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LEXICAL-SEMANTIC TRANSFORMATION OF CLIMATE-ADAPTIVE AGRICULTURAL TERMS: A COMPARATIVE STUDY OF ENGLISH AND UZBEK

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Abstract: This article examines lexical-semantic transformations that occur when climate-related agricultural terminology is transferred from English into Uzbek. The analysis focuses on such units as climate-smart agriculture, climate-resilient agriculture, climate-informed planning, drought-tolerant crops, water-use efficiency, conservation agriculture, precision irrigation, mitigation, adaptation, and early warning system. The study applies comparative-semantic, componential, contextual and terminological-equivalence methods. Particular attention is paid to calquing, semantic narrowing and broadening, component substitution, descriptive translation and borrowing. The findings show that a number of English terms are represented in Uzbek not by complete conceptual equivalents but by forms in which one semantic component is strengthened while another is weakened. In particular, the Uzbek rendering of climate-smart agriculture as “iqlimga moslashuvchan qishloq xo‘jaligi” is communicatively clear, yet it does not equally foreground all three dimensions of the source concept: productivity, adaptation/resilience and mitigation. The article argues that the standardization of new agricultural terminology in Uzbek should be based not only on lexical correspondence but also on the conceptual scope of terms in international scientific discourse.

Keywords: climate-adaptive agriculture, agricultural terminology, lexical-semantic transformation, equivalence, calquing, semantic narrowing, semantic broadening, English, Uzbek, terminological standardization.

INTRODUCTION

Climate change is rapidly reshaping the lexical inventory of agricultural science and practice. In recent years, terms such as climate-smart agriculture, climate resilience, climate-informed planning, climate adaptation, drought tolerance and water-use efficiency have become regular elements of global agricultural policy, scientific research, extension services and digital platforms. FAO describes climate-smart agriculture as an approach that pursues three interrelated objectives: sustainably increasing agricultural productivity and incomes, adapting and building resilience to climate change, and reducing or removing greenhouse-gas emissions where possible. The IPCC glossary similarly treats the term as an integrated approach linking food security, adaptation, resilience and mitigation. Therefore, the conceptual structure of the term is broader than the ordinary-language meaning of “adaptation to climate”.

In Uzbekistan, water scarcity, salinization, rising temperatures, drought risks and agroclimatic instability are increasing the relevance of climate-resilient farming practices and, consequently, the circulation of new terminology. UNDP materials on Uzbekistan actively use concepts equivalent to “climate resilience”, “agrometeorological services” and “climate-informed planning”, demonstrating that this lexical layer is becoming part of national professional discourse . At the same time, the Uzbek equivalents selected for English terms do not always maintain a full balance between formal structure, scientific content and practical clarity. Local studies have examined the semantic properties, linguistic value, borrowing sources and standardization of agricultural terms, yet the newest layer of climate-related agricultural terminology still requires systematic comparative lexical-semantic analysis. The aim of this article is therefore to identify the principal semantic transformations that arise in the transfer of these terms from English into Uzbek and to propose principles for their more consistent translation and standardization.

The study employs comparative-semantic analysis, componential analysis, contextual analysis and terminological-equivalence assessment. The material is drawn from international publications issued between 2017 and 2026, scientific studies on climate-smart agriculture, documents and project materials related to climate-resilient agriculture in Uzbekistan, and recent research on English-Uzbek

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agricultural terminology. The analysis indicates that new terms enter Uzbek through several different mechanisms. One group is transferred through relatively direct calquing: drought-tolerant crops becomes “qurg‘oqchilikka chidamli ekinlar”, water-use efficiency is rendered as “suvdan foydalanish samaradorligi”, and early warning system as “erta ogohlantirish tizimi”. In these cases, the components of the English term are replaced by semantically corresponding Uzbek units, and conceptual loss is minimal. A second group is characterized by descriptive translation. Climate-informed planning, for example, may be translated as “iqlim ma’lumotlariga asoslangan rejalashtirish” or “iqlim omillarini hisobga olgan holda rejalashtirish”. The English component informed is not replaced by a single Uzbek lexical unit; instead, its functional content is explicated through a phrase. This strategy improves comprehensibility in Uzbek scientific prose, though it reduces terminological compactness. A third group involves international borrowings combined with native words and affixes: agrometeorological services becomes “agrometeorologik xizmatlar”, while decarbonization and mitigation may appear in internationalized forms such as “dekarbonizatsiya” and “mitigatsiya”. In many applied texts, however, explanatory equivalents such as “oqibatlarni yumshatish” or “emissiyalarni kamaytirish” are more transparent. For this reason, international recognizability and national comprehensibility should be treated as complementary rather than competing criteria in terminological selection.

The most significant transformation is observed in the term climate-smart agriculture. In general English, smart may be associated with intelligence, efficiency or technological sophistication, but in agricultural discourse the term does not simply denote digital or intelligent technology. In FAO and IPCC usage, climate-smart agriculture is a policy-scientific concept that combines productivity, adaptation, resilience and mitigation. Chandra, McNamara and Dargusch show that the term is framed differently across scientific and policy contexts and that its meaning cannot be reduced to a single technical solution. Later reviews likewise define climate-smart agriculture as an integrated approach combining technology, management, resource efficiency and climate-risk reduction. In Uzbek, “iqlimga moslashuvchan qishloq xo‘jaligi” is pragmatic and natural, but it semantically narrows the source term because the mitigation and productivity components contained in smart are not explicitly visible. A more literal form, “iqlim jihatdan aqlli qishloq xo‘jaligi”, is structurally closer to English, yet the Uzbek adjective “aqlli” is strongly associated with digital devices or artificial intelligence and may therefore create an unintended technological interpretation. A more appropriate academic practice is to introduce the expression as “iqlimga moslashuvchan (climate-smart) qishloq xo‘jaligi” at first mention and immediately define its three conceptual dimensions. In terminological standardization, conceptual equivalence should take priority over formal similarity.

