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# Formation Models of Technical Terms in English, Uzbek And Russian

Abdullayeva Fotima Baxramovna
Lecturer at Jizzakh State Pedagogical University, Uzbekistan

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**Abstract:** This article examines the formation models of technical terms in English, Uzbek and Russian. Technical terminology is one of the most rapidly developing layers of vocabulary because it directly reflects scientific discoveries, industrial modernization, engineering practice and technological innovation. The formation of technical terms is not a random lexical process; it is determined by the structural possibilities of a language, the conceptual needs of a professional field, the influence of international terminology and the communicative requirements of specialists. The purpose of this article is to analyze the main models through which technical terms are formed in English, Uzbek and Russian, and to reveal their similarities and differences from a comparative linguistic perspective. The study is based on descriptive, comparative, structural and semantic methods. The results show that English technical terminology is characterized by compounding, conversion, abbreviation, acronym formation, semantic specialization and the active use of Greek-Latin and international elements. Russian technical terminology is distinguished by productive affixation, compounding, calquing, terminological word combinations and adaptation of international units. Uzbek technical terminology develops through native derivation, compounding, analytical combinations, borrowing, calquing and adaptation of English and Russian technical terms. The article concludes that the comparative study of term-formation models is important for terminology standardization, translation practice, technical education and multilingual professional communication.

**Keywords**: Technical terms, term formation, English terminology, Uzbek terminology, Russian terminology, word formation, compounding, borrowing, calquing, abbreviation, structural models, technical vocabulary.

**Introduction:** Technical terminology is an essential part of specialized language because it names objects, processes, devices, operations, methods and concepts used in science, engineering and technology. Every technical field develops its own system of terms, and this system changes as new technologies appear. The development of terminology is especially active in such fields as information technology, mechanical engineering, energy, transport, construction, electronics, automation, telecommunications and industrial production. In these areas, the need for precise naming is constant because professional communication requires accuracy, clarity and conceptual stability.

The formation of technical terms is closely connected with the internal structure of language. Each language has its own mechanisms for creating new lexical units. English often forms technical terms through compounding, conversion, abbreviation and the use of international elements. Russian actively uses derivational affixes, compound structures, syntactic combinations and calques. Uzbek employs native word-formation resources, descriptive combinations and borrowed elements, especially from Russian and English. These differences show that the same technical concept may be expressed through different structural models in different languages.

The comparative study of English, Uzbek and Russian

technical terms is relevant for several reasons. English functions as a global language of science and technology, and many new technical concepts first enter international communication through English. Russian has played an important historical role in the formation of technical vocabulary in Uzbekistan, especially during the development of engineering education, industrial terminology and scientific literature. Uzbek, as the state language of Uzbekistan, is actively expanding its technical terminological system in accordance with national language policy, educational needs and technological modernization. Therefore, technical terminology in Uzbekistan often exists in a multilingual environment where English, Russian and Uzbek terms interact.

The problem of term formation is not only linguistic but also practical. In technical education, students must understand terms accurately in different languages. In translation, specialists must choose appropriate equivalents and avoid semantic distortion. In lexicography, dictionaries must present standardized, clear and functional terms. In professional communication, engineers, researchers and teachers need terminological consistency. If technical terms are formed inconsistently, communication becomes complicated and misunderstandings may arise. Therefore, the study of term-formation models contributes to the improvement of scientific and technical communication.

The aim of this article is to analyze the formation models of technical terms in English, Uzbek and Russian. The article examines synthetic and analytical models, affixation, compounding, abbreviation, borrowing, calquing, semantic specialization and hybrid formation. It also explains how these models function in each language and how they influence the semantic structure of technical vocabulary. The central idea of the study is that technical term formation is shaped by both linguistic structure and professional conceptual needs.

The research is based on descriptive, comparative, structural and semantic methods of linguistic analysis. The descriptive method is used to characterize the main term-formation models in English, Uzbek and Russian. This method allows the study to present each language as a system with its own lexical, morphological and syntactic possibilities. The comparative method makes it possible to identify similarities and differences among the three languages and to determine how they express similar technical concepts through different structural means.

