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Original Research

Environmental Architecture Research–Practice Partnerships (A.RPPs): Integrating Green Building Theory and Practice in Ethiopia

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Abstract

Green building systems are essential instruments for achieving environmental sustainability. Even though many nations have adopted a sustainable rating system for environmentally friendly construction, adoption tends to be fragmented. In this regard, this paper seeks to investigate green building systems in Ethiopia in terms of policies, coordination, awareness among professionals, and implementation. In this regard, a mixed methodological strategy involving literature review and empirical investigation has been used. Data has been collected from governmental and non-governmental construction sectors, universities, and professionals. Based on the data, it can be seen that even though there is wide awareness about sustainability, its implementation faces challenges due to a lack of a national framework for green buildings, an ineffective monitoring mechanism, fragmentation of coordination, and a weak link between research and practice. In this regard, the research indicates that the problem is not of policy commitment or awareness among professionals but the lack of a mechanism that can translate sustainable practices into implementation. To address this problem, the paper suggests the Environmental Architecture Research-Practice Partnership (A.RPPs) model based on the Dual Evaluation-Creation Cycle (Dual-ECC).

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INTRODUCTION

Sustainable development has become one of the focal areas of contemporary architecture and urbanism. Urbanization, demographic increase, resource consumption, and environmental issues have brought into focus the environmental performance of buildings. All around the world, buildings consume large portions of resources such as energy, materials, and water, and produce waste and greenhouse gases. As a result, green building standards and rating systems have been developed in many nations to promote environmentally friendly construction and performance of buildings. The use of green building standards is not only a technical tool for assessing buildings but also a way of governance that could affect design decisions, regulations, and markets. The effectiveness of green building standards is based on an institutional environment that is favorable to their implementation. Technical standards alone are not enough where regulation, expertise, monitoring, and learning are underdeveloped. In Ethiopia, sustainability considerations have increasingly appeared within national development strategies and environmental policy frameworks.

Government efforts in this regard include programs such as the Climate-Resilient Green Economy Strategy. However, despite such advancements in policy development, there has been no uniform implementation of green building principles into architecture and construction practice. Although there has been an increase in awareness among professionals, the methods of implementation have been very disjointed.

The aim of this study is to examine the state of implementation of green building systems in Ethiopia with special emphasis on the institutional environment in which implementation occurs. The areas of analysis are policy, practice, coordination, and governance.

In addition, the study suggests a framework for Environmental Architecture Research–Practice Partnerships (A.RPPs) that is guided by the process of a Dual Evaluation–Creation Cycle (Dual-ECC). This framework aims at enhancing the process of interaction between research, policy-making, practice, and evaluation within a structured and coordinated partnership approach.

The contribution of the present study goes well beyond the mere identification of implementation challenges. The purpose of this paper is to show how the combination of theory and practice within a structured framework may help to enhance the sustainability, governance, and institutional learning in the context of emerging practices.

Rating systems for green buildings have been developed internationally as systematic means for assessing the environmental performance of buildings. Some of the well-known rating systems include LEED, BREEAM, and the DGNB certification system. These systems consist of assessment criteria concerning energy efficiency, water savings, material choices, indoor air quality, waste management, and sustainability of the site (Cole, 2005; Berardi, 2012).

Despite the fact that these systems made significant contributions to the improvement of the environmental performance of buildings, their implementation in various geographical and institutional contexts raised serious discussions. The existing research proves that the assessment systems developed in industrialized nations need some modification in order to become effective in developing countries. There are differences in climatic conditions, construction technology, economic opportunities, institutional settings, and legal environment (Berardi, 2012; Darko & Chan, 2017).

Thus, researchers now focus on the significance of contextual adaptation. Recent literature also points out that implementation of green buildings in developing nations will only be successful through adaptation to local institutional capability, market conditions, and governance structure instead of transferring the international assessment system (Darko et al., 2021).

In addition to technological adaptation, governance theories stress the role of institutional coordination in the accomplishment of sustainability goals. Implementation of environmental policies is normally done through many actors, which include government departments, professional organizations, academia, financial institutions, business, and the community. Successful implementation requires coordination among these actors and processes that enable knowledge sharing and coordination (Ansell & Gash, 2008).

Similarly, the concept of environmental policy integration holds that the objectives of sustainability cannot be achieved via isolated actions. Sustainability will require an integration of policies and governance across sectors and levels of governance, accompanied by processes of learning and adaptation (Jordan & Lenschow, 2010).

