

UNCOVERING THE SEMANTIC ARCHITECTURE OF GREEN ECONOMY RESEARCH IN AFRICA: A LEXICOMETRIC PERSPECTIVE

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Abstract

This article examines the semantic architecture of green economy research in Africa through a lexicometric approach. Based on a textual corpus processed with IRaMuTeQ, the study analyzes lexical salience, descending hierarchical classification, factorial correspondence analysis, and similarity networks to identify the main semantic structures of the field. The results reveal a cohesive lexical core centered on sustainable development, green economy, Africa, South Africa, environmental economics, energy, and emissions. They also highlight three major discursive registers: a policy-developmental register, a techno-energetic register, and an econometric register focused on emissions and macroeconomic variables. The study shows that green economy research in Africa forms a hybrid discursive field where normative, technical, and empirical rationalities intersect. It contributes by providing a deeper semantic reading of a literature often described only through thematic inventories.

Keywords

Green economy; Africa; lexicometric analysis; semantic architecture; thematic dynamics; IRaMuTeQ.

Introduction

The green economy has gradually become one of the main conceptual frameworks through which contemporary debates on sustainability, development, climate transition, and resource governance are being redefined. In the African context, this notion has acquired particular relevance because it speaks to a set of interconnected challenges that are simultaneously environmental, economic, social, and political. African countries are increasingly confronted with the need to reconcile growth imperatives, ecological pressures, energy vulnerability, and the demands associated with global sustainability agendas. In this respect, the green economy is no longer approached merely as an environmental orientation. It is increasingly framed as a broader developmental horizon through which transformations in energy systems, production models, and public policies may be imagined, justified, and assessed.

Yet, despite the growing visibility of this theme, the literature on the green economy in Africa remains marked by conceptual breadth and discursive heterogeneity. It mobilizes a wide range of expressions and problematics, including sustainable development, environmental economics, renewable energy, emissions, public policy, economic growth, and territorial differentiation. This diversity reflects the richness of the field, but it also raises an important analytical difficulty. When a research domain accumulates concepts faster than it clarifies their relations, conventional thematic reviews are no longer sufficient to capture its internal organization. Under such conditions, it becomes necessary to move beyond the simple identification of topics and to examine the semantic structure of the field itself, namely the dominant lexical forms around which it is organized, the recurrent associations that give coherence to its discourse, and the oppositions that reveal its internal tensions.

This need is especially important in the African case. Existing studies have documented the increasing prominence of green economy concerns across the continent, but much less attention has been given to the way this literature is discursively structured. Which lexical forms dominate the field? Does the literature primarily rely on a normative language of sustainability and transition, on a more technical vocabulary centered on energy systems, or on a more empirical and quantitative register organized around emissions and macroeconomic variables? More fundamentally, does green economy research in Africa operate through a relatively unified discourse, or is it shaped by several partially differentiated semantic registers? These questions matter because they allow the literature to be understood not simply as a collection of publications, but as a structured discursive space in which some meanings become central while others remain secondary or peripheral.

The present article addresses this gap through a lexicometric perspective. Rather than examining publication productivity, source concentration, or country performance, it focuses on the internal semantic organization of the corpus. More specifically, the study seeks to identify the dominant lexical nuclei of the field, to uncover the main discursive registers that structure the literature, and to clarify the semantic oppositions through which this body of scholarship is internally differentiated. The aim is not to measure the direct effects of green economy policies, nor to provide a descriptive bibliographic inventory, but to understand how the African debate on the green economy is textually configured and which rationalities organize its semantic landscape.

To achieve this objective, the article relies on a textual corpus processed with IRaMuTeQ. The analytical design combines a set of complementary lexicometric procedures, including corpus description, lexical salience, descending hierarchical classification, factorial correspondence analysis, and similarity analysis. Taken together, these procedures make it possible to move from visible lexical concentration to deeper forms of semantic structuring. They help identify not only the most salient terms of the corpus, but also the main thematic groupings, the internal oppositions between discursive poles, and the network of central lexical connections that gives coherence to the field.

