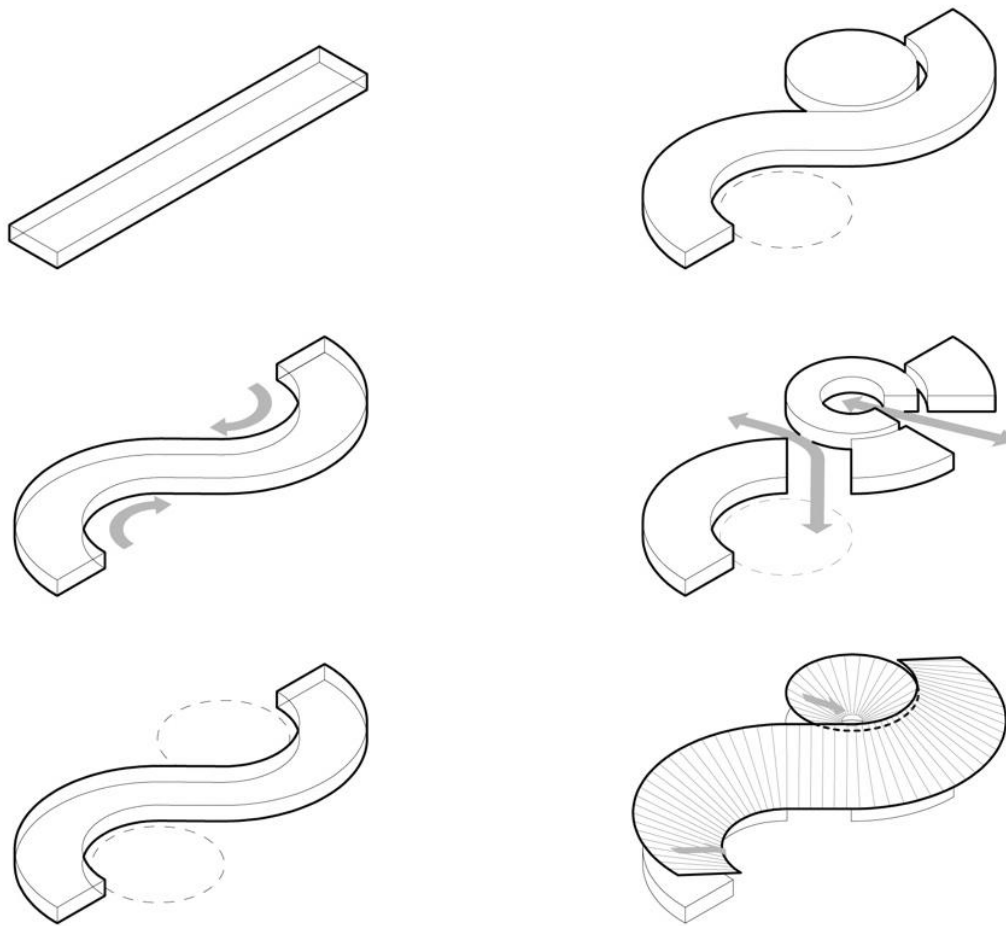


Figure 13. “Senegal River” Primary School, Design Diagrams

Source: Abagnale R, Airoidi F, Ambrosi A, Ballarani G, Borghi L, 2023.

The functional program – 6 classrooms of 25 students, offices for management and a meeting room for faculty, laboratory area, infirmary, canteen, storage, and toilettes – are set by a compositional element: a plug wall made by red clay-based *pisé* earth that runs along a side of the building and distributes services, common spaces, educational spaces, and equipment. The classrooms’ wing, designed to be flexible with the introduction of movable wooden partitions, is the one directly connected to the bend of the collective open space: here, the steps that raise the building from the ground offer the possibility of sitting, enjoying the shade of the outdoor vegetation or the shelter that precedes the entrances to the didactic area.

This elevation is characterized by the rhythm of the pillars and vertical closures made of stabilized clay bricks that draw jellies for the passage of light and air, and by the presence of the colored fabric that allows a separation between indoor and outdoor spaces.