The structural method is applied to analyze the formal organization of terms. Technical terms may be simple, derived, compound, abbreviated, borrowed or formed as multi-component combinations. Their structure may include roots, affixes, stems, international elements, abbreviations and syntactic components. The structural analysis helps explain how the form of a term reflects its function and conceptual content. For example, terms denoting devices often contain elements that indicate instrumentality, while terms denoting processes may contain suffixes or components expressing action or operation.

The semantic method is used to examine the relationship between the formation model and the meaning of the term. Technical terms are not only formal units; they are connected with specialized concepts. A term can be motivated if its structure clearly shows the meaning of the concept. A term can also be opaque if it is borrowed, abbreviated or historically fixed. The semantic analysis helps determine whether a term is transparent, partially transparent or conventional.

The theoretical basis of the study includes the works of E. Wüster, D. S. Lotte, V. M. Leychik, A. V. Superanskaya, S. V. Grinev-Grinevich, M. T. Cabré, J. C. Sager and other scholars of terminology and word formation. These works make it possible to interpret technical terminology as a systematic and concept-oriented layer of language. The article uses examples from engineering, information technology, energy, mechanics and industrial production in order to demonstrate the productivity of different formation models.

The analysis shows that English technical terminology is highly productive in compounding. Compound terms such as “power supply,” “control unit,” “circuit breaker,” “cooling system,” “data processing,” “fuel pump,” “gearbox,” “software package” and “machine learning” demonstrate the analytical nature of English technical vocabulary. In many cases, the first component specifies the function, material, field, object or process, while the second component names

the basic technical concept. This model is compact and convenient because it allows specialists to create new terms quickly without complex morphological changes. The noun-noun pattern is particularly productive because it can combine several conceptual features in a short form.

English also widely uses conversion as a term-formation model. Words can move from one part of speech to another without visible morphological change. For example, “to control,” “control,” “to monitor,” “monitor,” “to process,” “process,” “to drive” and “drive” may function as technical terms depending on context. This flexibility is useful in technical language because the same lexical base can name both an action and a device or process. Conversion supports economy and productivity in English technical terminology.

Abbreviation and acronym formation are especially characteristic of English. Technical fields often require short forms because full terms may be long and frequently repeated. Terms such as “CPU,” “RAM,” “USB,” “GPS,” “CAD,” “CAM,” “CAE,” “CNC,” “LED,” “AI” and “IoT” are widely used in international technical communication. Such abbreviated forms become independent terminological units and often enter other languages without translation. Their advantage is brevity, but their interpretation requires professional knowledge.

Another productive model in English is semantic specialization. Common words may acquire technical meanings in specific fields. Words such as “mouse,” “cloud,” “window,” “cell,” “network,” “bridge,” “bus,” “port” and “driver” have specialized meanings in technology and computing. This model demonstrates the metaphorical and functional development of technical vocabulary. The term is formed not by creating a new word, but by narrowing or transferring the meaning of an existing word.

Russian technical terminology is characterized by productive affixation. Russian uses prefixes and suffixes to form terms denoting processes, devices, instruments, results and properties. Terms such as “двигатель,” “измеритель,” “нагреватель,” “охладитель,” “переключатель,” “соединение,” “заземление,” “напряжение,” “проводимость” and “устойчивость” show how derivational morphology creates semantically motivated technical units. Suffixes often indicate the function of an object or the nature of a process. For example, the suffix “-тель” is productive in naming devices or agents, while “-ние” and “-ость” are used to express processes, states and qualities.

Russian also forms technical terms through compound and analytical constructions. Terms such as “электрическая цепь,” “система управления,” “источник питания,” “двигатель внутреннего сгорания,” “печатная плата,” “автоматизированная система проектирования” and “цифровая обработка данных” show the importance of multi-component structures. These combinations are semantically precise because each component adds a definite conceptual feature. The grammatical agreement between adjectives and nouns, as well as genitive relations, helps organize meaning clearly.

Calquing is an important model in Russian technical terminology. Many international and English terms are translated component by component. For example, “machine learning” corresponds to “машинное обучение,” “artificial intelligence” to “искусственный интеллект,” “cloud computing” to “облачные вычисления,” and “power supply” to “источник питания” or “электропитание,” depending on context. Calquing allows Russian to preserve semantic transparency while adapting foreign concepts to its own grammatical system.