Climate-resilient agriculture and climate-smart agriculture are also sometimes treated as near-synonyms in Uzbek usage. In fact, resilient refers primarily to the capacity of a system to withstand, absorb and recover from shocks, stresses or adverse climatic events and may be represented by Uzbek words such as “chidamli”, “barqaror” or “bardoshli”. Climate-smart, by contrast, functions as a broader management paradigm. Consequently, “iqlimga chidamli qishloq xo‘jaligi” and “iqlimga moslashuvchan qishloq xo‘jaligi” should not be treated as complete synonyms. Uzbekistan-focused materials from 2023–2024 use “climate resilience” chiefly to describe the ability of farms, horticultural systems and local livelihoods to withstand negative climatic impacts. The World Bank study on climate adaptation in Uzbekistan, meanwhile, discusses water-saving technologies, soil conservation, drought- and salinity-tolerant crops and efficient resource use within a wider climate-smart framework. From a lexical-semantic perspective, this distinction creates a terminological hierarchy: climate resilience describes a property or outcome; climate adaptation denotes a process; and climate-smart agriculture is a higher-order concept that integrates those processes and outcomes with productivity and mitigation.

Semantic broadening is also visible in the adaptation-related lexicon. In scientific discourse, adaptation does not merely mean passive adjustment. It includes climate-risk assessment, anticipatory planning, technological change, crop substitution, modification of irrigation regimes and institutional measures. Accordingly, the Uzbek term “moslashuv” expands from its general-language meaning into a specialized management concept. Similarly, “chidamlilik”, used for resilience, traditionally denotes

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physical or biological endurance, but in contemporary agricultural discourse it increasingly refers to a complex systems property of farms, territories, agroecosystems and supply chains. Studies of Uzbek agricultural terminology likewise indicate that technological innovation and socio-economic change alter the semantic value of sectoral terms and generate new borrowing and word-formation patterns. A corpus-based approach to English-Uzbek agricultural lexicography can strengthen this process by extracting terms from authentic contexts, comparing variants and identifying stable equivalents. For climate-related agricultural terminology, corpus monitoring, parallel-text analysis and expert evaluation by both linguists and agricultural specialists should therefore be used together.

Table 1. Lexical-semantic transformation of selected English climate-related agricultural terms in Uzbek

English term	Uzbek equivalent	Transformation type	Semantic comment
climate-smart agriculture	iqlimga moslashuvchan qishloq xo‘jaligi	Semantic narrowing + functional equivalent	Productivity and mitigation are not fully explicit.
climate-resilient agriculture	iqlimga chidamli qishloq xo‘jaligi	Calque / near-equivalent	Resilience denotes resistance and recovery from climate shocks.
climate-informed planning	iqlim ma’lumotlariga asoslangan rejalashtirish	Descriptive translation	Informed is explicated rather than compressed into one unit.
drought-tolerant crops	qurg‘oqchilikka chidamli ekinlar	Full component calque	High degree of semantic correspondence.
climate adaptation	iqlim o‘zgarishiga moslashuv	Semantic broadening	Moslashuv expands into a systems-management concept.

The examples in Table 1 demonstrate that a successful Uzbek equivalent should satisfy three conditions. First, it should preserve the core semantic features of the concept. Second, it should conform to Uzbek word-combination and term-formation norms. Third, it should remain equally understandable to agronomists, translators, researchers and practitioners. If translation relies only on formal calquing, multilayered terms such as smart, resilience and mitigation may be interpreted too narrowly or inaccurately. If it relies only on descriptive translation, terms become excessively long and lose the compactness required of stable scientific nominations. The optimal model is therefore to select a primary standardized equivalent, explain it briefly at first occurrence, and then use the same form consistently throughout the text. Boboyev identifies synonymy, polysemy and the multiplication of borrowed variants as key problems in the standardization of Uzbek agricultural terminology . Qodirova likewise emphasizes that historical layers, borrowing and word-formation mechanisms directly influence the development of English and Uzbek agricultural terminological systems. The current transformation of climate-related terminology is therefore not an isolated phenomenon, but part of the broader modernization of Uzbek agricultural terminology under the influence of globalization, technological change and new scientific concepts.

CONCLUSION

The comparative analysis of English and Uzbek climate-related agricultural terminology shows that new agrarian lexical items are not transferred through simple translation alone; they are integrated through complex lexical-semantic transformation. Full calquing, descriptive translation, component substitution, semantic narrowing, semantic broadening and international borrowing emerge as the principal mechanisms. The greatest difficulties occur with conceptually dense terms such as climate-smart agriculture, resilience and mitigation. The Uzbek form “iqlimga moslashuvchan qishloq xo‘jaligi” is communicatively effective, but it does not automatically express every semantic dimension

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of the international concept; in academic texts, it should therefore be explicitly linked to productivity, adaptation/resilience and mitigation. Climate resilience and climate adaptation also need to be differentiated: the former primarily denotes a system property, while the latter denotes a process. Standardization of Uzbek agricultural terminology should combine international conceptual definitions, national linguistic norms, frequency in authentic professional usage and expert assessment. Regular analysis of parallel English-Uzbek texts and corpus-based monitoring can contribute to the development of stable, concise and semantically precise equivalents for newly emerging climate-related agricultural terms.

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