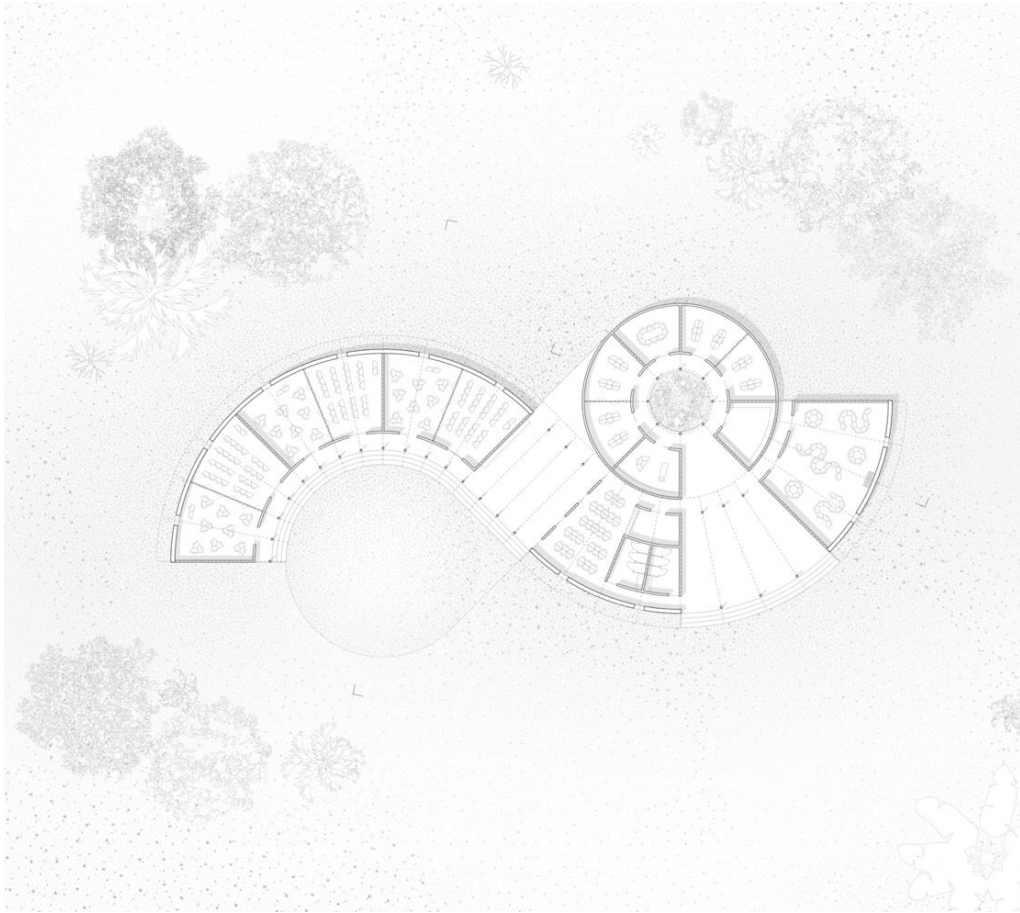


Figure 14. “Senegal River” Primary School, Plan

Source: Abagnale R, Airolidi F, Ambrosi A, Ballarani G, Borghi L, 2023

A central open but covered space, communicating with the canteen, precedes the part of the laboratories, flexible spaces that occupy the other wing of the complex. The latter, turns its concavity toward the second bend, which houses an architectural object, the office building for administration and faculty. It is developed with a central layout, around a circular inner court, establishing a relationship in elevation with the forms of the main volume and the heights of the two roofs.

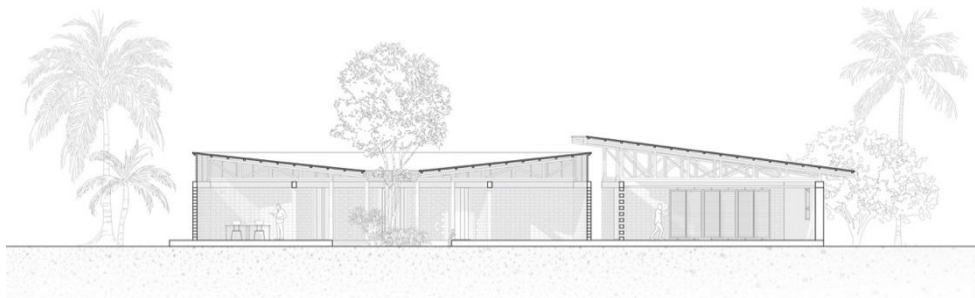


Figure 15. “Senegal River” Primary School, Section I

Source: Abagnale R, Airolidi F, Ambrosi A, Ballarani G, Borghi L, 2023.