The analysis shows that green economy research in Africa is organized around a relatively cohesive semantic core dominated by terms such as sustainable development, green economy, Africa, South Africa, environmental economics, energy, and emissions. Beyond this shared lexical center, the corpus reveals several differentiated discursive registers. A dominant register is policy-developmental, structured around strategy, governance, frameworks, and transition. A second register is techno-energetic, centered on renewable energy, infrastructure, and conservation mechanisms. A third register is more econometric and impact-oriented, organized around CO₂ emissions, GDP, consumption, and quantitative assessment. These dimensions do not constitute isolated strands. Rather, they interact within a hybrid discursive field in which normative ambitions, technical concerns, and empirical reasoning coexist and shape the literature in different ways.

The contribution of this article is threefold. First, it offers a semantic reading of green economy research in Africa by identifying the lexical nuclei that give coherence to the field. Second, it highlights the internal differentiation of the corpus by showing that the literature is structured around several discursive registers rather than a single homogeneous sustainability narrative. Third, it illustrates the value of lexicometric analysis for examining conceptually

dense and rapidly expanding research areas whose internal organization cannot be fully captured through conventional thematic summaries alone.

The remainder of the article is organized as follows. The next section presents the methodological framework and the constitution of the textual corpus. The third section reports the main lexicometric findings, beginning with lexical salience before moving to descending hierarchical classification, factorial correspondence analysis, and similarity analysis. The final section discusses the broader implications of these findings for understanding the semantic organization of green economy research in Africa.

2. Methodology

2.1 Research design

This article adopts a lexicometric research design to examine the semantic architecture of green economy research in Africa. The aim of this approach is not to assess publication productivity, journal concentration, or country performance, but to investigate how the discourse itself is internally structured through recurrent lexical forms, thematic concentrations, semantic oppositions, and networks of lexical proximity. In this perspective, lexicometric analysis provides a useful way of moving beyond conventional thematic summaries by identifying the dominant nuclei of meaning and the main discursive registers that organize the corpus. The study therefore focuses on the textual configuration of the literature rather than on its bibliometric metadata.

2.2 Textual corpus

The analysis is based on a textual corpus processed with IRaMuTeQ. As shown in Table 1, the corpus comprises 7 texts, 2,371 text segments, 802,253 occurrences, and 3,791 forms. It also contains 18,397 hapax, representing 48.53% of the forms and 2.29% of the total occurrences. These indicators point to a lexically dense corpus, suitable for a structured exploration of the semantic organization of the field. The corpus was used as the empirical basis for identifying dominant lexical forms, major discursive groupings, and the principal semantic oppositions structuring the literature on the green economy in Africa.

Table 1. Descriptive statistics of the textual corpus

Indicator	Value
Number of texts	7
Number of text segments	2,371

Total occurrences	802,253
Number of forms	3,791
Number of hapax	18,397
Hapax / forms	48.53%
Hapax / occurrences	2.29%

Source: Elaborated by the authors based on IRaMuTeQ outputs.

2.3 Analytical environment and lexicometric procedures

The lexicometric analysis was conducted using IRaMuTeQ version 0.7 alpha 4. The analytical design combines several complementary procedures in order to examine the corpus from different yet interconnected angles. A first level of analysis focuses on lexical salience, with particular attention to the visibility and prominence of the dominant terms in the corpus. A second level relies on descending hierarchical classification in order to identify the main lexical classes and the broader discursive registers structuring the field. A third level uses factorial correspondence analysis to reveal the major semantic oppositions and proximities between these classes. Finally, similarity analysis is used to examine the central lexical nodes and the co-occurrence links that connect the main semantic poles of the corpus. Taken together, these procedures make it possible to move from surface-level lexical concentration to a deeper reconstruction of the semantic architecture of the literature.

2.4 Lexical salience

The first stage of the analysis examines lexical salience in order to identify the most visible terms in the corpus and to assess whether the literature is organized around a dispersed vocabulary or around a more cohesive lexical core. At this stage, particular attention is paid to dominant expressions such as sustainable development, green economy, Africa, South Africa, environmental economics, energy, and emissions, since these forms provide the first semantic coordinates of the discourse. The word cloud is used here as an initial visual device to capture lexical prominence and to identify the terms that structure the most visible layer of the corpus.

2.5 Descending hierarchical classification

The second stage of the analysis relies on descending hierarchical classification. The purpose of this procedure is to partition the corpus into internally coherent lexical classes and thereby identify the main discursive registers through which green economy research in Africa is articulated. Rather than merely listing recurrent words, this procedure makes it possible to distinguish relatively stable

thematic groupings and to observe how different segments of the corpus cluster around specific lexical universes. In the context of this study, descending hierarchical classification is used as the main interpretive device for uncovering the substantive structuring of the corpus.

