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# Arabic linguistic foresight as development infrastructure: Terminology modernization for the SDGs across health, sustainability, public services, the energy transition, and future economies

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## ABSTRACT

Budgets and technologies do not implement sustainable development on their own; the SDGs also depend on shared language that makes problems nameable, indicators measurable, and policies teachable. In many Arabic-speaking contexts, SDG-related knowledge arrives first through English-dominant research, consultancy, and standards, while Arabic public and educational communication often inherits improvised borrowings and unstable calques. This integrative review introduces Arabic linguistic foresight as a forward-looking approach to language planning that treats terminology modernization as development infrastructure. Drawing on language policy and planning, terminology science, science communication, and sustainability studies, and interpreting these literatures through genre and critical discourse perspectives, the review maps recurring points of linguistic friction across five SDG-related pillars: health and bio-innovation; environmental sustainability and circular economy; basic needs and public services; energy transition and industrial leadership; and sustainable finance and future economies. Across these domains, three mechanisms repeatedly narrow access: linguistic inequality in global knowledge flows, mismatch between Arabic registers, and fragmented governance of technical terms. To address these mechanisms, the review proposes a staged workflow linking horizon scanning to concept mapping, principled term formation, definition drafting, expert validation, open dissemination, and iterative evaluation of uptake. A mini-glossary demonstrates how morphologically plausible Arabic coinages, accompanied by clear definitions and usage notes, can retain scientific precision while increasing local intelligibility. The review concludes with recommendations for cross-sector coordination in Saudi Arabia and comparable settings, positioning Arabic as a working language for inclusive and durable SDG implementation.

**KEYWORDS:** Arabic for Specific Purposes, linguistic foresight, language planning, terminology governance, terminology modernization, Sustainable Development Goals, science and policy communication, Saudi Vision 2030

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## 1. Introduction

The Sustainable Development Goals (SDGs) frame sustainable development as an interdependent agenda in which human well-being, planetary boundaries, and economic transformation are treated as a single system (United Nations, 2015). Implementation, however, depends on more than coordination and capacity: it depends on the communicative conditions under which concepts move from expert settings into curricula, regulations, professional routines, and everyday deliberation. When key ideas remain linguistically inaccessible, sustainable development becomes unevenly knowable, and, in practice, unevenly actionable.

Language does not merely carry policy; it constitutes the categories through which policy can be conceived, debated, and audited. The ability to name a risk, define an indicator, or distinguish adjacent concepts is a precondition for measurement and governance. Research in the economics of language shows that linguistic competencies distribute access to education, labor markets, and civic participation (Coulmas, 1992; Gazzola & Wickström, 2016). Sociological accounts add that institutions convert particular linguistic forms into legitimacy and authority, turning language into symbolic capital within fields such as science, media, and public administration (Bourdieu, 1991).

These dynamics are sharpened by the contemporary asymmetry of global knowledge production. English functions as the default medium of much scientific publishing and many transnational policy genres, shaping what is visible, citable, and institutionally persuasive (Montgomery, 2013; Tardy, 2004). For scholars and professionals working beyond Anglophone centers, participation can entail a double labor: writing to English-dominant gatekeeping norms while translating specialized knowledge into locally meaningful forms (Canagarajah, 2002; Lillis & Curry, 2010). Critical work on linguistic imperialism has long argued that such asymmetries are not accidental; they are historical and political arrangements with practical consequences for whose problems and solutions become globally legible (Phillipson, 1992).

In Arabic-speaking contexts, global asymmetries intersect with a distinctive linguistic ecology. Arabic diglossia and register variation mean that Modern Standard Arabic (MSA) carries formal authority, while spoken varieties organize everyday communication and intimacy (Ferguson, 1959; Holes, 2004). In rapidly evolving technical domains, the pressure of modernization can produce a fragmented terminological landscape: multiple Arabic renderings for the same concept, inconsistent borrowing practices, and limited availability of standardized resources that are simultaneously precise and teachable (Bassiouney, 2009; Versteegh, 2014). The result is not only lexical instability but also uneven epistemic access.

Against this backdrop, the present review develops the notion of Arabic linguistic foresight: a strategic, forward-looking mode of language planning that treats Arabic language development as enabling infrastructure for sustainable development. Rather than responding to terminological gaps after the fact, linguistic foresight anticipates emerging domains and prepares the lexical, definitional, and discursive resources that education, regulation, professional practice, and public deliberation require. It should be read not as a cultural slogan but as concept governance: the deliberate work of naming, defining, and stabilizing the categories through which development is planned and evaluated.

Saudi Arabia provides a timely setting for this discussion. Saudi Vision 2030 positions national transformation around a vibrant society, a thriving economy, and an ambitious nation, with strong emphasis on diversification, human-capital development, and global competitiveness (Kingdom of Saudi Arabia, 2016). These priorities converge with SDG targets in health systems strengthening, environmental sustainability, clean energy, industrial innovation, and inclusive economic restructuring. In such contexts, the modernization of Arabic technical discourse is not ancillary to development policy; it is a mechanism for widening participation in the knowledge economy and clarifying the language of implementation.

The review pursues three aims. First, it synthesizes interdisciplinary scholarship on language policy, terminology management, and sustainability communication to show how language infrastructures shape SDG uptake. Second, it maps recurring terminological and discursive challenges in Arabic SDG-related communication across five interlinked pillars: health; environmental sustainability and circular economy; basic needs and public services; energy transition; and sustainable finance and future economies. Third, it proposes an Arabic linguistic foresight framework that integrates concept monitoring, principled term formation, institutional validation, open dissemination, and evaluation of uptake, illustrated through a mini-glossary of high-impact concepts.