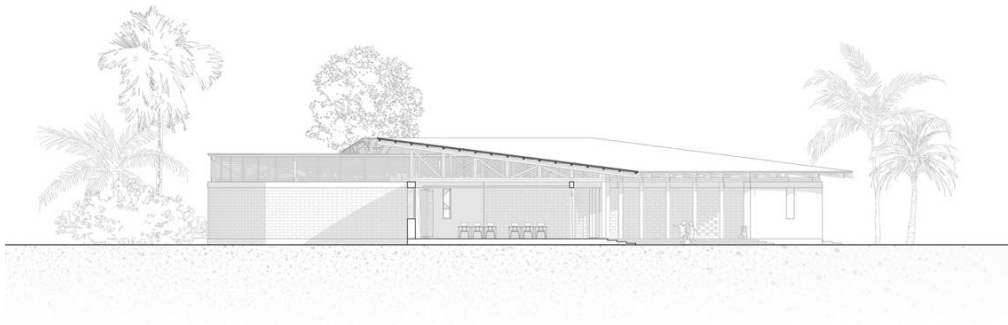


Figure 16. “Senegal River” Primary School, Section 2

Source: Abagnale R, Airoldi F, Ambrosi A, Ballarani G, Borghi L, 2023.

Another characteristic element is the roof, which is designed according to the irregular fluid form described above, and consisting of a truss system made by wooden beams supporting a cover of local straw and offering a possibility of natural ventilation through its section. The task of imparting a hierarchy to the fronts is fulfilled by the triangular shape of the beams that gives to the roof a precise orientation.

Finally, facade shielding and thermal comfort are considered as key topics, representing sensitive issues to which architecture offers some possibilities through technological choices in roofing and vertical closures. The selection of materials followed costs and on-site availability, according to participatory engagement in all the design phases, encouraging the possibilities of self-construction and DIY practices.



Figure 17. “Senegal River” Primary School, the Volumes’ Intersection

Source: Abagnale R, Airoldi F, Ambrosi A, Ballarani G, Borghi L, 2023.

Chosen Materials

The material strategy of the project is defined by three key architectural components: the continuous earthen wall, the modular arrangement of classrooms and office spaces, and the lightweight roof system.

A prominent feature of the design is the *pisé* earth wall made from locally sourced red clay. Beyond shaping the building's identity in both plan and elevation, this element contributes significantly to the environmental performance of the project by providing substantial thermal mass. The educational and administrative spaces, on the other hand, are enclosed with stabilized earth blocks, selected for their thermal efficiency as well as their ability to create a varied architectural language. Through the careful placement of these blocks, the facades can regulate daylight penetration and promote natural airflow within the interior spaces.

The roof represents the most technologically developed component of the building: in addition to protecting the structure from rain, it plays a crucial role in passive climate control by enhancing natural ventilation and reducing solar exposure on the walls below. Its supporting system consists of a triangular bamboo framework combined with a secondary structural layer. Above this structure lies a locally sourced straw covering, which provides shade and limits heat gain, while a waterproof membrane beneath it channels rainwater along the roof's slope. Bamboo is also employed for the shelter columns, where it serves both structural and architectural purposes. These vertical elements establish a clear rhythm along the internal facade and strengthen the relationship between the building and the adjacent common outdoor area. Concrete is used selectively throughout the project, primarily for paving the covered spaces and for supporting the structural beams connected to the solid wall enclosures.



Figure 18. “Senegal River” Primary School, View of the Classroom

Source: Abagnale R, Airolidi F, Ambrosi A, Ballarani G, Borghi L, 2023.

