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SYNONYMOUS FEATURES OF METALLURGICAL TERMS IN ENGLISH AND UZBEK LANGUAGES

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Abstract:

This article provides a linguistic and terminological analysis of the synonymous features of terms related to the field of metallurgy in English and Uzbek. As terminology constitutes the core conceptual framework of any scientific discipline, linguistic studies of technical terminology—particularly in metallurgy—are of considerable significance to academic research. The study investigates metallurgical terms through a comparative linguistic approach within the context of the English and Uzbek languages. Special attention is paid to the synonymous forms of terms, their usage domains, semantic distinctions, and stylistic connotations. The research findings reveal that the same technological process or metallurgical concept in English and Uzbek is often expressed using different lexical means. In some cases, multiple synonymous terms exist in English, while only one equivalent is used in Uzbek—or vice versa. This discrepancy can lead to the risk of incorrect or context-inappropriate usage during translation. The article also explores the functional roles of synonymous terms in scientific and technical texts, such as their contribution to clarity and conciseness, their degree of terminological rigidity, and their stylistic neutrality. It was found that English synonymous terms are often formed through conversion, abbreviations, or Latin and Greek roots, whereas their Uzbek equivalents are typically rendered through explanatory translation. This has contributed to the increase in the number of synonymous terms in Uzbek technical terminology. The results of this research indicate that a thorough study of synonymy in metallurgical terms is essential not only for improving translation quality but also for developing a unified and standardized system of terminology for the field. The conclusion of the article provides methodological recommendations for the systematization of English-Uzbek metallurgical terms, the clarification of semantic boundaries among synonyms, and the identification of their lexical and stylistic characteristics. This research may be of practical value to linguists, translators, technical specialists, and terminologists.

Keywords: Metallurgy, Metallurgical Terms, Terminology, Semantic Features, Synonymy, Synonymic Terms, Lexical and Semantic Characteristics, Abbreviations, Technical Terminology, Synonymic Layer, Semantic Differences

1. Introduction

In the 21st century, the rapid development of science and technology, as well as the expansion of industrial sectors, has posed new challenges for linguistics. In particular, expressing emerging concepts in the fields of science and technology, translating them consistently and accurately into various languages, and identifying their synonymous relationships have become critical scholarly tasks. Especially in technical terminology, the phenomenon of synonymy holds unique characteristics, where each terminological unit possesses a distinct semantic boundary, stylistic value, and communicative function [1]. From this perspective, studying the synonymous properties of metallurgical terms in English and Uzbek is significant not only from a linguistic standpoint but also in terms of practical application. The metallurgical industry, as a vital component of heavy industry, plays a crucial role in the socio-economic development of society. Scientific and technological advancements in this field, along with innovations in production technologies, give rise to new concepts and terms in its terminology. However, translating these terms from one language into another often leads to various lexical-semantic challenges. This is especially true for synonymous terms that exist within a single language or across two languages, which necessitates a deep analysis of their semantic nuances, stylistic variations, and contextual applications [2]. Through studying the synonymous aspects of metallurgical terms in English and Uzbek, we can identify their semantic structures, mutual substitutability, and the semantic ambiguities that may arise during translation. This article examines the synonymous features of terms in the field of metallurgy within the scope of two languages—English and Uzbek. The relevance of this topic lies in the fact that, in contemporary technical translations or the creation of scientific and literary texts, working with synonymous terms and ensuring their accurate usage in context is of vital importance to translators and specialists. Each domain has its own distinct terminological system, differing significantly from conventional vocabulary [3]. Therefore, studying synonymous metallurgical terms based on linguistic criteria is considered notable not only as a linguistic analysis but also as an interdisciplinary research endeavor. The article begins with a theoretical analysis of the concept of terminological synonymy, including its general and field-specific manifestations. In the following sections, practical exploration is carried out on English metallurgical terms and their synonymous counterparts in Uzbek. Special attention is given to alternative variants encountered during translation, their contextual uses, and the challenges of preserving semantic clarity. During the research, English metallurgical terms that have two or more equivalents in Uzbek are examined, their synonymic relationships are classified, and recommendations for their accurate application are provided. The ultimate aim is to assist translators and industry professionals by identifying synonymous relations in English and Uzbek metallurgical terminology, ensuring proper usage and linguistic precision. Furthermore, this article can serve as a theoretical and practical resource for scholars, specialists, and language learners conducting research in technical translation, domain-specific lexicology, and contrastive linguistics [4].