## 2. Conceptual Foundations: Language Planning, Terminology, and Foresight

### 2.1 Language as Development Infrastructure: Economic and Symbolic Dimensions

Development agendas presuppose communicative infrastructures. Policies, standards, curricula, and public campaigns rely on shared categories: not only names for things, but stable concepts that can travel across institutions without collapsing into ambiguity. From a language-economics perspective, language functions as a form of human capital that shapes access to employment, productivity, and participation in knowledge-intensive sectors (Coulmas, 1992; Gazzola & Wickström, 2016). Even in largely monolingual states, a foreign-language gatekeeping of high-status domains can stratify opportunity, converting linguistic competence into an invisible admission ticket to expertise.

Sociological accounts emphasize that such effects are not merely individual but institutional. Bourdieu's analysis of symbolic power explains how institutions authorize certain registers and genres as legitimate and thereby convert linguistic competence into social advantage (Bourdieu, 1991). In sustainability governance, texts such as strategic plans, regulatory standards, and technical reports do not simply describe reality; they install categories that determine what can be counted, funded, rewarded, or sanctioned. When those categories are unstable or opaque to wider publics, governance risks becoming technocratic in the strict sense: formally rational, yet communicatively exclusionary.

The SDGs explicitly commit to equity through the principle of leaving no one behind (United Nations, 2015). That pledge is difficult to honor if access to the language of sustainability is uneven. Linguistic inequality can restrict who can enter scientific discourse, contest policy frames, and adapt innovations to local needs (Ammon, 2012; Piller, 2016). The strategic question, therefore, is not whether English will remain important for international collaboration, but how Arabic can be strengthened as a language of specialized knowledge so that SDG concepts become teachable, disputable, and usable within Arabic public spheres.

### 2.2 Language Planning and Policy: From Practice to Theory

Language planning research offers a vocabulary for analyzing deliberate interventions in a language's functions and forms. Classic accounts define language planning as organized efforts to influence language structure and use in the service of social goals (Cooper, 1989). Subsequent frameworks distinguish among status planning (allocating functions to languages or varieties), corpus planning (developing and standardizing forms, including terminology), and acquisition planning (creating conditions for learning and uptake) (Kaplan & Baldauf, 1997; Ricento, 2006). Spolsky's model further reminds that policy does not reside only in documents; it is realized through practices and beliefs that determine what actually happens in institutions (Spolsky, 2004).

Applied to sustainability, these frameworks yield a practical warning: corpus interventions alone rarely succeed. New terms require acquisition pathways (curricula, professional training, and media explanation) and status mechanisms that authorize their use in high-impact arenas such as regulation, higher education, and national strategy. Without such supports, neologisms become dictionaries without users, while borrowings remain badges of expertise for insiders and barriers for others.

Arabic language planning has long negotiated a productive tension between preservation and modernization. Sociolinguistic analyses show how modern Arabic discourse is shaped by diglossic norms, debates over authenticity, and competing ideologies of identity (Bassiouney, 2009; Suleiman, 2003). These tensions do not preclude modernization; they define its conditions of legitimacy. Terminological innovations are most likely to circulate when they display morphological plausibility within Arabic, maintain semantic precision with respect to scientific concepts, and resonate with cultural frames of meaning without reducing concepts to slogans.

### 2.3 Terminology Science and Management: Stabilizing Meaning for Policy and Practice

Terminology science examines how specialized concepts are identified, named, defined, and managed within professional domains. In applied settings, terminology work aims to reduce ambiguity, support translation and knowledge transfer, and stabilize institutional communication. Foundational guidance emphasizes that terminology is concept-oriented: it begins with conceptual analysis and definition, then proceeds to term selection or coinage (Felber, 1984; International Organization for Standardization, 2019a). A practical consequence follows: terminological modernization cannot be reduced to replacing an English word with an Arabic word.

For SDG discourse, the challenge often lies in conceptual framing as much as lexical choice.

Contemporary terminology scholarship complicates strictly prescriptive approaches. Cabré's communicative theory locates terms within discourse practices and insists that specialized communication always addresses audiences with unequal expertise (Cabré, 1999). Temmerman's sociocognitive approach adds that scientific and technical categories evolve and sometimes resist rigid definition, making terminology work an iterative negotiation among experts, institutions, and users (Temmerman, 2000). These insights are particularly relevant for SDG concepts, which are interdisciplinary, policy-laden, and frequently contested in practice.

Standards provide operational discipline. ISO 704 specifies principles for concept analysis, definition writing, and term formation, while ISO 1087-1 offers a shared vocabulary for terminology science (International Organization for Standardization, 2019a, 2019b). In large-scale initiatives, stable term systems typically require infrastructure such as term banks, controlled vocabularies, and institutional workflows for proposing, reviewing, and disseminating approved terms (Sager, 1990; Wright & Budin, 1997). For Arabic, such infrastructures must also attend to morphology, orthography, and the distribution of terms across registers and genres.

Arabic's derivational resources can support concise and transparent neologisms when guided by systematic criteria. Reference grammars of MSA document the productivity of derivation, nominalization, and compounding for scientific naming (Ryding, 2005). Yet social uptake does not follow automatically from morphological elegance. Genres that address broad publics often favor clarity, paraphrase, and example over terminological density. Effective term work, therefore, must be paired with discourse-aware communication design rather than treated as a purely lexicographic craft.