In the case of Ethiopia, there are several policy measures in place that serve as a base for environmental governance, such as the Environmental Policy of Ethiopia (1997), the Environmental Impact Assessment Proclamation (2002), and the Climate-Resilient Green Economy Strategy (2011). These are some important policy measures that contribute to the protection of the environment and sustainable development. But there is no overall national policy framework available for the assessment of green building

performance across various dimensions of sustainability.

Indeed, from the scholarly discussions about governance, it is important not just to have technological change but also the necessary institutionality to facilitate sustainability. Cooperation needs to exist between governmental authorities, professionals, research facilities, finance, and community members. Current research about governance shows that proper sustainability implementation requires inclusive institutions that can help coordinate, learn, and make joint decisions (Ansell et al., 2020; Norström et al., 2020). It is often the lack of cooperation among these stakeholders that renders policy implementation ineffective.

Statement of the Problem

In spite of the presence of environmental policies and the growing knowledge of sustainability in Ethiopia, there is no consistent use of green building practices in the construction sector. It is not that there is any lack of commitment to policy and sustainability in Ethiopia, but it is the lack of a framework through which the policies can be translated into coordinated actions.

This situation has contributed to inconsistent implementation, ineffective monitoring, limited learning by institutions, and poor linkage between research and practice. As a result, a gap exists between the aspirations for sustainability and the actual realization of these goals in the built environment. Understanding the gap and the ways of overcoming it forms the core of this research.

Research Questions

1. How can the gap between sustainability policy and sustainability practice be understood within the Ethiopian context?
2. What institutional, organizational, and implementation-related factors contribute to this gap?
3. How can structured research–practice partnerships support improved implementation of green building systems in Ethiopia?

MATERIALS AND METHODS

For the purpose of studying the status of green building systems in Ethiopia and the development of the Environmental Architecture Research-Practice Partnerships model framework, this study used an interdisciplinary methodology that entailed reviewing literature and conducting empirical research.

The literature review considered various green building rating systems, sustainability governance practices, and theory-practice integration research from an international perspective. Much emphasis was placed on the major rating systems such as LEED, BREEAM, and DGNB.

The empirical part relied on information gathered from practitioners representing different sectors involved in the making of environmental policies and the practice of construction in Ethiopia. The respondents involved architects, engineers, lecturers, quantity surveyors, planners, and other practitioners who worked in governmental organizations, universities, the private sector, and development sectors. This diversity helped in gathering opinions on policy and practice.

Gathering of data was based on issues that are connected to environmental policy, legislation, coordination, capability, practices, monitoring, and sustainability performance. Instruments of survey and structured inquiries were used to uncover patterns and challenges faced in green building implementation.

The collected data were analyzed using descriptive analytical techniques to identify dominant themes and recurring institutional conditions. The empirical findings were subsequently interpreted alongside the literature review to develop the Environmental A.RPPs framework and its associated Dual Evaluation–Creation Cycle (Dual-ECC) as a conceptual response to the identified theory-practice gap.

The empirical component is based on data obtained from 300 lawyers, lecturers, architects, and quantity surveyors from twenty sectors in Ethiopia, as shown below under the Category of professionals involved in the study (Table 1). A

five-point Likert scale questionnaire was used for the 20 executives representing government agencies and real estate firms. Such people came from different fields of Ethiopia, such as the government field, the private sector, the educational sector, and non-governmental organizations. Through their composition, there was a complete representation of various professionals from the country.

Table 1

Category of professionals involved in the study

№	Variables	Category	Frequency	Percent
1	Occupation	architect	152	50.7
		lecturer	84	28.0
		Quantity surveyor	38	12.7
		lawyer	26	8.7
2	The sector of the study area in Ethiopia	public	86	28.7
		private	80	26.7
		education	129	43.0
		Other non-governmental	5	1.7
3	Work Experience	less than 5	26	8.7
		6-10	106	35.3
		11-15	110	36.7
		above 15	58	19.3

Figure 1 shows the distribution of 300 professionals involved in the study according to occupation, employment sector, and work experience. Architects formed the largest occupational group (50%), followed by lecturers (27%), while quantity surveyors and lawyers had lower representation. In terms of the employment sector, the education sector had the highest participation (43%), followed by the public (28%) and private (27%) sectors, with very few respondents from other non-governmental organizations (2%). Regarding work experience, most respondents had between 10 and 15 years of experience (35%) or 15 years and above (37%), while only a small proportion had less than five years of experience (8%). These findings suggest that the study drew responses primarily from experienced professionals with substantial expertise in their respective fields, which enhances the credibility and reliability of the data and increases confidence that the study findings are informed by practical knowledge and professional experience.

