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A SEMANTIC AND STRUCTURAL ANALYSIS OF IT TERMINOLOGY IN ENGLISH AND UZBEK

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Annotatsiya. Ushbu tezis ingliz va o'zbek tillaridagi axborot texnologiyalari terminlarining semantik hamda struktur xususiyatlarini qiyosiy tahlil qiladi. Tadqiqotda IT terminlarining asosiy ma'no guruhlari, bir va ko'p komponentli tuzilmalari, qisqartmalar, kalkalash, transliteratsiya, o'zlashma va tavsifiy tarjima kabi termin hosil qilish mexanizmlari ko'rib chiqiladi. Ingliz tilining global texnologik diskursdagi yetakchi mavqei o'zbek IT terminologiyasiga kuchli ta'sir ko'rsatishi, biroq bevosita o'zlashtirish bilan bir qatorda milliy til me'yorlariga moslashtirish jarayoni ham faol kechayotgani aniqlanadi. Tahlil terminologik standartlashtirishda semantik aniqlik, tizimlilik va foydalanuvchiga tushunarlilik o'rtasidagi muvozanat muhim ekanini ko'rsatadi.

Kalit so'zlar: IT terminologiyasi, semantika, struktur tahlil, termin o'zlashuvi, kalkalash, qisqartma, ingliz tili, o'zbek tili, terminologik ekvivalentlik.

Аннотация. В тезисе проводится сопоставительный анализ семантических и структурных особенностей терминологии информационных технологий в английском и узбекском языках. Рассматриваются основные тематико-семантические группы IT-терминов, одно- и многокомпонентные модели, аббревиатуры, калькирование, транслитерация, заимствование и описательный перевод. Показано, что доминирующая роль английского языка в глобальном технологическом дискурсе существенно влияет на формирование узбекской IT-терминологии, однако наряду с прямыми заимствованиями активно развивается адаптация терминов к нормам узбекского языка. Отмечается необходимость сочетания семантической точности, системности и понятности при стандартизации терминов.

Ключевые слова: IT-терминология, семантика, структурный анализ, терминологическое заимствование, калькирование, аббревиатура, английский язык, узбекский язык, терминологическая эквивалентность.



Abstract. This thesis provides a comparative semantic and structural analysis of information technology terminology in English and Uzbek. It examines major semantic domains of IT vocabulary, one-word and multi-word structures, abbreviations, calques, transliteration, direct borrowing, and descriptive translation. The analysis shows that the dominant role of English in global technological communication has a strong impact on the development of Uzbek IT terminology. At the same time, Uzbek increasingly adapts borrowed terms to its own lexical, morphological, and orthographic norms. Particular attention is paid to terminological equivalence, semantic transparency, and the tension between international uniformity and national language standardization. The study argues that effective terminological policy should preserve conceptual precision while ensuring that terms remain comprehensible and structurally natural for Uzbek users.

Keywords: IT terminology, semantics, structural analysis, borrowing, calque, abbreviation, English, Uzbek, terminological equivalence.

INTRODUCTION

Information technology is one of the fastest-growing domains of modern professional communication. New hardware, software, digital services, cybersecurity practices, artificial intelligence systems, cloud platforms, and data-processing technologies continuously generate new concepts that require stable linguistic representation. As a result, IT terminology develops more rapidly than the vocabulary of many traditional disciplines. This dynamic is especially visible in languages that interact intensively with English, the principal source language of contemporary technological innovation and digital communication.

In the Uzbek linguistic environment, IT terms enter professional and everyday usage through education, software interfaces, technical documentation, social media, state digitalization projects, and international business. Some terms are borrowed without major change, for example server, browser, modem, platforma, and monitoring. Others are translated or calqued, as in ma'lumotlar bazasi for database, sun'iy intellekt for artificial intelligence, bulutli hisoblash for cloud computing, and operatsion tizim for operating system. A third group circulates in parallel forms, creating variation that may complicate standardization and teaching.

The purpose of this study is to identify the principal semantic and structural patterns of IT terminology in English and Uzbek and to explain the main mechanisms through which English technological terms are represented in Uzbek. The analysis focuses on conceptual grouping, word-formation structure, abbreviation, borrowing, translation, and semantic equivalence. The topic is relevant not only to terminology studies and comparative linguistics but also to translation practice, technical education, localization, lexicography, and the development of Uzbek-language digital resources.