**2.4 Linguistic foresight: integrating futures studies with language development**

Foresight research in science and technology policy has developed methods for anticipating emerging challenges, exploring plausible futures, and aligning present decisions with long-term goals. Technology foresight is often defined as a systematic and participatory process that surveys future developments in order to inform strategic action (Martin, 1995). Methodological syntheses identify a broad repertoire of tools, including horizon scanning, Delphi studies, scenario planning, and roadmapping (Popper, 2008).

Linguistic foresight adapts this policy logic to language development. Rather than reacting to terminological gaps after they have already produced educational or communicative failure, foresight-oriented planning anticipates emerging concept systems and prepares the linguistic resources needed for teaching, regulation, and public deliberation. This orientation is especially important for SDG-related domains, where conceptual change is rapid, interdisciplinary, and synchronized with policy cycles.

Arabic linguistic foresight is defined here as a coordinated set of corpus, acquisition, and communication interventions that: (a) monitor emerging global concepts relevant to sustainable development; (b) develop standardized Arabic terminologies and definitions through expert-informed workflows; (c) integrate those terms into curricula, professional standards, and public communication; and (d) evaluate uptake and comprehension across audiences. The framework proposed below therefore integrates language planning theory (Cooper, 1989; Kaplan & Baldauf, 1997; Spolsky, 2004), terminology science (Cabré, 1999; International Organization for Standardization, 2019a), and foresight methodology (Martin, 1995; Popper, 2008) to outline practical steps for SDG-aligned Arabic modernization.

**3. Methodology: Integrative Review and Discourse-Informed Synthesis**

This article is a critical, integrative review designed to synthesize scholarship across fields rather than to present new classroom, survey, or experimental data. Integrative reviews are appropriate when the research problem spans multiple disciplines with partially disconnected vocabularies and methodological habits. The purpose is to assemble a coherent conceptual framework and to derive actionable recommendations by bringing complementary insights into dialogue.

Source selection followed three guiding priorities. First, the review draws on foundational and widely cited work in language planning and terminology management that supplies stable conceptual definitions and operational guidance (Cooper, 1989; Kaplan & Baldauf, 1997; Wright & Budin, 1997). Second, it incorporates research on linguistic inequality, the political economy of English dominance, and the gatekeeping norms of global academic discourse (Ammon, 2012; Montgomery, 2013; Phillipson, 1992). Third, it draws on domain-

specific sources in sustainability and development policy (SDGs, circular economy, energy transition, and sustainable finance) in order to identify which conceptual features tend to generate terminological instability in Arabic (Ellen MacArthur Foundation, 2013; International Energy Agency, 2019; United Nations, 2015).

To connect terminological questions with uptake, the synthesis is informed by critical discourse analysis and genre analysis. Critical discourse analysis treats discourse as a site where power and knowledge are negotiated, and where institutional texts stabilize particular versions of common sense (Fairclough, 1992; Wodak & Meyer, 2009). Genre analysis emphasizes that meanings are sustained by recurrent communicative forms that carry expectations for audience, evidence, and structure (Swales, 1990). Together, these approaches help explain why some Arabic terms circulate widely while others remain confined to expert enclaves or fragment across institutional glossaries.

Because the paper aims to build a forward-looking framework, the analysis is organized around SDG-relevant pillars rather than around a single discipline's internal taxonomy. The pillars correspond to domains emphasized in global and national transformation agendas: (a) human health and bio-innovation; (b) environmental sustainability, including circular economy and climate action; (c) basic needs and public services; (d) energy transition and industrial leadership; and (e) sustainable finance and future economies. Within each pillar, the review identifies recurrent sources of terminological friction and derives stabilization strategies grounded in terminology standards (International Organization for Standardization, 2019a, 2019b) and language planning theory (Ricento, 2006; Spolsky, 2004).

## 4. Findings from the Literature: Where Arabic SDG Discourse Encounters Linguistic Friction

### 4.1 Cross-Cutting Patterns: Linguistic Inequality, Register Mismatch, and Terminological Fragmentation

Across the literatures reviewed, three cross-cutting dynamics recur whenever SDG concepts are localized into Arabic. The first is structural linguistic inequality in global knowledge production. When cutting-edge research, standards, and professional frameworks circulate primarily in English, Arabic-speaking students and practitioners often encounter key concepts first as English terms, acronyms, and genre conventions. This normalizes English as the language of expertise and positions Arabic as a secondary code for simplified explanation (Ammon, 2012; Montgomery, 2013). The effect is not simply borrowing; it is a redistribution of epistemic authority, where the language of publication functions as a proxy for legitimacy (Bourdieu, 1991).

The second dynamic is register mismatch within Arabic. Diglossia means that audiences routinely move between high-register MSA and vernacular varieties, and specialized terms travel unevenly across these registers (Ferguson, 1959; Holes, 2004). A term can be technically well formed in MSA yet remain opaque in public communication unless it is accompanied by concise definitions, paraphrases, and example-based explanation. Conversely, rapid borrowings that become common in spoken discourse may lack stable spelling and conceptual precision in educational and regulatory writing, producing inconsistency across textbooks, media, and policy documents (Bassiouney, 2009).

