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Article

Semantic, Formal and Pragmatic Characteristics of Terminology

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Abstract

Terminological vocabulary holds a significant position in the general lexicon of a language, though not much is known about the formal structure and pragmatic functions of the semantics of social science terms in a professional and scientific discourse. The purpose of this study is to study the problem of compliance of the results of term formation in the modern Kazakh language with semantic, formal and pragmatic requirements. The study was guided by the theoretical and practical foundations of the formation of the Kazakh National terminological corpus including inventory, systematization, and regulation. The social science terms sampled for the study were restricted to 386 terminological units, selected using the mass sorting method from the terms approved during the period from 1971 to 2014. To analyze the findings, descriptive, structural, semasiological, onomasiological, combinatorial, definition, quantitative and component analysis methods were used. The results revealed the synchronous state of established terms, including molded term systems in the field of social sciences. The difficulties faced in the development of a state language, absence of a terminological system, and practical inadequacy of terminological work were also identified. The relevance of the term to the sphere of the terminological system, the ambiguity and accuracy of the term, consistency, and linguistic correctness were established. The study also established that terminology in a communicative context has semantic precision, formal stability and pragmatic variability. A comprehensive analysis of these characteristics showed their possibility to improve the standardization of terms and optimize professional communication. The results of the study can be used in works carried out in order to improve the formation and use of terms in the field of term formation.

Keywords

Term Formation, Terminological Norm, Requirements for Terms, Semantic, Formal and Pragmatic Requirements, Consistency.

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Introduction

Social science terminology is characterized by a high degree of abstractness, interdisciplinary connections and a constant evolution of meanings due to changes in social reality (Kragh, 2024; Riggs, 1979). This terminology plays both decisive and vital role in the formation and transmission of professional knowledge in modern social sciences which cover several areas and disciplines (e.g., sociology, political science, economics, and psychology) (Riggs, 2012; Thouless, 2014). Each of these disciplines possesses various terminological systems. It must be noted that there is no isolated, independent term. Each term generally has a certain place and meaning in one (or more) terminological systems. To understand the science of terminology, it is necessary to define the field of each term, to classify concepts, and take into account how these terms are closely related and together form a terminological system (Picht, 2011; Tator, 1952; Vakulenko, 2013). In accordance with this task, problems of any terminological system (in accordance with the definition) of each term of social sciences, should be clarified and scope defined (Nguyen, 2025).

One of the most important problems of terminology is the study of the terminological property of a linguistic sign. The problem of the manifestation of terminologicity in a language system is one of the most popular and important research topics of modern linguistic research, as well as that of the terminology itself. The linguistic importance of intersectoral coordination of terminology is a problem area. For instance, in the field of science and technology, any linguistic term resulting from a certain scientific discovery or invention leads to the fact that it has different meanings or its semantic shade varies in each branch of knowledge-science. This semantic variation is due to the nature, task and purpose of the said discovery or invention. In the context of the development of interdisciplinary research and the rapid increase in scientific communication, the problems of studying the terminology of social sciences with a linguistics angle remains relevant.

In the context of the Kazakh linguistics, there are many works devoted to the theory of terms, as well as the study of branch and tarsal systems, their development, systemic, linguistic and extralinguistic characteristics, and the nature of individual terminological units (Anafinova et al., 2025; Manasbayeva & Sabitova, 2025; Turlybekova & Nurkenova, 2024). There are various aspects of the language of science that have attracted the attention of the Kazakh scholars, as well as other foreign linguists and specialists in the field of social sciences (Aldaberdikzy et al., 2024; Alwusaidy & Alwasidi, 2024; Berdiyev, 2024; Rashidova, 2024). Owing to these contributions, the last twenty years of Kazakhstan's social science are marked by the formation of terminology as a separate discipline (Honig, 2018; Isakova, 2007). Its main task is to study the special language from different points of view. Since all such works are carried out at the junction of linguistics and various other branch, this direction is considered a purely linguistic science. After all, its purpose is to study many sublanguages that are not subsystems nor completely isolated from the general literary language but being a part of it. These small languages, like the general language, are characterized by direct and systematic linguistic relations. However, it cannot be ruled out that each terminological system has its own characteristics.