A number of interrelated factors were considered in this study, which included policy, legislation, coordination, expertise, process, and measurement. The above information was then subjected to analysis to find out any patterns, issues, or gaps that are present in practice. The findings from the above analysis provided the basis upon which the Environmental A.RPPs model was developed as a remedy for the theory-practice gap.

RESULTS AND DISCUSSION

Results

The findings indicate that the principal barriers affecting green building implementation in Ethiopia are institutional rather than conceptual in nature. While sustainability principles are generally recognized among professionals and supported by national environmental policy frameworks, implementation remains fragmented and inconsistent.

From the results of the survey, it is evident that the significance of sustainable construction practices and environmental performance assessments was generally recognized by all the respondents; however, this recognition did not result in a systematic implementation of such

concepts in the construction industry. The lack of a national standard of green buildings became one of the main barriers, according to the participants.

In addition, the results show that poor coordination between different organizations dealing with environmental management, construction regulation, professional practices, and higher education was another problem identified by the respondents. This issue becomes particularly important because sustainability measures tend to be implemented on an individual basis rather than by institutions.

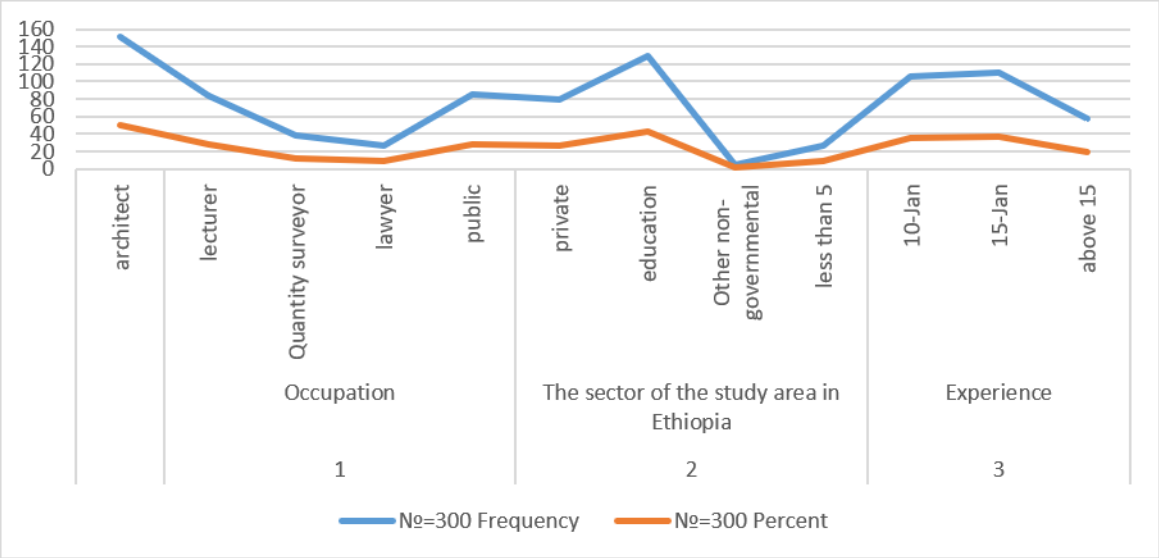

Figure 1. *Category of professionals involved in the study*

Moreover, deficiencies were noted in terms of monitoring and enforcement procedures. While there are policies for the environment and sustainability goals have been established, it was found that there is a lack of measures to gauge compliance and monitor the environmental performance of buildings at various stages of their life-cycle. Table 2 highlights the inconsistent application of building regulations and sustainability practices across industries. Likewise, it can be seen from Table 2 that governance issues such as coordination, monitoring, policy integration, and institutional support have all been repeatedly cited as key issues.

Table 2

Descriptive Statistics Analysis of Institutional & Governance

S. No.	Institutional & Governance	N	Minimum	Maximum	Mean	Std. Deviation
1	Certified Building	300	1	5	2.26	1.366
2	Green Building Council	300	1	5	1.95	1.135
3	Public organization initiatives	300	1	5	2.27	1.245
4	private initiatives	300	1	5	2.20	1.208
5	Non-governmental initiative	300	1	5	2.35	1.299
6	Building Codes	300	1	5	2.58	1.147
7	Building policies	300	1	5	2.58	1.055

The results further show that there is reasonably high awareness of sustainability among professionals. Architects, engineers, planners, lecturers, and other professionals seem to be aware of environmental design concepts and sustainable building objectives. However, despite the presence of professional awareness, it has not been translated into practice. This implies that the major problem is not due to a lack of knowledge but rather a lack of processes to translate knowledge into practice.