Borrowing is also common in Russian technical terminology. Terms such as “компьютер,” “сервер,” “сканер,” “принтер,” “модем,” “робот,” “датчик,” “сенсор,” “интерфейс” and “контроллер” show the influence of international technical vocabulary. Borrowed terms are usually adapted phonetically and grammatically. They receive Russian endings and may form derivatives according to Russian word-formation rules. This shows that borrowing does not remain passive; it becomes integrated into the receiving language.

Uzbek technical terminology has its own formation models, but it is strongly influenced by both Russian and English. One of the main native models is affixal derivation. Terms such as “o‘lchagich,” “hisoblagich,” “uzatkich,” “qizdirgich,” “sovutkich,” “boshqaruv,” “ulanish,” “ajratish,” “taqsimlagich” and “moslama” demonstrate the productivity of Uzbek suffixes. The

suffixes “-gich,” “-kich,” “-uv,” “-ish,” “-ma” and similar forms help create terms denoting devices, actions, processes and technical objects. These terms are often semantically transparent for Uzbek speakers because their structure indicates their function.

Analytical combinations are very common in Uzbek technical terminology. Terms such as “elektr ta’minoti,” “boshqaruv tizimi,” “ichki yonuv dvigateli,” “ma’lumotlarni qayta ishlash,” “sun’iy intellekt,” “avtomatlashtirilgan loyihalash tizimi,” “raqamli boshqaruv,” “mexanik uzatma” and “issiqlik almashinuvi” show that Uzbek often expresses complex technical concepts through multi-word constructions. This model is productive because it allows concepts to be explained clearly. At the same time, long analytical terms may be less convenient in practical communication, which sometimes leads to the use of borrowed or shortened variants.

Borrowing is a significant source of Uzbek technical terms. Some terms entered Uzbek through Russian, while newer terms increasingly come directly from English. Words such as “kompyuter,” “printer,” “skaner,” “monitor,” “server,” “modul,” “robot,” “generator,” “transformator,” “kompressor,” “sensor,” “algoritm” and “interfeys” are widely used. Borrowing is often necessary when a new concept enters the language together with a new technology. However, borrowed terms require orthographic, phonetic and grammatical adaptation in accordance with Uzbek language norms.

Calquing is another important model in Uzbek. Expressions such as “sun’iy intellekt,” “bulutli hisoblash,” “mashinali o‘qitish,” “elektr zanjiri,” “ma’lumotlar bazasi,” “boshqaruv bloki” and “quvvat manbai” show that Uzbek can translate the components of foreign terms while preserving their conceptual structure. Calquing is useful because it creates understandable and nationally adapted terms. However, not all calques become widely accepted. Some may compete with borrowed forms, especially in fields where English terminology is dominant.

Hybrid formation is also observed in Uzbek technical terminology. A hybrid term contains both native and borrowed components, such as “sensorli qurilma,” “raqamli platforma,” “kompyuter tarmog‘i,” “modulli tizim,” “robotlashtirilgan jarayon” and “elektron boshqaruv.” This model reflects the transitional and multilingual character of modern Uzbek technical vocabulary. Hybrid terms are practical because they combine international recognizability with Uzbek grammatical structure.

The results show that all three languages use international elements, but the degree and manner of adaptation differ. English often serves as the source language of modern technical terms. Russian adapts international terms through its morphological system and also creates calques. Uzbek uses direct borrowing, Russian-mediated borrowing, calquing and native formation. This creates a complex network of terminological equivalents. For example, the English “control system,” Russian “система управления” and Uzbek “boshqaruv tizimi” express the same concept through different structural models. The English term is compact, the Russian term uses a genitive construction, and the Uzbek term uses an analytical noun phrase.

The comparison of term-formation models in English, Uzbek and Russian shows that technical terminology develops under the influence of both internal linguistic mechanisms and external sociolinguistic factors. Internal mechanisms include affixation, compounding, conversion, abbreviation and semantic specialization. External factors include scientific progress, international communication, translation practice, standardization, education and language policy. The interaction of these factors determines which models become productive in each language.

English technical terminology is effective because of its structural economy. Compounds and abbreviations allow new terms to be formed quickly and used conveniently in professional communication. This is one reason English has become highly influential in global technical discourse. However, the compactness of English terms may create problems for translation because the semantic relation between components is not always explicit. For example, the meaning of the first component in a noun-noun compound may depend on context. Therefore, translators must identify whether the component expresses function, location, material, object, process or purpose.