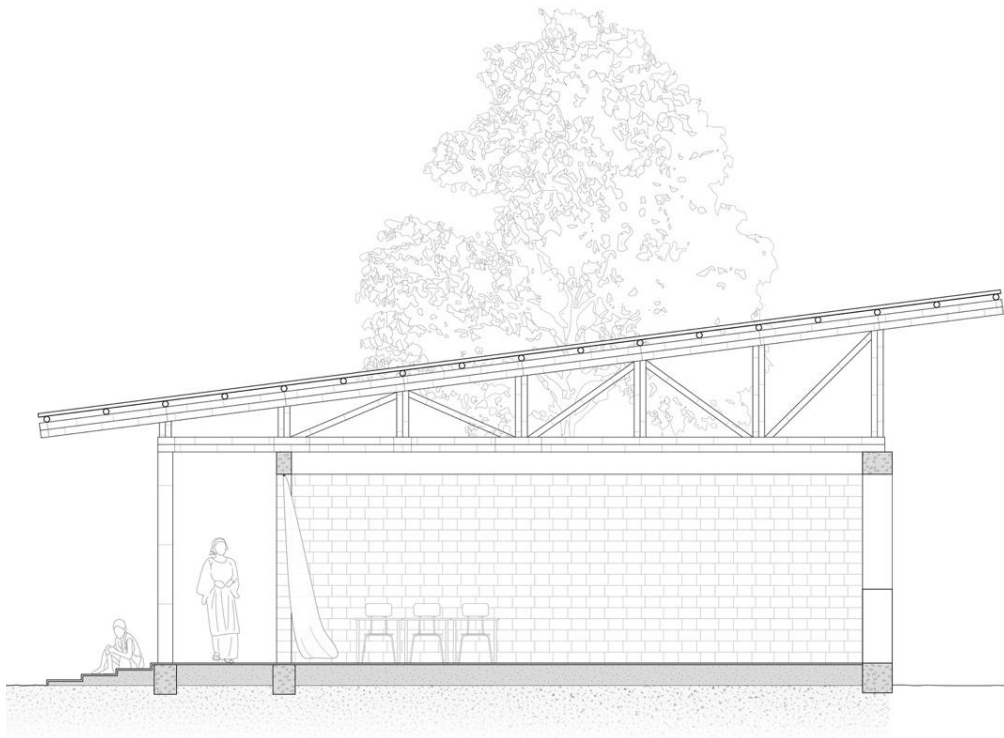


Figure 19. “Senegal River” Primary School, Detailed Section

Source: Abagnale R, Airoidi F, Ambrosi A, Ballarani G, Borghi L, 2023.

Table 2. “Senegal River” Primary School, Estimated Costs of Materials

Material	Quantity	Total Costs (Euro)
Red clay	68.11 m ³	11,578.80
Clay bricks (20x30x15cm)	9,754 bricks	3,901.60
Wood panels for partitions (Bamboo + fraké)	27 panels	553.50
Wood panels for windows (Bamboo + fraké)	20 half-panels	100.00
Concrete (for crowning)	74.73 ton	8,967.60
Concrete (for foundations)	72.13 ton	8,655.60
Lightweight concrete (for floor)	207.77 ton	18,699.30
Bamboo pillars (d = 0.20m; h = 2.85m)	33 elements	62.70
Bamboo beams (primary structure)	35 truss beams	8,751.40
Bamboo beams (secondary structure)	17 lines	5,491.00
Plastic (roof water protection) (1x0.5x0.02m)	2,740 elements	838.44
Straw (roof)	1,370 groups of straw	685.00
Fabric (for curtains)	72 m ²	108.00
TOTAL		68,392.94

Source: Abagnale R, Airoidi F, Ambrosi A, Ballarani G, Borghi L, 2023.

Self-Construction Process

By combining traditional building techniques with contemporary ones, the project aims to balance environmental sustainability, affordability, and construction efficiency. The estimated construction time is 5 months and a half, assuming a workforce of 20 people operating on 8 hours per day.