2.6 Factorial correspondence analysis

The third stage uses factorial correspondence analysis to refine the interpretation of the lexical classes identified through the classification procedure. This technique helps reveal the main semantic oppositions and proximities that organize the corpus by projecting the classes into a factorial space. In doing so, it makes it possible to identify broader lines of semantic tension and to clarify the relative position of the main discursive poles. Within this study, factorial correspondence analysis is therefore used to complement the classification results by highlighting the relational architecture of the corpus rather than only its segmented structure.

2.7 Similarity analysis

The final stage of the analysis is based on similarity analysis. This procedure examines the network of lexical co-occurrences in order to identify the most highly connected nodes and the links that connect the central terms of the corpus. It is particularly useful for assessing the degree of semantic centrality of dominant lexical forms and for visualizing the relational structure of the discourse. In this article, similarity analysis is mobilized to clarify how the most salient terms are connected and to identify the lexical pathways through which the green economy debate in Africa acquires semantic coherence.

2.8 Interpretive strategy

The interpretive strategy follows a progressive logic. The analysis begins with lexical salience in order to identify the dominant vocabulary of the corpus and to determine the most visible semantic core. It then moves to descending hierarchical classification in order to uncover the main lexical classes that structure the field. Factorial correspondence analysis is subsequently used to interpret the oppositions and proximities between these classes, while similarity analysis provides an additional relational perspective by showing how the central terms are connected within the broader lexical network. This sequential design is intended to avoid a purely descriptive reading of isolated outputs. Instead, the interpretation is based on the convergence between lexical prominence, class structure, semantic opposition, and co-occurrence centrality.

2.9 Scope and limitations

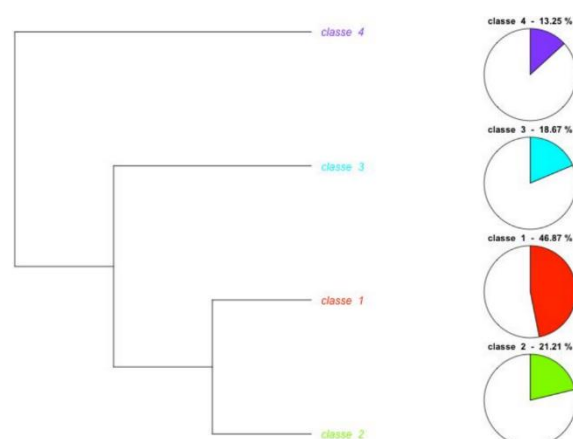
At the most visible level, *sustainable development* and *green economy* occupy the central position in the corpus, followed by terms such as *South Africa*, *Africa*, *China*, *environmental economics*, *CO2 emissions*, *innovation*, and *sustainability*. This lexical prominence is analytically important because it indicates that green economy research in Africa is not merely organized around environmental vocabulary in a narrow sense. Rather, it is articulated through a broader semantic space in which ecological concerns, territorial anchoring, and developmental ambitions are closely intertwined.

Taken together, these patterns suggest that the corpus is structured around a dual semantic orientation. On the one hand, it is framed by a normative and developmental language centered on sustainability and transition. On the other hand, it incorporates a more operational vocabulary related to energy systems, emissions, policy concerns, and economic transformation. Even at this first descriptive level, the lexical field appears internally organized rather than semantically diffuse.