Literature Review

The study of synonymous features in English and Uzbek metallurgical terminology is currently one of the most relevant topics in the fields of linguistics, technical translation, terminology studies, and domain-specific linguistics. From this perspective, analyzing the existing scholarly literature is advisable in two primary directions: the lexical-semantic analysis of metallurgical terms and their equivalence in translation. First and foremost, in the works of Uzbek linguists such as G. Gulomov, M. Ismoilov, and N. Jurayev, the synonymous layers of technical and scientific terminology are discussed in dictionaries and studies dedicated to technical terminology and terminology science [5]. In these studies, synonymy is assessed mainly through linguistic criteria such as semantic proximity, functional similarity, and stylistic expression. For instance, in M. Ismoilov's work entitled "Translation of Technical Terms," various alternative Uzbek equivalents (synonyms) of English metallurgical and other technical terms are analyzed. The author highlights the existence of multiple equivalents for certain terms and emphasizes that translations should be performed based on context. This is particularly evident with terms like "smelting," "casting," and "refining." Additionally, the

monograph “Fundamentals of Technical Terminology” by Abdurakhmonov provides valuable analytical insights into the classification of technical terms, their adaptation into the Uzbek language, and the importance of synonym selection in translation [6]. He explains that polysemous English words are not always translated into a single synonymous form in Uzbek but are rendered differently depending on the context. For example, the term “metal forming” can be translated as “shaping metal,” “pressing metal,” or “processing metal” depending on usage. When turning to foreign sources, M. G. Znamenskaya’s “Scientific and Technical Translation” underscores that the choice of synonymous variants in technical translation should align not with internal linguistic norms but with technical documentation, regulatory standards, and accepted terminological units [7]. The author emphasizes that for terms recognized by international standards such as ISO and ASTM, synonymy is highly restricted. V. Karpov grouped English metallurgical process terms into lexical-semantic categories and attempted to identify synonymic layers in the translation process. He showed, with examples, that although terms such as “forging,” “pressing,” and “stamping” are semantically close, they are not interchangeable in terminological usage—thereby confirming that terminological synonymy is functionally limited. There are also studies that distinguish between term equivalents and true synonyms. For example, X. Tukhtayeva argues that the use of synonymous terms in translating English metallurgical terminology can sometimes distort meaning or cause ambiguity [8]. She maintains that technical synonyms in Uzbek often differ contextually or stylistically, and therefore, in translation, standardized equivalents rather than mere synonyms should be prioritized. Modern corpus linguistics research has developed methods for automatically identifying synonymy in metallurgical terms using parallel corpora of English-Uzbek technical texts. Such approaches, based on computational linguistics and artificial intelligence, offer new opportunities to analyze terminological synonymy. In conclusion, existing literature addresses the issue of synonymy from diverse perspectives, including linguistics, translation theory, and practical technical translation. In analyzing the synonymic layer of English and Uzbek metallurgical terms, semantic differences, functional similarities, and adherence to international standards must be taken into account. Moreover, it is necessary to critically evaluate the contrast between localized equivalents and internationally standardized terminology [9].

2. Materials and Methods

The methodological foundation of this study is based on linguistic analysis, comparative linguistics, terminological systematization, and translation studies approaches. As a branch of technical sciences, metallurgy possesses a distinct scientific and technical terminology that warrants in-depth linguistic investigation, particularly regarding its synonymous aspects. For this reason, this article selects and analyzes English and Uzbek metallurgical terms based on their semantic, stylistic, morphological, and functional features [10]. The research methodology relies on a multi-stage analytical approach, including the following components:

Selection and Systematization of Empirical Material

First, metallurgical terms in English and Uzbek were compiled from sources such as the Oxford Dictionary of Science, Dictionary of Metallurgy, the National Encyclopedia of Uzbekistan, the Explanatory Dictionary of Metallurgical Terms relevant textbooks, and scholarly articles. More than 300 terms from each language were selected, and their translated equivalents and synonymous variants were prepared for comparative analysis [11].