Construction begins with the foundation works. Trenches approximately 1m-deep are excavated along the footprint of the load-bearing walls and filled with locally sourced dry-laid stone. Once the excavations are completed, the site is levelled and prepared for the floor structure: timber formwork is installed to raise the finished floor above ground level. The floor slab is then formed using welded steel mesh and concrete pours, with expansion joints incorporated for thermal movement. The erection of the main *pisé* earth wall follows: the red clay mixture, carefully moistened to prevent shrinkage cracking during drying, is compacted within timber. The wall is built progressively through a sequence of layers which must be thoroughly compressed and allowed to dry before the next one is added. This stage represents the most time-consuming part of the process and may extend for up to 2 and a half months. After that, the stabilized earth-block partitions are assembled using a staggered bonding pattern that creates permeable surfaces capable of facilitating ventilation.

The second major phase concerns the roof structure: lightweight bamboo elements are connected through screws and joints, allowing portions of the framework to be prefabricated at ground level before. These elements are subsequently secured to the completed load-bearing walls.

The final stage focuses on completing the roof assembly. A secondary framework is installed above the primary bamboo structure, followed by a waterproof membrane to ensure protection from rainfall. The outer layer consists of locally sourced straw, which provides solar shading and contributes to the thermal comfort of the approximately 650 m² spaces.



Figure 20. “Senegal River” Primary School, View of the Open Spaces

Source: Abagnale R, Airolidi F, Ambrosi A, Ballarani G, Borghi L, 2023.