MAIN PART

From a semantic point of view, English and Uzbek IT terminology can be organized into several interrelated conceptual fields. The first group denotes computer hardware and physical infrastructure: processor, motherboard, memory, router, server, printer, sensor, and storage device. Uzbek usage demonstrates both adapted borrowings and translated combinations, such as protsessor, server, printer, xotira qurilmasi, and saqlash qurilmasi. A second group covers software and operating environments: application, operating system, driver, interface, plugin, browser, and database. A third major field includes network and Internet terminology, such as protocol, domain, hosting, bandwidth, firewall, cloud, and web service. More recent semantic fields are associated with cybersecurity, artificial intelligence, machine learning, big data, blockchain, and digital platforms.

The semantic organization of IT vocabulary reflects hierarchical conceptual relations. Hyperonym-hyponym relations are especially frequent. For example, software functions as a broad category that includes operating system, application, utility, driver, and firmware. Likewise, cybersecurity includes authentication, encryption, firewall, malware detection, access control, and intrusion prevention. In Uzbek, these relations are often preserved through direct borrowing or semantic calquing. Such preservation is important because terminology is not simply a collection of isolated words; it is a system in which each term occupies a place within a conceptual network.

Polysemy and terminologization also play an important role. English words such as cloud, window, thread, cookie, mouse, and port existed in general vocabulary before acquiring specialized technological meanings. When such terms enter Uzbek, translators must decide whether to preserve the figurative model, borrow the English form, or provide a functional equivalent. For instance, cloud has become productive in compounds such as cloud computing and cloud storage, commonly rendered as bulutli hisoblash and bulutli saqlash. This type of semantic calque is effective because it reproduces the conceptual metaphor while remaining understandable in Uzbek.

Structurally, English IT terminology is characterized by a high proportion of compact compounds and multi-word noun phrases. Common models include noun + noun (data center, network security, cloud service), adjective + noun (digital signature, virtual machine, artificial intelligence), participle + noun (distributed system, embedded software), and longer combinations such as natural language processing model or identity and access management system. English permits dense premodification, which makes technical naming concise but may create translation difficulties.

Uzbek generally restructures such compact English combinations according to its own syntactic norms. The dependent component usually precedes the head, but grammatical relations



may be made more explicit through possessive and case markers. Thus, database becomes ma'lumotlar bazasi, data security becomes ma'lumotlar xavfsizligi, user interface becomes foydalanuvchi interfeysi, and network administrator can be expressed as tarmoq administratori. This shows that equivalence is often achieved not by copying the source structure mechanically but by adapting the term to Uzbek morphosyntax.

One-word terms form another important structural group. English examples include server, browser, scanner, router, token, script, cache, pixel, and codec. Many of these terms are internationalisms and are transferred into Uzbek with little or no semantic change. Their integration is visible when Uzbek grammatical suffixes are attached: serverlar, brauzerda, faylni, skanerlash, formatlash. This morphological behavior demonstrates that borrowed IT vocabulary can become structurally integrated into the receiving language even when its lexical root remains foreign.

Abbreviations are exceptionally productive in IT discourse. Terms such as CPU, GPU, RAM, ROM, URL, IP, DNS, HTTP, HTML, SQL, API, VPN, AI, and IoT are widely used in both English and Uzbek professional communication. In many cases the abbreviation is retained internationally, while the full form may be translated for explanatory purposes. For example, AI may be accompanied by sun'iy intellekt, VPN by virtual xususiy tarmoq, and IoT by narsalar interneti. This dual representation is useful in education because it connects international professional usage with a transparent Uzbek explanation.

Direct borrowing is currently one of the most visible mechanisms in Uzbek IT terminology. It is efficient because specialists work with international software, documentation, and programming environments in which English terminology predominates. However, excessive borrowing can reduce transparency for non-specialist users and produce orthographic inconsistency. Forms such as fayl, sayt, brauzer, server, login, akkaunt, skaner, and printer are already widespread, whereas some newer terms still compete with translated alternatives. Therefore, the practical criterion should not be the complete avoidance of borrowings but the establishment of stable, understandable, and normatively consistent forms.