Comparative-Linguistic Analysis

Metallurgical terms in both languages were compared in terms of morphological structure, semantic content, and lexical similarities and differences. The English terms and their Uzbek equivalents were evaluated based on direct translation, semantic equivalence, functional correspondence, and degree of synonymy. For example, the term “smelting” may be translated into Uzbek as “eritish” or “quyish,” yet each carries slightly different connotations depending on the context[12].

Identification of Types of Synonymy

During the analysis, the types of synonymy among terms were classified according to the following criteria:

a. Absolute synonyms – terms that are fully interchangeable (e.g., “casting” – “quyish”);
b. Near synonyms – lexical units that may be used interchangeably depending on the context (e.g., “annealing” – “tavlash” and “qayta ishlov”);
c. Stylistic synonyms – terms that differ based on usage in formal or informal contexts;
d. Functional synonyms – terms that are synonymous depending on the role they perform.

Translational Analysis Method

In translating metallurgical terms—particularly from English into Uzbek—the selection of synonymous equivalents plays a crucial role. The study incorporates theoretical concepts from translation studies, such as denotative and connotative meaning, levels of equivalence, and term assimilation. The translation process accounted not only for word-for-word correspondence, but also for semantic clarity, stylistic precision, and domain-specific applicability [13].

Statistical Approach

The frequency and contextual expansion of synonymous term usage were evaluated using statistical methods. In the selected text corpus (scientific articles, textbooks, encyclopedic sources), the frequency of synonymous term occurrences was calculated to determine which variants were most prevalent. This helped identify the dominant terms among multiple options.

Discourse-Analytical Approach

Certain synonymous equivalents of metallurgical terms were analyzed within the context of scientific-technical texts to evaluate their discursive roles—i.e., how terms are used in different sections of a text, under what stylistic tone, and within which thematic frameworks. This allowed the study to evaluate terms not just at the lexical level, but also in terms of their functional significance within discourse.

These methodological approaches—including empirical, linguistic, comparative, translational, and statistical analyses—were applied to comprehensively investigate the synonymous features of metallurgical terms in English and Uzbek. As a result, the study offers a novel scientific perspective on terminological synonymy and establishes key methodological principles for improving translation processes.

3. Results and Discussion

In the course of this study, English and Uzbek metallurgical terminologies were comparatively analyzed, and their synonymous characteristics were examined based on various linguistic criteria. According to the research findings, synonymous units exist in both languages within the field of metallurgy, and multiple factors influence their formation. Primarily, the formation of metallurgical terminology in Uzbek relies on two main sources: native (Turkic-rooted) terms and those borrowed from Russian. In contrast, English terminology in this field is largely derived from Greek, Latin, and occasionally French origins and is shaped according to standardized, globally recognized scientific-technical terminology. The analysis revealed that English metallurgical terms are often monosemous, meaning that each term typically denotes a single, clearly defined concept[14]. However, in Uzbek, a single concept may be represented by multiple terms, reflecting a more active form of synonymy. For example, the term “quyma” in Uzbek may appear as “kuyma,” “to‘kma,” or “g‘allama,” whereas in English the same concept is precisely expressed through terms like “casting” or “ingot.” In addition, in some cases, English contains multiple synonymous terms that differ in their contextual or stylistic applications. For example, while both “smelting” and “melting” may be translated into Uzbek as “eritish,” the former refers specifically to extracting pure metal from ore, whereas the latter indicates a general phase transition into a liquid state. Thus, English terms are applied with greater specificity, and synonymous expressions often carry distinct functional nuances. In contrast, such precision may sometimes be lacking in Uzbek. For instance, the terms “metal eritish” (melting metal) and “quyish” (casting) are occasionally used interchangeably, which can lead to ambiguity in scientific and industrial contexts. Surveys conducted among technical specialists participating in the research confirmed that inconsistencies in terminology—particularly in translation—may negatively impact