3.2 Descending hierarchical classification and lexical classes

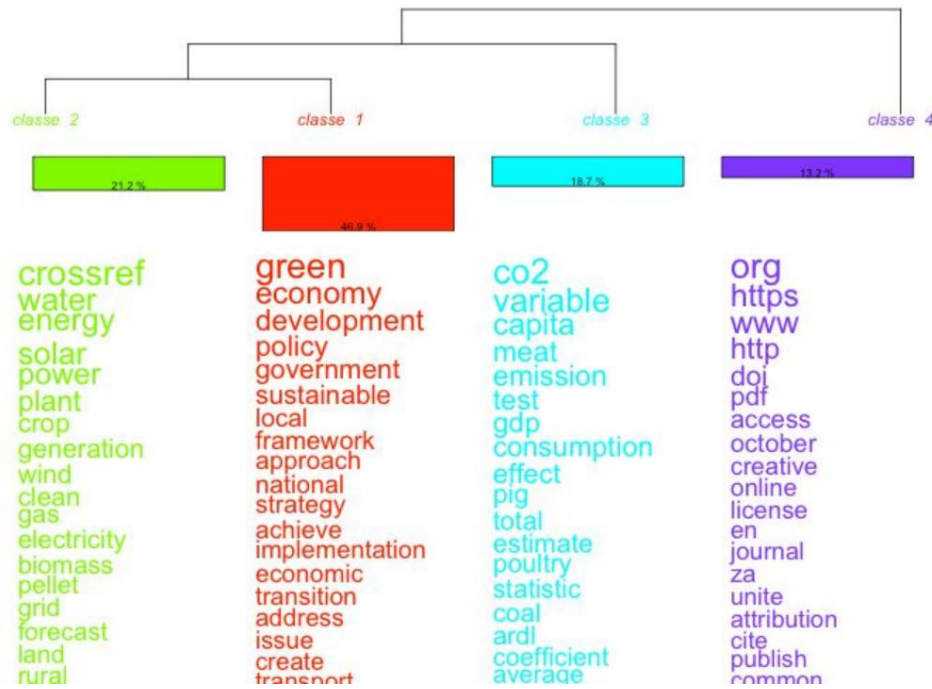
The descending hierarchical classification provides a more structured understanding of the semantic architecture of the corpus. As shown in Figures 2 and 3, the classification identifies four lexical classes, among which three can be interpreted as clearly substantive. These classes reveal that the corpus is internally differentiated into several discursive registers rather than organized around a single homogeneous sustainability narrative.

Figure 2. Descending hierarchical classification of the corpus and relative weight of lexical classes



Source: Elaborated by the authors using IRaMuTeQ.

Figure 3. Lexical profile of the classes identified by the CHD



Source: Elaborated by the authors using IRaMuTeQ.

The first and dominant class, labeled *Green economy development* (46.9%), groups together forms such as *green*, *economy*, *development*, *policy*, *government*, *sustainable*, *framework*, *strategy*, and *implementation*. This class captures the principal discourse of the field and shows that the literature is primarily structured around policy-oriented and developmental interpretations of the green economy. In this register, the green economy is framed less as a purely environmental issue than as a strategic horizon linking governance, transition, and development.

The second class, *Energy conservation* (21.2%), includes lexical forms such as *water*, *energy*, *solar*, *power*, *plant*, *generation*, *wind*, *electricity*, *biomass*, and *grid*. This class points to a more technical and infrastructural dimension of the literature. It reveals that a substantial part of the corpus is concerned with renewable energy systems, concrete transition mechanisms, and material solutions associated with energy transformation.

The third class, *CO2 variable* (18.7%), is structured around terms such as *CO2*, *variable*, *capita*, *emission*, *GDP*, *consumption*, *effect*, *coal*, *coefficient*, and *average*. This class reflects a more econometric and impact-oriented register in which environmental degradation, emissions, and growth-related variables are approached through quantitative analytical frameworks. It therefore introduces into the corpus a more empirical and measurement-based form of reasoning.