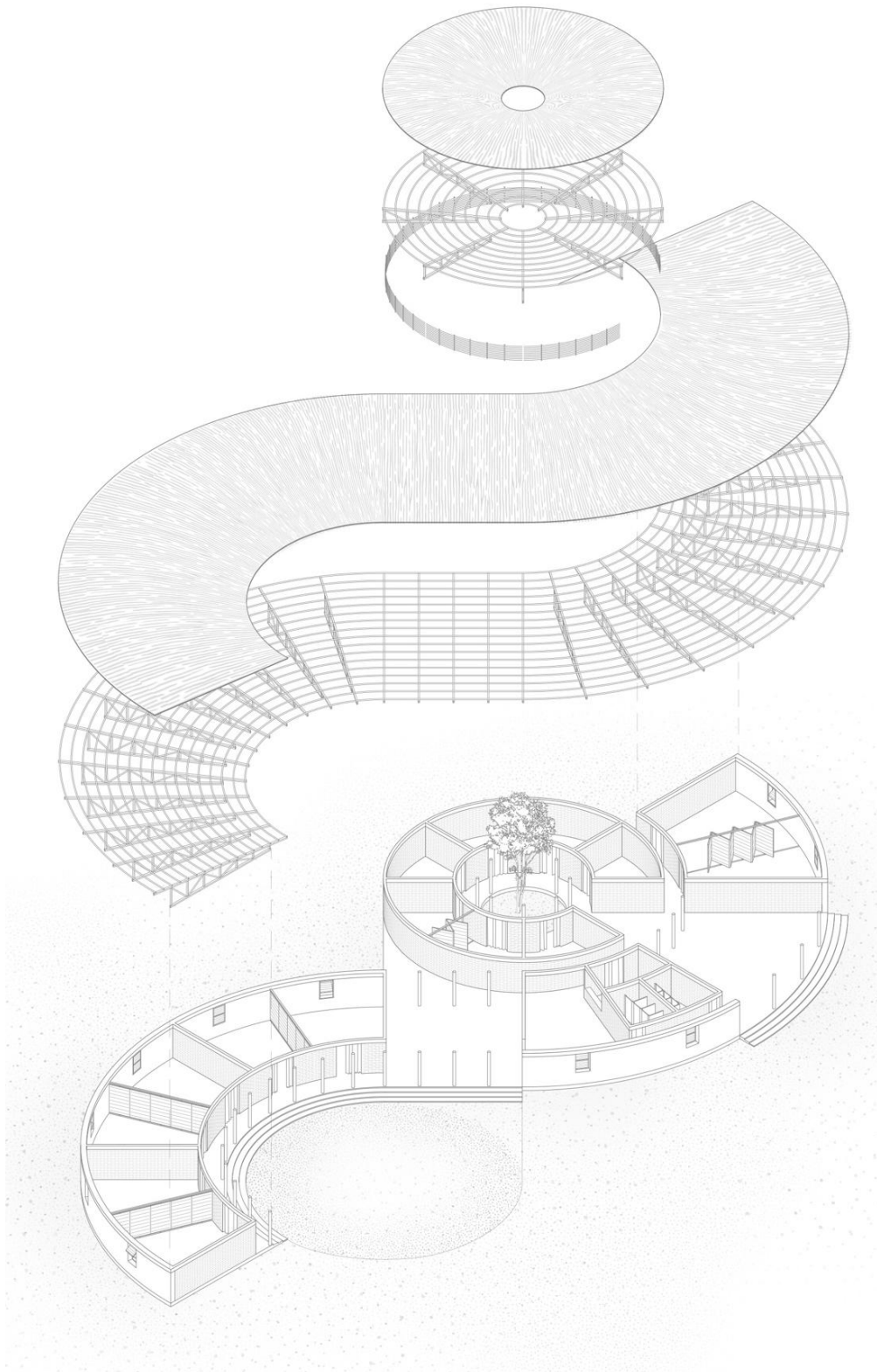


Figure 21. “Senegal River” Primary School, Axonometric Explosion
Source: Abagnale R, Airoidi F, Ambrosi A, Ballarani G, Borghi L, 2023.

Table 3. *Self-Construction and Participation Timeline of the Two PoCs*

Phase	Baghere Children's House	"Senegal River" Primary School
<i>Pre-construction</i>	Design with workers and future users; shared knowledge; visual communication	Planning meetings and workshops; participatory learning; shared knowledge
<i>Workforce</i>	10 people / 3.5 months	20 people / 5.5 months
<i>1. Foundations</i>	Excavation; local dry-laid stone; floor structure	Excavation; local dry-laid stone; floor structure
<i>2. Walls</i>	Pisé earth walls + stabilised earth blocks; up to 2.5 months	Pisé earth walls + stabilised earth blocks; up to 2.5 months
<i>3. Roof structure</i>	Lightweight fraké timber; ground assembly	Lightweight bamboo; ground assembly
<i>4. Roof completion</i>	Local fabric + corrugated sheets	Waterproof membrane + local straw
<i>Participation during construction</i>	Shared expertise; self-construction; spatial awareness; common language	Collective learning; self-construction; spatial awareness; social cohesion
<i>Post-construction</i>	Spatial awareness and potential adaptation	Continued learning and adaptation

Participation framework:**BEFORE:** shared design + knowledge exchange**DURING:** self-construction + learning**AFTER:** adaptation + continued spatial awareness

Source: Airoidi 2026.

Discussion

The two PoCs work on an understanding of DIY architecture as an alternative spatial practice informing co-design processes: it is witnessed, on one side – the Zobeide's physical one – by the contemporary architectural language rooted in the tradition, the choice of materials, and the construction systems and periods imagined; and on the other side, by the design of a common language of images and the reflections on the working and social effort required – referring to Ersilia's dimension. At the same time, the two PoCs suggest that antifragility can be approached through processes that enable communities and spaces to learn, adapt, and transform in response to uncertainty. This has important implications for the contemporary relevance of architecture as a discipline: in permacrisis condition, when many of the challenges facing cities and territories are characterized by rapid changes, architecture's contribution may no longer depend exclusively on its ability to produce objects or technical solutions. Instead, its strength may increasingly derive from its capacity to facilitate collective action, support local initiatives, and enable adaptive processes of spatial transformation sensitive to contemporary urgencies. DIY practices suggest a redefinition of the architect's role in this direction, from an author to a collaborator of shared antifragile processes in spatial agency: they invite a conception of design concerned with generating the conditions through which diverse actors – or stakeholders – can participate in shaping their world and spatially better understand it. Such a shift does not imply abandoning professional expertise, but it requires situating knowledge within broader ecologies that recognize the value of place-based intelligence and community-based practices.

PoCs' Limitations

Several limitations should be acknowledged in interpreting the two PoCs. First, the projects examined in this paper are unbuilt design proposals and should not be understood as completed architectural interventions whose performance can be empirically assessed. Their contribution is instead situated at the level of design-driven research: they test architectural strategies, processes, and relationships between DIY practices and antifragility through the development of design proposals. The arguments concerning empowerment, collective learning, and adaptive capacity should consequently be understood as design intentions and projected potentials, rather than as demonstrated post-implementation outcomes.