scientific accuracy and even safety in production processes. Furthermore, English synonymous terms denoting a technological process are sometimes used complementarily or in a more detailed manner. For example, “annealing,” “tempering,” and “normalizing” all fall under the broader category of “heat treatment,” but each term refers to distinct procedures with specific temperature and cooling parameters. In Uzbek, however, these distinctions are often generalized under the umbrella term “issiq ishlov berish” (heat treatment), which fails to fully capture the semantic depth of the individual terms. Another significant result is that many metallurgical terms in Uzbek are still used in forms borrowed directly from Russian. Terms such as “martensit,” “ferrit,” and “austenit” have been adopted in their Russian forms and rarely appear with Uzbek synonyms. In contrast, these terms exist in standardized and independently established forms in English, regularly appearing in academic journals and scientific texts. The study also observed the presence of colloquial synonyms within the Uzbek terminology of metallurgy. Expressions such as “temir to‘kish” (pouring iron) and “po‘lat quyish” (casting steel) are used in spoken language, although they do not align fully with formal scientific terminology. In English, such dual-layered distinctions are more sharply defined, with academic terminology rarely overlapping with colloquial usage. During the discussion process, linguists and technical professionals emphasized the need for updates, unification, and standardization of metallurgical terminology in Uzbek. Inaccurate use of synonymous terms in translation can lead to misunderstandings in scientific writing, technical documentation, and educational processes. Another important observation is that in English, synonymous metallurgical terms are often differentiated based on stylistic and functional factors and fulfill specific purposes in scientific texts. In Uzbek, such differentiation is not yet fully developed. This highlights the need to create analytical dictionaries and establish context-based criteria for the use of synonymous terms in Uzbek[15]. Based on the analysis, the study arrives at the following conclusions:

a. English metallurgical terminology is highly standardized, and clear semantic boundaries are established between synonyms.
b. In Uzbek, synonymous terms are sometimes used interchangeably, potentially undermining scientific precision.
c. The challenges of synonymy in terminology are most pronounced in the context of translation.
d. Creating explanatory, context-sensitive dictionaries of terminological synonyms will enhance the development of technical vocabulary in the Uzbek language.

4. Conclusion

Terminology related to the field of metallurgy in both English and Uzbek possesses unique lexical-semantic and stylistic characteristics. Analyzing their synonymous aspects is of great importance for the development of modern technical translation, terminology engineering, and scientific thinking. The results of this study demonstrate that the terms used in metallurgy are generally based on international standards. In most cases, English terms are not translated directly into Uzbek but are either transliterated or rendered through semantic equivalence. This process contributes to the formation of synonymous layers within Uzbek technical terminology and leads to distinctions between terms. For example, the English term “alloy” may be translated into Uzbek using several different equivalents such as “qotishma,” “aralashma,” or, in some cases, “kompozit material.” Similarly, the term “casting” can be translated as “quyish,” “quyma,” or “metall quyish jarayoni” depending on the context. While these examples demonstrate the availability of synonymous variants in translation, they also reveal how meaning may shift based on contextual usage. Therefore, a contextual approach is essential in the translation of each term, as misinterpretation can negatively affect the content of scientific-technical documents. In addition, there are specific distinguishing factors among the synonymous variants of English and Uzbek metallurgical terms. These differences are primarily tied to the functional load of the term, its usage domain, and the accepted conventions within the specialized field. From this perspective, translators and linguistic specialists must evaluate each term not only based on its dictionary meaning but also by its functional role within the scientific-engineering context. The study also shows that the choice of synonymous terms is a decisive factor in ensuring precision and clarity

in scientific discourse. Replacing terms with incorrect or overly generalized synonyms can lead to technical errors, misunderstandings, and, in some cases, hazardous consequences. Thus, when translating metallurgical terms into Uzbek, it is crucial to select the synonym that is semantically accurate, contextually appropriate, and terminologically precise. Moreover, it was observed that the synonymous system of some metallurgical terms in Uzbek has not yet been fully developed. This situation calls for close cooperation among linguists, technical translators, and professionals in the field of metallurgy. Such collaboration should aim to create a unified, systematic, scientifically grounded, and synonymically accurate database of metallurgical terminology. In conclusion, the synonymous features of metallurgical terms in English and Uzbek are of significant scientific and practical value not only for linguistics and translation theory but also for applied fields such as engineering, technology, and industrial operations. A thorough study of synonymy in this domain contributes to high-quality translation of technical documentation, enhances the efficiency of scientific communication, and improves mutual understanding among field specialists. Therefore, research on this topic can make a meaningful contribution to the consistent and functional development of metallurgical terminology.

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