In the context of the intensification of scientific communication and the globalization of science, the terminology of social sciences becomes of particular importance. Terms not only reflect the development of scientific thought, but also ensure the accuracy of education, acting as a means of exchanging scientific knowledge and information. That is why the question of the possibility of using terminology in one sense in various fields of knowledge is so important. Studying the positions of scientists in the issues of unification and standardization of scientific and technical terminology, it is concluded that the work on streamlining terminology is associated with its critical analysis, revision of concepts and definitions, as well as their systematization and classification.

Existing research has restricted its focus on a narrow semantic description of terms or their formal characteristics, taking into account only the functional-communicative aspects of terminological use (Apresyan, Mel'čuk, & Žolkovsky, 1969; Grigoriev, 2021; Pankina & Sokolova, 2023; Rey, 1995). Despite these scholarly deliberations, the problems of a comprehensive analysis of terms from the perspective of semantic, formal and pragmatic characteristics have remained unexplored. There are still several controversial issues mainly because each newly studied term highlights certain differences from the already studied term systems. In this way, the general theory of the term is never clarified. Despite the accumulated theoretical and empirical material, a comprehensive analysis that combines the semantic, formal and pragmatic levels of the terminological system of the social sciences is still undeveloped and requires further study. This study is aimed at filling this gap and identifying the features of the use of social science terms, taking into account their multi-level characteristics.

Moreover, since terminological vocabulary occupies an important and extensive place in the general lexicon of the literary language (Chiphambo, 2019; Ten Hacken, 2015; Vorona & Kitura, 2021), there is a need to throw light on various features, formal structure and pragmatic functions of the semantics of social science terms in professional and popular science discourse. There is also a need for a comprehensive analysis of the terminological system of social sciences, which encompasses the study of semantic meanings, formal symbols (structure, word formation models), as well as the pragmatic functions of terms in the context of scientific texts. This approach makes it possible to identify the patterns of functioning of terms in real scientific discourse, identify typical strategies for their use in various genres and communicative situations, as well as give recommendations for standardization and improvement of the terminological apparatus. This study aims to fill the listed theoretical and practical gaps.

In modern linguistics, comprehensive research is being carried out on the approaches to term formation of language units operating in various spheres of human activity. However, the problem of compliance of terms created by these approaches with the requirements for them has not yet been fully resolved. The current study, therefore, asks the following research questions: Do social science terms approved by the terminological commission meet semantic requirements? What formal structures (word formation patterns, complex terms, borrowings) are not in use? How is the compliance of terms with pragmatic requirements and the relationship between specialists and a wide audience manifested? The theoretical foundation of the study is based on terminology (Leichik, 2009), cognitive linguistics (Manerko, 2014) and works on pragma-linguistics (Baranov & Dobrovol'skiy, 1996) as well as functional stylistics (Galperin, 1971).

Literature Review

The terminology of social sciences has a complex structure that includes several linguistics aspects including semantic, formal and pragmatic characteristics (De Paoli, 2024; Kodirovich, 2025; Lam, 2024). The semantic aspect includes the problems of uncertainty and ambiguity, variability of interpretation, the presence of various synonyms and terminological polysemy (Apresyan et al., 1969). The formal descriptions relate to word-formation models, morphological features, and the standardization of terms (Leichik, 2009; Temmerman, 2022). The pragmatic aspect of terminology is considered through the lens of the context of the use of terms, communicative intent, pragmatic labeling and genre differences in scientific speech (Sager, 2004; Wüster, 2003).

There is no dearth of empirical research on terminologies of social sciences (Riggs, Mälkiä, & Budin, 2011; Yin, 2021; Yuliawati, Suhardijanto, & Hidayat, 2018). There are also studies on science of terminology (Picht, 2011); corpus analysis of terminology (Aarts, 2022), discursive study of terminological variations (Petrova, Privalova, & Kosova, 2023), and the study of professional communication within the framework of the cognitive-discursive approach (Orifjonovich, 2023). The study of terminology as a special internal subsystem of language has attracted the attention of several linguists in the current times (Bazarbaev & Reimova, 2024; De Paoli, 2024; Kodirovich, 2025; Rashidova, 2024). These studies have established that terms have a special lexical and semantic character, and they carry out the main activity in scientific communication.