The third dynamic is terminological fragmentation across institutions and genres. Terminology management research stresses that stable term systems require governance: concept definitions, review workflows, and dissemination infrastructures (Sager, 1990; Wright & Budin, 1997). In their absence, parallel Arabic renderings proliferate, driven by local translation teams, ministry glossaries, university curricula, and media routines. Such multiplicity can be a normal phase of innovation; it becomes harmful when it persists without convergence, undermining instruction, public comprehension, and the operational translation of targets into practice.

### 4.2 Human Health and Bio-Innovation: From Health Literacy to Genomics Discourse

Health-related SDG targets are mediated by public understanding of risk, prevention, and health-system navigation. Health literacy research frames literacy as the capacity to access, appraise, and use health information for decision-making (Nutbeam, 2000; Sørensen et al., 2012). Terminology is therefore not cosmetic: unstable or undefined Arabic renderings of core concepts can weaken comprehension and trust, reducing the effectiveness of public health communication. Because health literacy is built at the interface between specialized and everyday registers, terminological modernization must be coupled with plain-language definitions and culturally familiar examples.

The health pillar is also increasingly shaped by bio-innovation domains such as genomics, digital health, and precision medicine. These domains import dense concept systems and rapidly proliferating labels that challenge any language's terminological capacity. Arabic can exploit productive derivational patterns to generate concise neologisms, but successful adoption depends on stable definitions and consistent usage across higher education, clinical practice, and policy genres (Ryding, 2005; International Organization for Standardization, 2019a). In practice, bio-innovation concepts often enter Arabic through translation of press releases, bilingual professional training, or English-dominant research networks, increasing the risk of partial calques and acronym drift (Montgomery, 2013; Tardy, 2004).

Finally, health discourse is ethically charged. A critical discourse perspective highlights that terminological frames can individualize responsibility or foreground structural determinants, thereby shaping agency and policy legitimacy (Fairclough, 1992; Gee, 2014). Arabic linguistic foresight, accordingly, should not only supply words but also curate definitions and discursive frames that preserve scientific meaning while enabling informed public deliberation.

**4.3 Environmental Sustainability and Circular Economy: Translating Systems Thinking**

Environmental sustainability discourse is marked by systems thinking, long causal chains, and contested value claims. The SDGs treat environmental protection as inseparable from social equity and economic transformation (Sachs, 2015; United Nations, 2015). Yet environmental communication routinely struggles to translate abstract, temporally distant risks into immediate public relevance. Research on climate communication suggests that fear-based framings can produce avoidance, whereas clear, actionable narratives and locally meaningful imagery can sustain engagement (Moser, 2010; O'Neill & Nicholson-Cole, 2009). In Arabic settings, terminological modernization must therefore be paired with communicative strategies that make environmental concepts legible and actionable.

The circular economy is an exemplary case because the concept is simultaneously popular and conceptually unstable. It is often promoted as a model that decouples economic activity from resource depletion through reuse, repair, remanufacturing, and circular design. However, analyses show that 'circular economy' functions as a family of related definitions rather than a single consensus concept (Kirchherr et al., 2017). It also overlaps with, yet is not reducible to, recycling or waste management (Geissdoerfer et al., 2017). These properties create translation risk: a term may be rendered into Arabic, but the definition may collapse into familiar practices, erasing the systemic innovation that the concept is meant to signal.

A concept-first methodology recommends beginning with definition work and concept mapping before term selection (Felber, 1984; International Organization for Standardization, 2019a). Influential circular economy reports emphasize that the paradigm concerns redesigning value chains and business models, not merely improving end-of-pipe recycling (Ellen MacArthur Foundation, 2013). Arabic linguistic foresight should therefore stabilize Arabic definitions that preserve systems thinking while remaining teachable in schools, universities, and professional training.

**4.4 Basic Needs and Public Services: The Language of Everyday Inclusion**

A substantial part of the SDG agenda concerns basic needs and public services: poverty alleviation, food security, water management, housing, and sustainable cities (United Nations, 2015; Sachs, 2015). Here the challenge is not limited to specialist jargon, but extends to the everyday legibility of policy: eligibility rules, service pathways, and the meanings of indicators that appear in municipal dashboards and national reports. Concepts such as water scarcity, food security, and sustainable urban mobility are measurable precisely because they are defined; when definitions drift, so do the metrics and the public expectations attached to them.

Arabic diglossia makes this domain especially sensitive to register mismatch. Service encounters typically occur in spoken varieties, while forms, guidelines, and official announcements are written in Modern Standard Arabic (Ferguson, 1959; Holes, 2004). If terminology is coined only for expert reports, frontline communication is left to improvisation, and citizens receive mixed signals across documents, media, and everyday interactions. Genre analysis reminds that public-service texts (application forms, SMS alerts, infographics, municipal brochures) impose their own constraints on clarity and concision (Swales, 1990). Multimodal design also matters: images, icons, and layouts can either reinforce or undermine the meaning of technical terms (Kress &

van Leeuwen, 2006).

For this pillar, Arabic linguistic foresight should therefore treat plain-language definition work as part of standardization rather than as an afterthought. Stable term systems need not eliminate variation across registers, but they should provide a controlled, teachable core: preferred Arabic terms, concise definitions, and examples tailored to everyday use. Such investments are integral to the SDG principle of leaving no one behind, because they reduce the extent to which access to public services depends on access to English or to bureaucratic literacy (Ammon, 2012; Piller, 2016).