Consequently, the gap between policy and practice of sustainability in Ethiopia is mainly linked with institutional fragmentation, inadequate implementation processes, poor monitoring systems, and a lack of integration between research, policy formulation, and practice.

Discussions

Interpretation of Findings

Consequently, it appears clear from the findings that the green building problem facing Ethiopia cannot be attributed to poor environmental awareness or lack of environmental policy commitment on the part of the government. Rather, the study reveals that the idea of sustainability is being increasingly acknowledged by both policymakers and professionals. It is the institutional framework necessary for making sustainable development goals practical in operation that is really important.

In fact, the findings of this study fit well with sustainability governance studies wherein successful policies are determined not by technological details but by coordination, cooperation, institution-based learning, and adaptation (Ansell & Gash, 2008; Ostrom, 2010; Ansell et al., 2020). This point of view has been confirmed by recent studies in sustainability transitions wherein collaborative learning and co-creation process among stakeholders have been emphasized (Frantzeskaki et al., 2022).

The results also support the international literature, which suggests that sustainability implementation is essentially an issue of governance. It is not sufficient just to have policies, regulations, and standards; without the presence of monitoring systems, organizational learning processes, and institutional collaboration, the implementation process will be lacking.

Additionally, the lack of a national standard for green buildings adds to implementation inconsistency. Since there are no performance criteria, methods of evaluation, or accountability systems, the sustainability programs stay project-specific.

Alternative Explanations and Contributing Factors

However, while institutional fragmentation became an important issue, other possible explanations must not be overlooked either. The economic issue is still relevant. Sustainable building technologies typically involve additional expenditures on the part of the organization at the very beginning, which might prove prohibitive for organizations that lack sufficient resources. The problem with access to specific funding sources could also come into play. The issue with technical competencies is another possible issue. Even though awareness among professionals is high enough, there is an insufficient level of competence concerning life-cycle assessment, building performance assessment, post-occupancy assessment, and sustainability assessment.

Another issue to consider is market readiness. The demand for green buildings that have received certification is not high, thus discouraging people from engaging in sustainable construction. The regulatory environment can also affect the results of implementation. Environmental policies usually set the general goals for achieving sustainability without specifying any concrete ways for implementing the policies or measures for evaluating performance.

Factors such as culture and organization should also be taken into account. Traditions of institutions and organizations and professional norms may affect the rate of introduction of sustainability innovations.

None of these factors refutes the key findings of the study. Instead, they support the necessity to create a model of sustainability implementation that

would incorporate different aspects of sustainability implementation.

Emergence and Adaptation of Environmental ARPPs

Unlike the concept of A.RPPs, which were an abstract form of governance that arose independent of practice, are the roots of the concept of A.RPPs lie within the environment of architectural research, where deliberate attempts have been made to overcome the separation problem between academia and practice.

The very same structural circumstances that necessitated the creation of ARPPs in architecture apply to the environmental policy field. The situation is such that there is already a lot of knowledge out there, but what is lacking is the processes whereby this knowledge can be mobilized and integrated into action.

Crucially, the evolution of A.RPPs were influenced by experience gained from working with researchers and practitioner-researchers who wanted to find better ways of bridging theory and practice. This model did not emerge as a result of theoretical considerations but through the experience of dealing with implementation issues. Its emergence, therefore, represents an adaptation to circumstances in which standard linear approaches to knowledge transfer were inadequate.

In this case study, we take the idea of integrating theory and practice to the field of sustainability governance. The reviewer comments that the author received while preparing the current article for publication have added value to the notion of the necessity of such integration. As a result, environmental A.RPPs should be perceived as not a substitute for current sustainable approaches but as a governance tool, which facilitates interactions between the parties involved in the processes of creation, implementation, evaluation, and improvement of such measures. This idea corresponds to the contemporary approach to knowledge co-production, according to which sustainable transitions are more probable to occur in the case of continuous interactions between the parties involved, rather than one-sided knowledge transfer from researchers to the field (Norström et al., 2020).

Environmental A.RPPs and the Dual Evaluation–Creation Cycle

As suggested by the Environmental A.RPPs framework, there exists an organized process through which research institutions, government agencies, professional associations, finance institutions, industry players, and the community at large can continuously engage in learning and implementing sustainability measures.