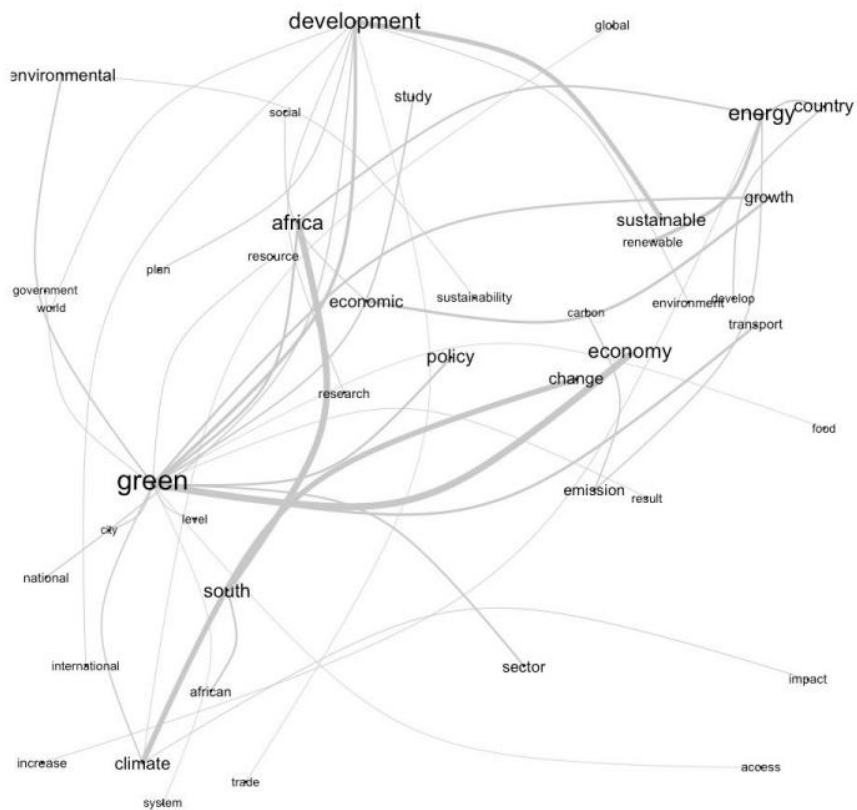
The second axis, accounting for 25.69% of the variance, is more analytically significant. It differentiates the policy-developmental vocabulary from the more emission-centered and quantitatively oriented vocabulary. In substantive terms, this means that the corpus is organized around at least two major semantic poles: one associated with governance, strategy, transition, and public action; the other associated with emissions, macroeconomic variables, and empirical measurement. The energy-related vocabulary occupies an intermediate position, suggesting that it functions as a bridge between these two poles rather than as an entirely separate discursive universe.

This result is important because it prevents an overly simplified reading of the field. Green economy research in Africa does not operate through a single unified discourse. Rather, it combines developmental, technical, and empirical registers that coexist within the same body of literature, sometimes converging and sometimes remaining partially differentiated.

3.4 Similarity analysis and semantic centrality

The similarity analysis complements the previous results by focusing on the network of lexical connections linking the most central terms of the corpus. As shown in Figure 5, the discourse is organized around a relatively restricted set of highly connected nodes, especially *green*, *Africa*, *economy*, *development*, *policy*, *energy*, *climate*, and *emission*. These central forms are linked by relations of varying intensity, indicating stronger or weaker degrees of semantic proximity.

Figure 5. Similarity graph of the lexical field



Source: Elaborated by the authors using IRaMuTeQ.

This network structure confirms that the corpus is organized around a developmental-environmental nexus in which the green economy is framed not only as an ecological or climate-related concern, but also as a policy issue, a development strategy, and an economic transformation process. The recurrence of links between *green*, *economy*, *Africa*, *development*, and *energy* indicates that the field has developed a strongly integrated semantic core.

At the same time, the graph also reveals several more peripheral terms, such as *sector*, *impact*, *access*, *transport*, and *renewable*, which appear less fully stabilized within the central lexical structure. These peripheral terms suggest that the field remains open to thematic extensions and is still undergoing semantic consolidation. The literature is therefore both structured and evolving: it is anchored in a coherent lexical center while preserving secondary thematic openings that may gain prominence in future work.

3.5 Synthesis of findings

Taken together, the results show that green economy research in Africa is organized around a relatively cohesive semantic core linking sustainable development, green transition, energy concerns, environmental economics, and territorially salient African references. At the same time, the corpus reveals three main substantive discursive registers. The first is policy-developmental, centered on governance, frameworks, strategy, and transition. The second is techno-energetic, focused on renewable energy systems, infrastructure, and conservation mechanisms. The third is econometric and impact-oriented, organized around emissions, GDP, consumption, and quantitative assessment.

This configuration suggests that the field is neither semantically fragmented nor conceptually homogeneous. Rather, it is structured through a hybrid architecture in which normative, technical, and empirical rationalities coexist and interact. Such a result is important because it shows that the African literature on the green economy should be understood not as a single discursive stream, but as a differentiated semantic space whose internal coherence depends precisely on the articulation between these distinct yet interconnected registers.