In the current context, studies have established a deeper understanding of the mechanism by which various professional discourses have seen the light of the day to evaluate the semantic, formal and pragmatic characteristics of terms (Yunus, Zharkymbaeva, & Omarov, 2024). For instance, the semantic characteristics of terms, according to Telia (1986), are reflected in their semantic structure, conceptual content and connection with the conceptual system of science. The semantic structure is also distinguished by unambiguity and consistency, which ensures the accuracy of scientific information. Kobrin (2003) reiterates that "terms follow a certain cognitive model and are closely related to the concepts of the scientific picture of the universe". Likewise, Novikov (1982) asserts when a concept is developed, "the term can be ambiguous in different subject contexts (for example, the term "model" in physics and sociology)." This suggests that the semantics of the term continues to depend not only on the lexical meaning, but also on the scientific paradigm in which it is used.

The formal characteristics of terms are determined by grammatical and morphological features. Lotte (1971) emphasizes certain properties of the term, namely, morphological economy, word-forming clarity and stability of form. Akhmanova (1957) argues that a term can be both a single word and a phrase, and multi-component terms are characteristic of the exact sciences (for example, "channel information capacity"). The formal nature of terms is also available in word formation models, including composites, structures formed by suffixes and

calculus from Latin and Greek. In general, the formal structure of terms in vocabulary obeys the internal logic of the discipline and reflects the process of scientific categorization (Chiphambo, 2019; Vorona & Kitura, 2021).

Finally, the pragmatic characteristics of terms function in a specific communicative environment, with their usage found in scientific, educational and professional contexts. In this context, Kabachenko (2007) argues that the pragmatic potential of the term is manifested in relation to the goals and objectives of the relationship. The same term can be interpreted differently depending on the audience (e.g., students, specialists, the general public). Wasow and Arnold (2005), too, noted that when actively terminating, it is important to take into account the legibility and convenience of the term for the addressee, which is especially important in popularizing science. Moreover, within pragma-linguistics, the evaluative potential of terms is also studied, especially in humanities, which can include the emotional evaluative tone of the term. The pragmatic aspect of the term emphasizes that it is not an isolated unit; that is, it always takes place in a certain speech situation. Hence, studies on the semantic, formal and pragmatic characteristics of terms shows that terminology is not just a collection of words, but a complex system that operates in the context of scientific and professional communication (Yin, 2021). The relevance of these studies, therefore, is directly related to the desire for accuracy, efficiency and universality of scientific communication.

Methodology

Research Design

A descriptive and analytical research design guided this study with a mixed method as guided in previous research (Guetterman, Plano Clark, & Molina-Azorin, 2024). The purpose of the study was to identify the features of semantic, formal and pragmatic characteristics of terms in the field of social sciences with regard to a term paper approved by the terminology Commission of the Republic of Kazakhstan.

Sampling and Population

The sample comprised a corpus of terms approved during the period from 1971 to 2014 related to the field of sociology, political science, economics, literature, language, cultural studies and philosophy. The total volume of the corpus was about 6,000 terms. To increase representativeness, the sample was derived from Kazakh and Russian, and partly English-language publications.

Data Collection Instruments

The following tools and procedures were used to collect data: corpus terminology platform on the website (<https://termincom.kz/>) for extracting frequency terms and analyzing their use; independent designation of terms according to semantic, formal and pragmatic characteristics; use of a term classification model based on the works like (Leichik, 2009; Temmerman, 2022; Wüster, 2003) and finally, identifying terminological variability depending on the discipline through comparison.

Data Analysis

Adhering to the linguistic and terminological research, the study carried out specific terminology analysis techniques. For instance, the semantic and formal characteristics of terminology were analyzed through descriptive, structural, semasiological, onomasiological and component analysis methods. The descriptive method was used to register and analyze language units in their natural state, that is, in the process of describing the form, meaning and function of the term; the structural method allowed to study the internal structure of the term, its morphemic composition, word formation models. It also helped in the formation of terms, term determination of patterns of formation through suffix-conjugation, compound words, and abbreviations. The semasiological method helped to identify what meanings a language unit can have by analyzing the term from its form to its meaning; and explain all the meanings of the term and their terms of use. The onomasiological method was used to analyze from a concept to its linguistic form. With this method, it is possible to determine which terms are used to name a single concept. That is, a selective selection of the most accurate/common terms for a particular concept. Finally, the method of component analysis was used for determining the semantic components (semes) of a term and identifying differences between related terms by dividing the meaning of the term into the smallest signs.