It should be noted that the Dual Evaluation-Creation Cycle (Dual ECC) forms the core of this process. In regard to the evaluation aspect of the process, it revolves around the assessment of the current situation, outcomes of policies, performance in implementation, and effectiveness of the institution. Through constant evaluation, the strengths, weaknesses, opportunities, and implementation gaps emerge.

The creation process is based on the lessons learned through the evaluation process. The lessons learned through assessment processes feed into policy development, formulation of implementation tools, improvement of professionalism, and development of pilot programs.

An important strength of the framework lies in its departure from traditional linear models, whereby knowledge creation is done by researchers, followed by the transfer of that knowledge to practitioners. Environmental A.RPPs, on the other hand, encourage reciprocity whereby research informs practice, but implementation itself informs research, policy formulation, and institutional learning at the same time.

Given that the sustainability aspirations in Ethiopia often outstrip implementation capabilities, this approach can provide a useful tool for improving coordination and knowledge sharing in the process of sustainability governance.

Based on the above analysis, one can conclude that a sustainability transition requires not only technical standards and political commitment but

also institutional tools that facilitate collaboration, learning, and adaptation. The environmental A.RPPs framework, underpinned by the dual evaluation-creation cycle, is one example of such an institutional arrangement.

CONCLUSIONS

The research focused on the existing state of green buildings in Ethiopia and the institutional environment impacting the process of sustainable development of the construction industry. The results show that the main impediments to the process are not conceptual or technical. They are caused by a fragmented institutional environment, a lack of coordination processes, monitoring measures, and a nationwide system for assessing the environmental performance of buildings.

The research also proved that there exists a high level of professional awareness about the principles of sustainability. As a result, the inconsistency between sustainability policies and practice cannot be explained by a lack of awareness and policy commitment only. There is a theory-practice gap due to a lack of a mechanism for its implementation. In view of these results, the authors propose a framework for Environmental Architecture Research-Practice Partnerships (A.RPPs), based on a Dual Evaluation-Creation Cycle (Dual-ECC). The framework is conceived of as a form of governance designed to foster collaboration among research organizations, government bodies, professional associations, industries, finance organizations, and communities.

Instead of offering yet another tool for evaluating the environment, this framework aims to increase learning, coordination, and dissemination of knowledge. It is meant to offer an enabling context whereby knowledge related to sustainability could be shared across research, policy-making, implementation, evaluation, and improvement.

Hence, this study finds that not only environmental policies and standards but also mechanisms that would help integrate theory and practice through such means of cooperation and learning are necessary for successful sustainability transitions.

Recommendations

Based on the findings of the study, the following recommendations are proposed to strengthen green building implementation and sustainability governance in Ethiopia. There is a need for a nationally recognized green building framework that will give a standard for evaluating environmental performance in the construction industry. The framework must take into consideration the local environmental, economic, technological, and institutional aspects and lessons from abroad.

Systems need to be put in place to facilitate coordination between governmental institutions, professional bodies, universities, businesses, and other stakeholders in implementing sustainability. Coordination would help to minimize fragmentation. Environmental policies and sustainable development programs must be backed up by performance indicators, monitoring systems, and evaluation tools. Periodic evaluations during the entire process would help ensure that there is accountability and institutional learning.

Training should be done within learning institutions to enhance capacity building on sustainable design, environmental impact assessment, life-cycle assessment, and performance assessment of buildings. The continuous professional development courses will improve implementation capacity.

Sustainability mechanisms through financial tools like tax breaks, grants, subsidies, and preferential financing options need to be studied to promote sustainable construction techniques.

The research organizations, universities, professions, and industry players need to develop forums for collaboration that would help in problem-solving through the exchange of information. This collaboration would make the process of implementing sustainability easier.

Further efforts should examine the feasibility of implementing the Environmental Architecture Research Practice Partnerships (A.RPPs) approach

in some chosen cases. This would help to see how effective it is and where changes are needed.

Documentation of green building experience, lessons learned, case studies, and their implementation is important. The documentation will enhance institutional memory and policy learning, which is necessary for future sustainable development projects.

CRediT authorship contribution statement

Amsalu Geneti: Conceptualization, methodology, investigation, data collection, formal analysis, framework development, writing—original draft preparation; **Fathi Bashier:** writing—review and editing; and supervision of the overall research process.

Declaration of competing interest

The authors declare that there are no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Ethical approval

The study was conducted in accordance with accepted academic research standards. Participation in the survey was voluntary, and respondents were informed of the purpose of the research. Data were collected and reported in aggregate form to ensure confidentiality and anonymity.

Data availability

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

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