**4.5 Energy Transition and Industrial Leadership: The Language of Decarbonization and Hydrogen**

Energy transition discourse has expanded rapidly as states pursue decarbonization pathways that align climate commitments with economic diversification. Global policy and technical genres introduce dense term clusters: net-zero, carbon neutrality, scope 1-3 emissions, hydrogen value chains, power-to-X, and long-duration storage. These terms cascade from strategy reports into regulations, procurement, workforce training, and public debate. When Arabic equivalents are unstable or absent, the transition can appear as an expert project insulated from social participation, even though its consequences are distributive and cultural as well as technical.

Green hydrogen illustrates the challenge with unusual clarity. Major technical syntheses describe hydrogen as a versatile energy carrier for decarbonizing industry and transport, while emphasizing the need for definitional precision about what counts as 'clean' or 'green' based on production pathways and emissions intensity (International Energy Agency, 2019). Policy guidance similarly stresses that hydrogen strategies require regulatory frameworks, standards, and public communication that clarifies distinctions among hydrogen 'colors' and their infrastructural implications (International Renewable Energy Agency, 2020). Arabic localization therefore depends not only on translating the lexicon but on preserving the conceptual distinctions that underpin investment and governance.

Energy-transition communication also varies sharply by genre and audience. Technical reports, corporate strategies, classroom materials, and journalism demand different densities of jargon and different narrative forms (Swales, 1990). English often compresses meaning into acronyms and noun clusters that do not travel smoothly into Arabic. Arabic linguistic foresight can address this by producing layered resources: formal Arabic terms and definitions for regulation and higher education; public-facing glossaries with paraphrase and example; and bilingual mappings for sectors where English remains operational. Such layering acknowledges register diversity rather than assuming a single, uniform Arabic of expertise (Ferguson, 1959; Holes, 2004).

**4.6 Sustainable Finance and Future Economies: Making The Invisible Visible Through Language**

Sustainable development is inseparable from finance, because the transition is ultimately a story about how capital is priced, allocated, and governed. Sustainable finance introduces instruments and metrics that can remain linguistically distant without careful definition: green bonds, ESG criteria, transition finance, and climate-risk disclosure. These are not merely labels; they are mechanisms that mediate how sustainability claims are operationalized through reporting, incentive, and accountability structures (Organisation for Economic Co-operation and Development, 2017).

For many Arabic publics and for practitioners outside specialized finance sectors, sustainable finance can appear doubly opaque: abstract in mechanism and foreign in register, especially when English acronyms dominate everyday use. From a critical discourse perspective, this opacity can function as gatekeeping: jargon naturalizes expert authority and reduces the space for public scrutiny of what sustainability metrics reward or conceal (Bourdieu, 1991; Fairclough, 1992). Arabic linguistic foresight can counter this by curating Arabic definitions that make instruments visible, comparable, and contestable, which is essential for informed participation and for professional training.

Economic transformation narratives also depend on language ideologies. When English is treated as the sole language of modernity, Arabic terminology development is framed as symbolic rather than strategic. Language policy scholarship shows that such beliefs shape institutional investment and everyday practice (Ricento, 2006; Spolsky, 2004). Reframing Arabic as a legitimate language of specialized knowledge aligns terminology modernization with human-capital development and social inclusion, goals that are central to contemporary transformation agendas (Kingdom of Saudi Arabia, 2016).

## 5. An Arabic Linguistic Foresight Framework for SDG Implementation

### 5.1 Design Principles

Arabic linguistic foresight sits at the intersection of language policy, knowledge production, and development governance. For that reason, it requires explicit design principles that can guide decision-making across domains and institutions. The principles below are offered as a minimal architecture for SDG-aligned terminology modernization.

Principle 1 - Needs-driven prioritization. Term work should begin with a mapped account of communicative needs derived from SDG targets and national strategies. Rather than attempting to modernize all technical Arabic at once, a foresight-oriented approach identifies high-impact concepts that are central to implementation, likely to enter curricula and workforce training, and prone to misunderstanding if left undefined. This mirrors foresight practice, which focuses attention on domains of high uncertainty and high consequence (Martin, 1995; Popper, 2008).

Principle 2 - Concept-first terminology. Standardization becomes durable when it rests on explicit concept analysis and clear definitions (International Organization for Standardization, 2019a). For SDG discourse, definitions should delimit boundaries, map relations to neighboring concepts, and, where appropriate, surface the normative assumptions embedded in terms (for example, what qualifies as 'sustainable' in sustainable finance). This principle is compatible with sociocognitive perspectives that treat concepts as evolving yet still governable through iterative definition practices (Temmerman, 2000).

Principle 3 - Morphological legitimacy and semantic precision. New Arabic terms should draw on Arabic derivational resources to produce forms that are pronounceable, transparent, and consistent with Arabic morphology (Ryding, 2005). At the same time, semantic precision requires alignment with international definitions to prevent conceptual drift. The principle rejects a false choice between authenticity and accuracy: a term can be morphologically Arabic while remaining conceptually faithful.

Principle 4 - Usability across registers and genres. SDG communication occurs in strategy documents, regulatory standards, textbooks, professional training, and mass media. Terminology must therefore be disseminated in layered form: formal terms and definitions for institutional genres, alongside simplified paraphrases and examples for public communication. Genre analysis suggests that uptake depends on fit with genre conventions, including expected density of technical language and the use of acronyms (Swales, 1990). Designing for usability means producing resources tailored to communicative settings, not assuming that a single term list will serve all audiences.