In addition, a few other methods namely combinatorial method, definition method, and quantitative method, were also employed to identify pragmatic, formal, and partly semantic features of terminology. The combinatorial method contributes to the study of combination compatibility of terms, frequency of phrases, their stability in phrases and texts; the definition method relates to the analysis of definitions of terms and comparison of definitions. The main task is to determine the accuracy and completeness of definitions, terminological contradictions; the quantitative method was used for statistical processing of terms: determining the frequency, distribution, and performance of terminological models. Accordingly, these methods facilitated to consider terms from different angles, from meaning to use, from structure to numerical distribution. The results of the analysis also allowed us to identify typical models of term formation, the features of their use in various subject areas, as well as pragmatic mechanisms of terminological variation.

Findings

The study findings are based on the premise that modern terminology is a discipline that studies the principles of the formation, expenditure and development of terms in various fields of knowledge. One of the other premises of this study was the establishment of requirements for terms that ensure their accuracy, consistency and communicative effectiveness (Kulmanov et al., 2022; Kulmanov, Shulenbayev, & Ybyrayim, 2025). These studies have maintained that all requirements, as a rule, are divided into three main groups: semantic, formal and pragmatic (Alexeeva & Novodranova, 2006; Kragh, 2024; Nguyen, 2025; Sharafutdinova, 2016; Superanskaya, Podolskaya, & Vasilyeva, 2012). The first group of semantic requirements for terms ensure that each term corresponds to a particular scientific concept. These concepts included: unidirectionality, which means that a term should express only one concept in a particular subject area; terminological accuracy, which requires that the meaning of a term must clearly correspond to the content of the concept, without allowing broad or variable explanations; consistency, which ensures that the term logically corresponds to the hierarchy and structure of the terminological system of that branch of science; and finally, the limitation of general vocabulary which avoids multitasking, so that the term should not coincide with lexemes of household or emotional meaning. Table 1 presents a few semantic requirements of terms.

Table 1: *The Description of Semantic Requirements.*

Semantic requirements for terms	Correspondence of the term to the concept
	Unambiguity, that is, the absence of categorical polynomials
	Coverage of as few signs as possible in the meaning of the term
	Lack of synonyms

A quantitative indicator of non-compliance of terms with semantic requirements was approved by the state terminological commission of the Republic of Kazakhstan in the period from 1971 to 2014, as depicted in Figure 1. It is clearly evident that the years 1971-81 had the highest non-compliance (224 terms) and deviation from terminological norms; while in the succeeding years this non-compliance improved to 0 to 16 terms.

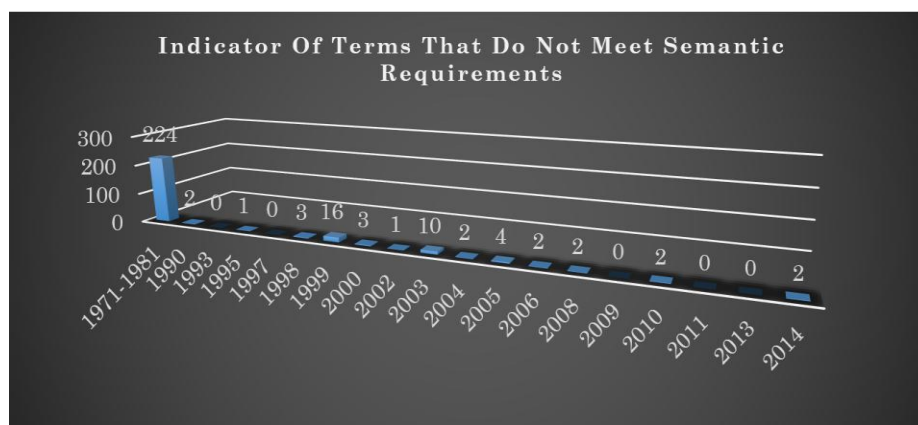


Figure 1: *Terms That Do Not Meet the Semantic Requirements.*

The second group of formal characteristics is associated with the problem of language formalization of terms. Among them are linguistic economy, which means increasing the brevity and convenience of the term; morphological clarity, a kind of structural clarity that allows the user to understand the semantics of the term by its composition; word-forming stability, which is the compliance of the language with the norms of the word-forming system; formalization standardization, uniformity in the use of affixes and models within one terminological system, and like. Table 2 enlists the formal requirements of terms.