Russian technical terminology demonstrates strong morphological organization. Affixation allows terms to

indicate technical function and process with clarity. Analytical combinations provide precision, especially when a concept has several defining features. Russian terminology has also developed a strong tradition of calquing international terms, which helps preserve semantic transparency. At the same time, Russian technical terms may be long and structurally complex, which can affect ease of use.

Uzbek technical terminology is developing in a situation of active modernization and multilingual influence. It must respond to two important tasks at once: to integrate international technical vocabulary and to strengthen national terminology. Native affixation and analytical combinations help create understandable terms, while borrowing ensures connection with global scientific communication. The challenge is to choose forms that are clear, accurate, stable and acceptable to specialists. Excessive borrowing may weaken national terminological independence, while excessive artificial translation may create terms that specialists do not use in practice. Therefore, Uzbek terminology requires balanced development based on linguistic norms and professional needs.

The formation of technical terms also influences their semantic transparency. Terms formed through native derivation or descriptive combinations are usually easier to understand for speakers of the language. For example, Uzbek “o‘lchagich” and Russian “измеритель” clearly indicate the function of measuring. English “measuring device” is also transparent, while “sensor” is more international but less semantically transparent for non-specialists. This shows that term formation affects accessibility of professional knowledge.

Abbreviations represent a special problem in multilingual terminology. English abbreviations often become international and are used in Russian and Uzbek without translation. However, they may create difficulties for students and non-specialists. In some cases, Russian or Uzbek equivalents exist, but English abbreviations remain dominant because they are widely used in technical documentation and software. This shows that terminological practice is influenced not only by language structure but also by professional convention and global standardization.

Borrowing and calquing are especially important for the interaction of the three languages. Borrowing preserves international recognizability, while calquing supports semantic transparency in the receiving language. In technical translation, both methods may be appropriate depending on the term, field and communicative situation. For widely international terms such as “robot,” “laser,” “generator” or “transformator,” borrowing is natural. For conceptually transparent terms such as “data processing,” “machine learning” or “control system,” calquing may be effective. The translator’s task is to determine which model provides the best balance between accuracy, clarity and usage.

The study of formation models is significant for technical education. Students who learn technical subjects in English, Uzbek and Russian must understand how terms are built. Knowledge of word-formation models helps them recognize new terms, infer meanings, compare equivalents and use terminology correctly. For example, understanding suffixes in Uzbek and Russian or compound patterns in English can improve comprehension of technical texts. Therefore, teaching technical terminology should include structural analysis and comparison of terms in different languages.

Terminology standardization is another important area where this research is useful. A standardized term should correspond to the concept precisely, follow language norms and be accepted by professional users. In multilingual contexts, standardization must consider equivalence among languages. If different translations of the same technical concept are used in textbooks, standards, documents and dictionaries, confusion may occur. Comparative analysis of formation models can help select the most appropriate and stable variants.

The discussion also shows that technical terminology is dynamic. New technologies constantly generate new concepts, and languages must respond quickly. English often provides the first naming model, but other languages adapt or translate it according to their systems. This process may produce several competing variants at first. Over time, professional usage and standardization determine which variant becomes dominant. Therefore, the study of term formation must be continuous, especially in rapidly developing fields such as artificial intelligence, robotics, cybersecurity, renewable energy and digital manufacturing.

The formation models of technical terms in English, Uzbek and Russian reveal both universal and language-specific tendencies. English technical terminology is characterized by compounding, conversion, abbreviation, semantic specialization and international productivity. Russian technical terminology is based on productive affixation, compound structures, analytical combinations, calquing and adaptation of borrowed terms. Uzbek technical terminology develops through native derivation, analytical word combinations, borrowing, calquing and hybrid formation.

The comparative analysis shows that the same technical concept can be expressed through different structural models in different languages. These models influence semantic transparency, translation equivalence, standardization and practical usage. English often provides compact and internationally recognized terms, Russian offers morphologically and syntactically organized forms, while Uzbek seeks a balance between national linguistic resources and international technical vocabulary.

The study confirms that understanding term-formation models is necessary for translation studies, terminology planning, lexicography, technical education and professional communication. Further research should focus on specific technical fields and develop multilingual terminological databases that include structural models, definitions, equivalents, usage contexts and standard variants in English, Uzbek and Russian.

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