4. Discussion

4.1 A semantically consolidated field rather than a diffuse thematic space

The results suggest that green economy research in Africa should not be understood as a loose aggregation of sustainability-related concerns, but rather as a semantically structured field organized around a relatively stable lexical core. The recurrent prominence of terms such as *sustainable development*, *green economy*, *Africa*, *South Africa*, *environmental economics*, *energy*, and *emissions* indicates that the literature has already developed a recognizable vocabulary through which its principal concerns are formulated. This is an important finding because it shows that the field has moved beyond a purely exploratory stage. Its discourse is now anchored in a coherent semantic nucleus that gives the literature a certain degree of unity, even if this unity does not eliminate internal differentiation.

This semantic consolidation matters analytically. In conceptually dense research areas, coherence cannot be taken for granted. The emergence of a stable lexical center suggests that the African debate on the green economy has reached a level of discursive maturity at which its principal meanings are no longer entirely dispersed. At the same time, this shared vocabulary does not imply semantic closure. Rather, it provides the common ground upon which more differentiated discursive orientations are articulated.

4.2 The dominance of a policy-developmental register

A first major implication of the findings is that the literature is primarily structured around a policy-developmental register. The weight of the dominant class identified in the descending hierarchical classification, together with the prominence of terms associated with strategy, governance, development, policy, framework, and implementation, shows that green economy research in Africa is not framed principally as a narrow environmental debate. Instead, it is approached as a broader developmental and political project through which sustainability is linked to public action, institutional orientation, and transition pathways.

This result is especially significant because it clarifies how the green economy is discursively positioned in the African literature. Rather than opposing environmental transformation to development, the corpus tends to articulate the two within a common narrative of strategic transition. In this sense, the green economy appears less as a purely ecological correction to conventional development and more as an attempt to reformulate development itself under the conditions of sustainability. This explains why the language of policy orientation, public intervention, and strategic implementation remains so central to the semantic structure of the field.

4.3 A hybrid field combining technical and econometric rationalities

The discussion would remain incomplete, however, if the corpus were reduced to this policy-developmental horizon alone. The results also reveal the presence of two additional substantive registers that significantly enrich the structure of the field. The first is a techno-energetic register, centered on terms such as *energy*, *solar*, *power*, *generation*, *wind*, *electricity*, *biomass*, and *grid*. The second is an econometric and impact-oriented register, organized around *CO₂*, *emission*, *GDP*, *consumption*, *coefficient*, and related measurement variables. These two classes indicate that the literature does not merely discuss green economy as a normative or policy-driven ideal. It also approaches it through the operational language of energy systems and through the analytical language of quantitative assessment.

The coexistence of these three registers constitutes one of the most important contributions of the article. Green economy research in Africa is not governed by a single discursive logic. It is structured through a hybrid semantic architecture in which normative, technical, and empirical rationalities coexist without collapsing into one another. On the one hand, the literature develops a discourse of transition, governance, and sustainability. On the other hand, it incorporates a more material concern with infrastructures and renewable systems, while also mobilizing a quantitative rationality concerned

with emissions, growth, and measurable effects. The field should therefore be interpreted as a multidimensional discursive space rather than as a unified sustainability narrative.

4.4 Semantic tensions and relational coherence within the corpus

The factorial correspondence analysis and the similarity graph deepen this interpretation by showing that the corpus is structured not only by thematic coexistence, but also by internal semantic tensions and relational hierarchies. The factorial space suggests a differentiation between the policy-developmental pole and the more emission-centered and quantitatively oriented pole, while energy-related vocabulary occupies an intermediate position. This means that the literature is internally organized by different ways of problematizing the green economy: one centered on governance and development, another on infrastructures and transition mechanisms, and another on indicators, variables, and measurable effects.

At the same time, the similarity analysis shows that these differentiated orientations do not produce a disjointed field. On the contrary, the network remains organized around a strongly connected lexical core structured by *green*, *Africa*, *economy*, *development*, *policy*, *energy*, *climate*, and *emission*. This is a crucial point. The corpus is internally differentiated, but not semantically fragmented. Its coherence depends precisely on the fact that these terms remain relationally connected, even when they belong to partially distinct discursive poles. The African literature on the green economy is therefore marked by both semantic plurality and relational integration.