Table 2: *Nature of Formal Requirements.*

Formal requirements for terms	Compliance with the language norm (correctness in terms of phonetic, grammatical, norms, and disconnection from professional jargon)
	Lexical and formal brevity (short form)
	Derivation ability
	Invariance of form
	Motivation
	Consistency

Quantitative indicator of non-compliance of terms with formal requirements approved by the state terminological Commission of the Republic of Kazakhstan in the period from 1971 to 2014 are presented in Figure 2. It is clearly evident that the years 1971-81 had the highest non-compliance (46 terms) and deviated from terminological norms; while in the succeeding years this non-compliance improved to 0 to 8 terms.

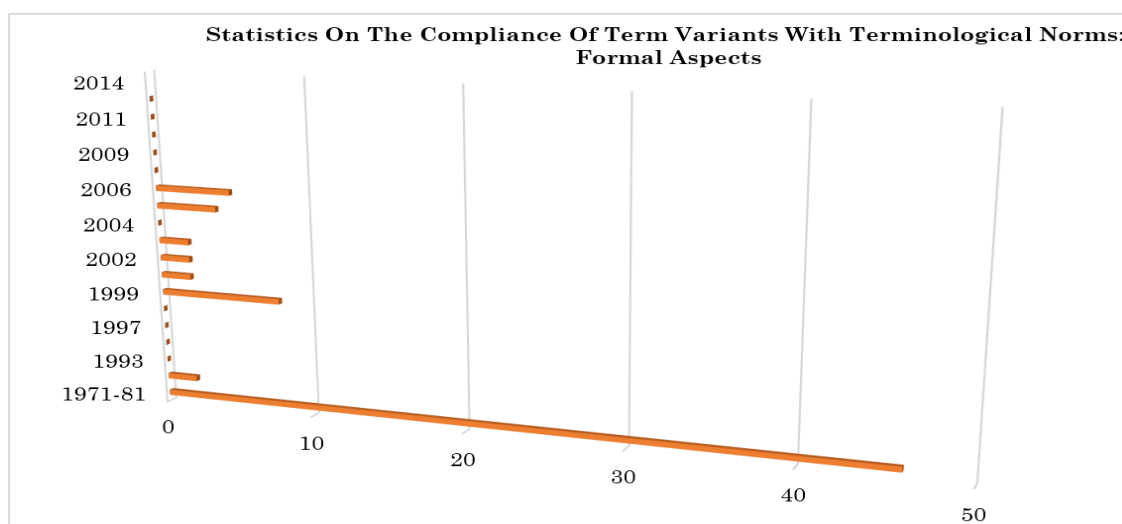


Figure 2: *Terms that do not Meet the Formal Requirements.*

The third group of pragmatic characteristics determine the functionality of the term in real professional communication: usage – the term should be used in practice by specialists in the relevant field; international identity-it is desirable that there are analogues in other languages, especially in the international scientific community; stylistic neutrality – lack of emotional or evaluative tone; lack of synonyms and homonyms-the presence of several signs of the same concept in order to avoid, and it is also advisable to exclude homonymy with other terms or words. Table 3 presents the pragmatic requirements for terms.

Table 3: *The Nature of Pragmatic Requirements.*

Pragmatic requirements for terms	Use in professional communication (frequency of use and general familiarity, degree of familiarity)
	Internationalism (coincidence in form and content in several national languages)
	Modern character (substitution of ancient terms with modern equivalents)
	Ease of pronunciation (euphony)

Quantitative indicators of non-compliance of terms with pragmatic requirements approved by the state terminological Commission of the Republic of Kazakhstan in the period from 1971 to 2014 are presented in Figure 3. It is clearly evident that the years 1971-81 had the highest non-compliance (22 terms) and deviation from terminological norms; while in the succeeding years this non-compliance improved to 0 to 9 terms.