Calquing is especially successful when the internal semantic structure of the English term can be reproduced naturally in Uzbek. Examples include artificial intelligence — sun'iy intellekt, information security — axborot xavfsizligi, computer network — kompyuter tarmog'i, digital signature — raqamli imzo, machine learning — mashinaviy o'rganish, and open source — ochiq kodli. Nevertheless, literal translation is not always optimal. A formally accurate calque may sound unnatural, fail to reflect established professional usage, or create ambiguity. Terminological decisions therefore require attention to both concept and actual language practice.



Descriptive translation is used when a short lexical equivalent is absent or when a new concept requires explanation. This strategy is useful in textbooks and introductory materials, but long descriptive forms may be inconvenient in professional discourse. As a term becomes more familiar, users often prefer a shorter borrowing or a stabilized calque. This process illustrates a general tendency in terminology development: new concepts initially require explanatory naming, while mature concepts tend toward economy and standardization.

Table 1. Selected structural and semantic correspondences in English and Uzbek IT terminology

English term	Uzbek equivalent	Formation type	Comment
database	ma'lumotlar bazasi	calque / phrase	semantic structure preserved
artificial intelligence	sun'iy intellekt	calque	stable conceptual equivalent
cloud computing	bulutli hisoblash	semantic calque	metaphorical model retained
browser	brauzer	borrowing	morphologically integrated
firewall	tarmoqlararo ekran / fayervol	translation + borrowing	variation remains in usage
machine learning	mashinaviy o'rganish	calque	productive in academic discourse
user interface	foydalanuvchi interfeysi	hybrid formation	native dependent + borrowed head
API	API / dasturiy interfeys	abbreviation + explanation	international abbreviation retained

The comparison also reveals a significant number of hybrid terms. These combine an Uzbek lexical element with an international or borrowed component: internet tarmog'i, mobil ilova, raqamli platforma, elektron pochta, server xonasi, and foydalanuvchi interfeysi. Hybridization is not necessarily a weakness. In many cases it is a natural transitional mechanism that allows a language to absorb an international concept while preserving native grammatical organization.



A key problem is terminological synonymy and variation. The same concept may appear in borrowed, calqued, and descriptive forms at the same time. Such variation is common during periods of rapid technological change, but it can create inconsistencies in textbooks, software localization, legislation, and scientific writing. Standardization should therefore be based on several criteria: conceptual accuracy, frequency of professional use, compatibility with Uzbek word-formation norms, brevity, unambiguity, and consistency with related terms.

Another issue concerns the speed at which terminology changes. Traditional dictionaries are often unable to capture emerging terms quickly enough. New items associated with generative artificial intelligence, large language models, prompt engineering, edge computing, zero-trust security, digital twins, and decentralized applications spread through professional communities before standardized Uzbek equivalents are established. For this reason, corpus-based monitoring of real usage, expert consultation, and regularly updated digital terminological databases are more effective than relying exclusively on static printed glossaries.

Overall, the relationship between English and Uzbek IT terminology is best described as a process of selective adaptation rather than simple borrowing. English supplies a large share of new lexical material because it dominates the production and global dissemination of technological knowledge. Uzbek, however, reorganizes this material through its own grammatical system, creates calques, develops hybrid forms, and gradually stabilizes competing variants. The resulting terminology is therefore both international and language-specific.

CONCLUSION

The semantic and structural analysis demonstrates that English and Uzbek IT terminologies share the same core conceptual domains but differ in the linguistic mechanisms used to package those concepts. English favors compact compounds, dense noun phrases, abbreviations, and highly productive lexical innovation. Uzbek frequently represents the same concepts through calques, adapted borrowings, hybrid combinations, and syntactically more explicit constructions.

The strongest influence of English is visible in newly emerging and internationally standardized concepts. At the same time, Uzbek is not a passive recipient: borrowed units are morphologically integrated, multi-word terms are reorganized according to Uzbek syntax, and many concepts receive transparent native equivalents. The main challenge is not borrowing itself but uncontrolled variation and inconsistent standardization.

For the further development of Uzbek IT terminology, coordinated work among linguists, translators, IT specialists, educators, software localizers, and lexicographers is necessary. A balanced terminological policy should retain internationally recognizable forms where they are functionally justified, create Uzbek equivalents where they improve semantic transparency, and avoid parallel variants that do not serve a clear communicative purpose. Such an approach can



strengthen the precision of scientific and technical communication while supporting the broader use of Uzbek in the digital sphere.

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