4.5 Territorial anchoring and the specificity of the African semantic landscape

Another important implication of the findings concerns the territorial anchoring of the discourse. The recurring visibility of *Africa* and especially *South Africa* suggests that the semantic organization of the field is not purely thematic. It is also spatially grounded. South Africa appears not simply as one geographic reference among others, but as a particularly salient discursive location within the corpus. This likely reflects its role as a recurrent empirical, political, and developmental point of reference in the literature on green transitions across the continent.

This territorial anchoring is important because it reminds us that the semantic structure of the field is inseparable from the contexts in which the debate is produced. Green economy discourse in Africa is not abstractly universal. It is articulated through specific regional and national referents that shape the way sustainability, development, and transition are framed. The centrality of African territorial markers therefore reinforces the idea that the corpus is not merely borrowing a global sustainability vocabulary, but actively reworking it through context-specific discursive configurations.

4.6 Methodological vigilance and implications for future research

One methodological point should nevertheless be acknowledged with caution. The residual class dominated by technical and bibliographic traces indicates that corpus cleaning, while functional, was not entirely exhaustive. This does not invalidate the interpretation, since the three main substantive classes remain clearly identifiable and structurally coherent. However, it does serve as a reminder that lexicometric outputs should not be interpreted mechanically. Their analytical value depends on careful discrimination between meaningful lexical structures and residual textual noise.

Beyond this methodological caution, the findings open broader perspectives for future research. They show that green economy research in Africa is now semantically structured enough to support more advanced interpretive work. Future studies could therefore move beyond the question of whether the green economy is present in African scholarship and instead examine how particular national, sectoral, or institutional contexts privilege certain semantic registers over others. Such work would help clarify how the meanings of sustainability, transition, and development continue to evolve across African settings, and how the semantic balance between policy, technology, and empirical assessment may shift over time

Conclusion

This article set out to uncover the semantic architecture of green economy research in Africa through a lexicometric perspective. Rather than treating the field as a simple aggregation of sustainability-related themes, the analysis examined how its discourse is internally structured through lexical salience, hierarchical classification, factorial oppositions, and similarity networks. The results show that the literature is not semantically dispersed, but organized around a relatively stable and coherent lexical core dominated by *sustainable development*, *green economy*, *Africa*, *South Africa*, *environmental economics*, *energy*, and *emissions*. This semantic concentration suggests that green economy research in Africa has moved beyond a merely diffuse or exploratory phase and has developed a recognizable discursive identity.

The study also shows that this semantic core is articulated through three main discursive registers. The first is policy-developmental, centered on governance, strategy, public action, and transition. The second is techno-energetic, focused on renewable energy systems, infrastructure, and conservation mechanisms. The third is econometric and impact-oriented, organized around emissions, GDP, consumption, and quantitative assessment. The coexistence of these three registers indicates that the African literature on the green economy is best understood as a hybrid discursive field in which

normative, technical, and empirical rationalities interact rather than as a homogeneous body of scholarship.

This finding has an important interpretive implication. Green economy research in Africa should not be reduced to an extension of sustainable development discourse alone, nor to a technical debate on energy transition, nor to a purely quantitative literature on environmental indicators. Its semantic structure reflects a more complex intellectual space in which development ambitions, environmental constraints, technological solutions, and empirical reasoning coexist and compete for centrality. In this respect, the article contributes to the literature by showing that the internal organization of discourse is itself a meaningful object of analysis. To understand how the field is structured semantically is also to better understand how it frames problems, defines priorities, and imagines pathways of transition.

The article also confirms the value of lexicometric analysis for investigating conceptually dense and rapidly expanding research domains. By combining lexical salience, descending hierarchical classification, factorial correspondence analysis, and similarity analysis, the study moves beyond surface-level thematic inventories and reconstructs the deeper semantic organization of the corpus. At the same time, the presence of a residual technical-bibliographic class reminds us that lexicometric interpretation requires methodological vigilance and careful textual control. Recognizing this limitation does not weaken the analysis; rather, it reinforces its transparency and analytical rigor.

Overall, the article shows that green economy research in Africa has developed a recognizable semantic center while preserving important internal differentiations. Future studies could extend this perspective by examining how specific national, sectoral, or institutional contexts privilege certain semantic registers over others. Such work would make it possible to better understand the diversity of African green transition discourses and the evolving meanings attached to the green economy across contexts. In this sense, the present study offers both an interpretive synthesis of the current semantic landscape and a foundation for further research on the discursive construction of sustainability transitions in Africa.

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