Second, the cases are strongly context-specific. Both are situated in places characterized by particular material, environmental, socio-economic, and cultural conditions. While these conditions are precisely what make the projects relevant to the discussion of architecture under uncertainty, they also limit the direct transferability of their findings to other geographical and institutional contexts. The cases should therefore be considered situated examples through which methodological principles can be explored, rather than universal models.

Finally, the study does not include longitudinal observation or post-occupancy evaluation. It is therefore not possible to determine whether the proposed construction systems, participatory processes, or community capacities would actually persist, adapt, or generate further transformations over time. In particular, claims concerning antifragility cannot be validated through evidence of responses to subsequent shocks or disturbances. The antifragility framework developed in this paper should consequently be regarded as an analytical and perspective one for evaluating design processes and their capacity to enable adaptation through collective agency. These limitations indicate the need for future research based on built projects, systematic community feedback, and longitudinal post-occupancy studies.

The evidentiary status of the two PoCs also requires clarification. The documented material concerns the development of architectural proposals, construction strategies, visual communication tools, and forms of intended engagement with workers and future users; it does not provide systematic post-occupancy data, longitudinal observations, or independently collected measures of community empowerment. The claims advanced here should therefore be read as conceptual and methodological propositions emerging from a design-driven research environment. In this sense, the two PoCs demonstrate how DIY practices can be translated into architectural strategies oriented towards antifragility, but they cannot establish that such strategies are empirically effective. Their primary contribution is to formulate and test a design framework that can subsequently be examined through built implementations, direct community feedback, and evaluation. In this sense, possible future research should move from conceptual and design-based exploration towards on-field validation: subsequent studies could test the proposed framework through built projects, documenting community participation during construction and use, collecting systematic feedback from users, and evaluating adaptation over time.

Openings

The theoretical contribution of this paper lies in connecting DIY architecture and antifragility through co-design, avoiding treating them as separate fields of inquiry. While participatory architecture has primarily focused on the redistribution of design agency and people engagement, and antifragility has emphasized the capacity of systems to learn and evolve through adaptation, this research proposes DIY practices as a possible operational bridge between the two elements. It argues that community-based adaptation can be understood not only as alternative ways of producing space, but as sources of situated knowledge through which architectural processes can develop greater capacity for learning, adaptation, and collective agency. The fundamental content is therefore the repositioning of DIY architecture from an alternative practice to a methodological and relational framework for designing antifragile spatial processes.

Across the different best practices and the two PoCs seen before, a common operational paradigm emerges: the integration of material and immaterial dimensions of DIY architecture into structured processes of co-design. Here, self-construction is no longer understood as an informal or residual action, but as a source of knowledge capable of defining design methodologies at multiple scales. Spatial appropriation, incremental building, and community-based adaptation are recognized as expressions of place knowledge that can be systematized. At the same time, the relational infrastructures that sustain these practices – trust, cooperation, shared learning, collective decision-making – are considered as fundamental components of architectural production. In this framework, co-design operates as a translation between bottom-up practices and formal architectural systems. It allows the common knowledge embedded in DIY processes to be expressed, while preserving their adaptive and context-specific qualities. More importantly, it reframes architecture as a dynamic field in which antifragility in permacrisis conditions is not achieved through control, but with the continuous capacity of communities to adapt themselves and their space in response to change. The integration of material construction and social production thus becomes a strategy: if taken together, Zobeide and Ersilia are metaphors of systems that do not only withstand shocks but evolve through them.

Finally, these contemporary best practices demonstrate that the two images from *Le città invisibili*⁴³ are not only literary metaphors but operative principles for rethinking contemporary architecture. By aligning spatial making with social learning, and construction processes with collective agency, they suggest a shift from architecture as an object to architecture as a process. In this shift, DIY architecture is not an alternative to design but its reconfiguration as a shared and future-oriented practice capable of generating adaptive forms of living in an increasingly uncertain world.

43. Calvino, *Le città invisibili*, 1972.

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