Principle 5 - Governance, openness, and evaluation. Terminology management is an institutional practice, not an isolated act of translation. Without governance, term systems fragment (Sager, 1990; Wright & Budin, 1997). Arabic linguistic foresight therefore requires multi-stakeholder structures that include language institutions, subject-matter experts, educators, and communication professionals. Open dissemination through public term banks and style guides supports consistent adoption, while evaluation should track both expert acceptance and public comprehension, recognizing that linguistic legitimacy is social as well as technical (Bourdieu, 1991; Spolsky, 2004).

### 5.2 A Staged Workflow for Term Development and Standardization

A workable program of Arabic linguistic foresight can be organized as a staged workflow that connects foresight methods to terminology management. The stages below are offered as a template for national language bodies, ministries, professional associations, and university networks.

Stage 1 - Horizon scanning and concept monitoring. Foresight begins with systematic monitoring of emerging concepts in international science, technology, and policy genres (Popper, 2008). In SDG domains, horizon scanning can track novel terms and frameworks appearing in major reports, standards, and research fields, such as hydrogen certification schemes, circularity metrics, or new models of health-data governance. The aim is to anticipate linguistic needs before they become urgent within national policy cycles.

Stage 2 - Concept selection and mapping. Selected concepts should be mapped within concept systems rather than treated as isolated items. ISO guidance recommends identifying hierarchical and associative relations among concepts to support coherent definition work and consistent term formation (International Organization for Standardization, 2019a). Concept mapping reduces the risk that related terms drift apart across institutions,

and it makes definitional boundaries visible to educators, translators, and policymakers.

Stage 3 - Term formation and definition drafting. Term formation should balance Arabic morphology with international semantic commitments. Options include derivation, compounding, semantic extension of existing roots, and controlled borrowing when necessary. Definitions should be drafted in clear MSA and, where appropriate, include operational indicators or examples relevant to policy and practice. Because SDG concepts are often interdisciplinary, drafting should involve subject-matter experts alongside linguists (Wright & Budin, 1997).

Stage 4 - Review, validation, and controlled variation. Terminology work benefits from structured review procedures: expert panels, cross-institutional consultations, and user testing. Communicative and sociocognitive approaches suggest that controlled variation may be acceptable in early phases, but it should be documented and managed rather than left to drift (Cabré, 1999; Temmerman, 2000). Review protocols can record competing Arabic renderings, evaluate them against shared criteria (precision, transparency, pronounceability, social acceptability), and justify preferred forms for standard usage.

Stage 5 - Dissemination and acquisition integration. Standardization is inert without dissemination. Language planning theory emphasizes that corpus planning must be paired with acquisition planning (Kaplan & Baldauf, 1997). Dissemination channels include open term banks, bilingual glossaries for professional sectors, curriculum integration, and media toolkits. Within Arabic for Specific Purposes programs, standardized terms can be embedded in task-based materials and assessment rubrics, allowing learners to rehearse them as instruments of practice rather than as museum pieces.

Stage 6 - Evaluation and iterative updating. Foresight is iterative by design. Evaluation should track uptake in official documents, textbooks, professional standards, and media, as well as comprehension among target audiences. Because language policy operates through practices and beliefs, evaluation should also examine institutional adoption: whether ministries, universities, and media organizations align style guides and translation routines with standardized terms (Spolsky, 2004). Iterative updates can be scheduled alongside reporting cycles so that Arabic terminologies remain current as SDG domains evolve.

### 5.3 Addressing English Dominance Without Rejecting Multilingual Collaboration

Arabic linguistic foresight does not entail rejecting English as a language of international collaboration. Rather, it responds to a risk identified in research on global scientific communication: when a single language dominates, local publics may be positioned as consumers of imported discourse rather than as co-producers of knowledge and innovation (Ammon, 2012; Phillipson, 1992). Sustainable development depends on local experimentation and debate; these processes require robust local-language infrastructures.

In higher education and industry, bilingual pathways will often remain necessary, particularly in highly technical sectors. However, scholarship on global academic publishing shows that exclusive reliance on English can create internal inequities, excluding capable contributors whose expertise is not matched by advanced English proficiency (Canagarajah, 2002; Lillis & Curry, 2010). Strengthening Arabic as a language of concepts and professional documentation can widen participation without foreclosing global engagement.

Bilingual mapping should therefore be designed as a feature, not a concession. Public term banks can link standardized Arabic terms to English equivalents, definitions, and usage examples, supporting translation quality and reducing duplication across institutions. Such mapping enables professionals to move across local and international genres while strengthening Arabic's corpus and status in high-impact domains (Montgomery, 2013; Ricento, 2006).

## 6. Mini-Glossary: Illustrative SDG Terminology Proposals for Arabic

Terminology proposals are most useful when they are accompanied by definitional notes and formation rationales. The following mini-glossary is illustrative rather than prescriptive: it models how Arabic linguistic foresight can generate transparent, morphologically plausible, and teachable equivalents that remain aligned with international definitions. Where competing Arabic renderings circulate, a preferred form is suggested together with a note on the conceptual emphasis that should be protected in translation and instruction.

| Domain | English concept | Proposed Arabic term | Definition and usage note |
|---|---|---|---|
| Environment/ Circularity | Circular economy | الاقتصاد الدائري | Define as system-wide design for reuse, repair, and value retention; do not reduce to recycling alone. |
| Environment/ Circularity | Extended producer responsibility | مسؤولية المنتج الممتدة | Policy mechanism that assigns producers responsibility across the product life cycle (including take-back and end-of-life). |
| Environment/ Circularity | Life-cycle assessment | تقييم دورة الحياة | Method for estimating environmental impacts from cradle to grave; note boundary and indicator choices. |
| Environment/ Climate | Net-zero emissions | انبعاثات صافي صفري | Differentiate from 'zero emissions': allows residual emissions balanced by verified removals within a specified scope and timeline. |
| Environment/ Climate | Carbon footprint | البصمة الكربونية | Total greenhouse-gas emissions attributable to an activity, product, or organization across an agreed boundary (often life-cycle). |
| Environment/ Climate | Climate adaptation | التكيف مع المناخ | Actions that reduce vulnerability to climate impacts; distinguish from mitigation in policy and education. |
| Environment/ Climate | Climate mitigation | التخفيف من تغير المناخ | Actions that reduce emissions or enhance sinks; specify sectoral pathway where relevant. |
| Environment/ Climate | Resilience | المرونة | Capacity to absorb shocks and maintain function; often paired with 'adaptive capacity' in development discourse. |
| Health | Health literacy | الثقافة الصحية | Capacity to access, understand, appraise, and use health information for decisions and navigation. |
| Health | Universal health coverage | التغطية الصحية الشاملة | Access to needed services without financial hardship; clarify services, coverage, and quality dimensions. |
| Health | Antimicrobial resistance | مقاومة مضادات الميكروبات | Resistance across bacteria, viruses, fungi, and parasites; avoid restricting the concept to antibiotics only. |
| Health/Bio-innovation | Genomic sequencing | تسلسل الجينوم | Process of determining DNA/RNA sequence; central to surveillance and precision medicine. |
| Health/Bio-innovation | Personalized medicine | الطب الشخصي | Tailored prevention/treatment based on individual characteristics; note relation to 'precision medicine' (الطب الدقيق). |
| Health/Digital | Digital health | الصحة الرقمية | Use of digital technologies for health (telemedicine, health information systems, analytics); define scope by use-case. |
| Energy transition | Green hydrogen | الهيدروجين الأخضر | Hydrogen produced via electrolysis powered by renewable electricity; contrast with other production pathways where relevant. |

| Domain | English concept | Proposed Arabic term | Definition and usage note |
|---|---|---|---|
| Energy transition | Electrolysis | التحليل الكهربائي | Splitting water into hydrogen and oxygen using electricity; distinguish alkaline/PEM/solid oxide in technical contexts. |
| Energy transition | Energy storage | تخزين الطاقة | Technologies that shift energy across time; specify duration (short vs long) and carrier (batteries, pumped hydro, hydrogen). |
| Energy transition | Smart grid | الشبكة الكهربائية الذكية | Grid enhanced by sensing, automation, and demand-response; emphasize reliability and integration of renewables. |
| Energy transition | Carbon capture and storage | احتجاز الكربون وتخزينه | Capturing CO2 and storing it; distinguish from utilization (CCUS) and specify storage integrity requirements. |
| Energy transition/Industry | Decarbonization | ازالة الكربون | Reducing carbon intensity in energy and industry; clarify whether absolute reductions or intensity reductions are intended. |
| Future economies/Finance | Sustainable finance | التمويل المستدام | Capital allocation aligned with environmental and social objectives, supported by governance and disclosure frameworks. |
| Future economies/Finance | Green bonds | السندات الخضراء | Debt instruments financing eligible green projects; specify taxonomy, reporting, and verification expectations. |
| Future economies/Finance | ESG criteria | معايير البيئة والمجتمع والحوكمة | Environmental, social, and governance criteria for assessment and disclosure; avoid acronym-only usage in public-facing genres. |
| Future economies/Finance | Transition finance | تمويل التحول | Financing that supports credible transition pathways in high-emitting sectors; define safeguards against greenwashing. |
| Future economies/Finance | Climate-risk disclosure | الإفصاح عن مخاطر المناخ | Reporting physical and transition risks and their financial materiality; note governance and scenario-analysis components. |
| Basic needs/Water | Water scarcity | ندرة المياه | Shortage relative to demand and supply; distinguish physical scarcity from economic/management scarcity. |
| Basic needs/ Food | Food security | الأمن الغذائي | Stable access to sufficient, safe, nutritious food; include availability, access, utilization, and stability dimensions. |
| Basic needs/Urban | Sustainable urban mobility | التنقل الحضري المستدام | Mobility systems that reduce emissions and improve access (public transit, walking, cycling, shared mobility). |
| Basic needs/ Tourism | Sustainable tourism | السياحة المستدامة | Tourism that balances economic benefits with ecological limits and cultural protection; specify local carrying capacity. |

| Domain | English concept | Proposed Arabic term | Definition and usage note |
|---|---|---|---|
| Environment/ Resources | Waste-to-energy | تحويل النفايات إلى طاقة | Energy recovery from waste; specify technology pathway and emissions controls to avoid conflating with recycling. |

**7. Implications for Saudi Vision 2030 and the Arabic-Speaking Knowledge Society**

Arabic linguistic foresight has direct implications for development planning in Saudi Arabia and across Arabic-speaking contexts. The SDGs and Saudi Vision 2030 share a premise: sustainable transformation is a social transition as much as a technical one, requiring education, participation, and institutional capacity (Kingdom of Saudi Arabia, 2016; United Nations, 2015). Language infrastructures shape each of these dimensions by determining who can access, interpret, and act on the concepts through which transformation is organized.

Policy communication and implementation. SDG-aligned policies are expressed through strategies, regulations, and standards that must be interpreted by ministries, municipalities, firms, educators, and the public. When key terms are unstable or imported without definition, implementation can stall at the point where vision is translated into operational guidance. Standardized Arabic terminology resources, disseminated through open term banks and policy style guides, can reduce ambiguity and support coordination across agencies, especially in cross-cutting areas such as circular economy regulation, hydrogen certification, and climate-risk disclosure (Wright & Budin, 1997).

Education. Education for sustainable development aims to equip learners with competencies to navigate complex sustainability problems (UNESCO, 2017). When curricula rely heavily on English-only materials, access becomes stratified: learners with strong English gain disproportionate advantage in high-value domains, while others are excluded from specialized discourse. Work on global academic writing demonstrates how English dominance can function as internal gatekeeping in non-English settings (Canagarajah, 2002; Lillis & Curry, 2010). Arabic linguistic foresight mitigates this by providing stable Arabic registers, definitions, and learning materials for core concepts and professional practice.

Research, innovation, and industry ecosystems. Economic transformation agendas rely on innovation, entrepreneurship, and the growth of new industries. Sustainable development requires not only green technologies but also governance innovations that align incentives with environmental and social goals (Organisation for Economic Co-operation and Development, 2017; United Nations Environment Programme, 2011). For these ecosystems to be inclusive, the language of innovation must be teachable and usable within local professional communities. Bilingual mappings can support international collaboration while ensuring that Arabic remains a language of deliberation, documentation, and technical argument rather than a language of after-the-fact simplification (Montgomery, 2013; Tardy, 2004).

Media and public engagement. Sustainability transitions require public trust and sustained engagement. Climate communication research indicates that engagement depends on framing, imagery, and credible pathways for action, not information alone (Moser, 2010; O'Neill & Nicholson-Cole, 2009). Arabic linguistic foresight can support journalists and communicators by providing standardized terms, concise definitions, and locally grounded examples. It can also counter the depoliticizing effects of jargon by making sustainability choices linguistically accessible and therefore publicly contestable (Fairclough, 1992; Wodak & Meyer, 2009).

Soft power and regional leadership. Strengthening Arabic as a language of science and sustainability can enhance cultural influence and regional coordination. Language policy scholarship notes that language status is shaped by institutional investment and by perceptions of a language's capacity to express modern knowledge (Ricento, 2006; Spolsky, 2004). When Arabic can articulate emerging domains - from circularity metrics to hydrogen value chains - it gains prestige not only as heritage but as a working language of the future, enabling regional cooperation on SDG implementation.

**8. Limitations and Directions for Future Research**

This review offers a conceptual framework and a synthesis of interdisciplinary scholarship rather than an exhaustive empirical mapping of Arabic SDG terminology across all institutions and media genres. The proposed workflow and glossary model practical directions, but they require validation through applied projects that

include expert panels, user testing, and longitudinal tracking of uptake.

First, corpus-based studies can systematically map how SDG-related terms are currently used across Arabic policy documents, textbooks, and media, identifying patterns of variation, drift, and institutional convergence. Such studies can combine corpus linguistics with critical discourse analysis to examine how sustainability is framed in relation to responsibility, agency, and national identity (Fairclough, 1992; Wodak & Meyer, 2009).

Second, experimental and survey research can test comprehension and preference for competing Arabic term formations across audience groups, including students, professionals, and general publics. Health literacy scholarship demonstrates that comprehension is shaped by lexical choices as well as by genre and context (Nutbeam, 2000; Sørensen et al., 2012). Parallel approaches can evaluate sustainability and energy-transition terminology, distinguishing technical acceptance from public intelligibility.

Third, institutional studies can evaluate governance models for terminology management, comparing centralized standard-setting, networked expert panels, and open collaborative models. The literature on terminology management suggests that infrastructure and workflow design strongly influence long-term stability and adoption (Sager, 1990; Wright & Budin, 1997). Such work can also clarify which incentives and mandates encourage ministries, universities, and media organizations to converge on shared definitions.

Fourth, foresight-oriented evaluations can test whether proactive term development measurably improves policy implementation timelines, curriculum uptake, and professional training outcomes in emerging sectors. Such evaluations would operationalize the central claim of this article: that language planning can function as a strategic enabler of sustainable development rather than as a symbolic accompaniment.

## 9. Conclusion

SDG implementation ultimately depends on communicative capacity: societies must coordinate action across sectors, translate complex ideas into teachable knowledge, and debate contested priorities in terms that are publicly intelligible (United Nations, 2015). In many Arabic-speaking contexts, terminological instability and English-dominant knowledge flows constrain these processes, narrowing who can participate in expert discourse and delaying the movement from strategy to routine practice.

Arabic linguistic foresight responds by treating terminology as a form of development infrastructure. A forward-looking program of concept governance (horizon scanning, definition work, principled term formation, validation, dissemination, and evaluation) can help Arabic name and stabilize emerging SDG concepts without severing ties to global multilingual collaboration. The larger issue is institutional: whether ministries, universities, professional associations, and media organizations will invest in shared mechanisms that allow Arabic technical discourse to circulate beyond specialist circles and into education, policy implementation, and everyday public deliberation.

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