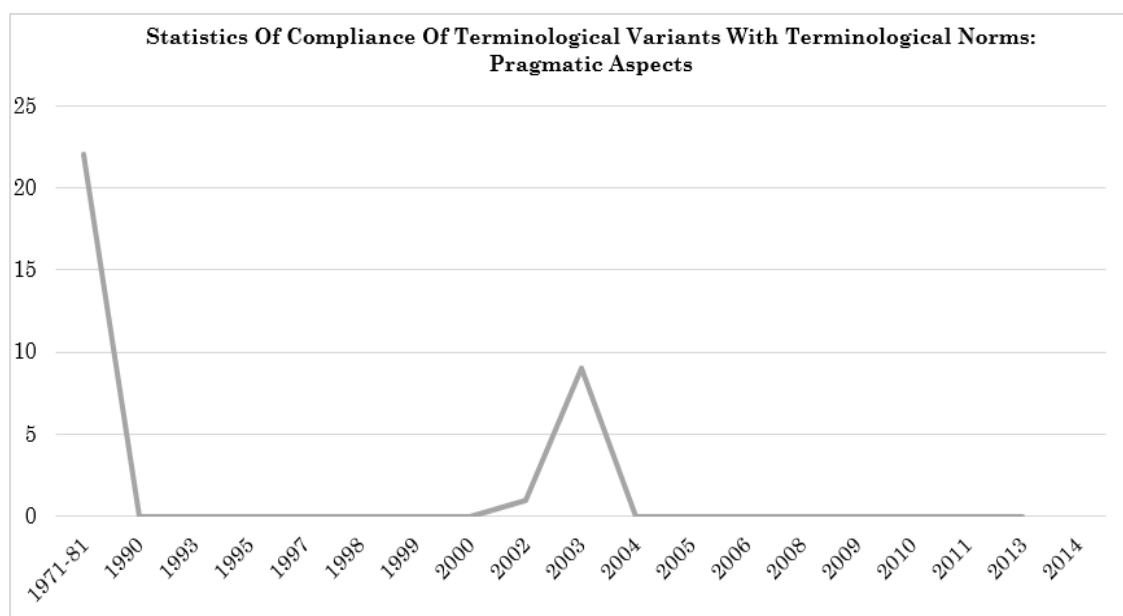


Figure 3: *Terms that do not Meet Pragmatic Requirements.*

At the next level, the specificity of terminological units was determined, by their internal semantic organization (structure). It was revealed that the peculiarity of the term lies not only in the type, but also in the content, that is, in the nature of its meaning. The term is the unity of the name of this science and technology, which is given to a specific concept and is associated with other names in this area and, together with them, forms a terminological system. The term is a symbol that corresponds only to one concept, in the term the identity of the symbol and the signifier has a one-dimensional character. The terminological system characterizes the system of scientific and technical concepts of a particular industry. This is a complex dynamic stable system, the main task of which is considered to serve as a sign (language) model of the same field of knowledge and activity. A terminological system is a set of sequential terms that denote a system of concepts of a special sphere of human activity. There is necessarily a constant connection between them, and the set of these connections determines their structure. Not every set of terms is a terminological system, only a high level of development of terminology leads to the creation of a terminological system. There are also several requirements for any terminological system. They can be divided into two categories, language requirements and regulatory requirements. In particular, the language requirements are shown in Table 4.

Table 4: *Linguistic Requirements of Terminological Systems.*

Linguistic requirements	Grammatical methods in the transmission of standardized terminology.
	Relationship to other language, dialect, or colloquial words used as terms
	Lexical and semantic characteristics of terms (polynomials, homonyms, synonyms, antonyms)
	Short form of the term

The terminological system must meet the following specific requirements: consistency, clarity, legibility and accuracy. The terminological system must also meet three equal terms of the set of concepts: that it must be based on the classification of concepts; it must have clear designations and concepts; and the units of the terminological system must determine the commonality and similarity of the terminological concept with others, as well as establish its originality. Table 5 lists regulatory requirements of terminological systems.

Table 5: *Regulatory Requirements of Terminological Systems.*

Regulatory requirements	Correspondence of the patterns and methods of term formation to the general patterns of
	Word formation and specific patterns of term formation
	The term is a prioritization of certain patterns of development
	Stylistic requirements for terminological structures (complex terms)
	Grammatical features of terms

In general, the linguistic criteria are evaluated with respect to their compliance with regulatory requirements. The linguistic normativity is considered to be the correctness of the formation and use of the term. The processes of term formation and expenditure of the term are not spontaneous, but conscious-purposeful processes that are under the control of linguists and terminologists. This is the consistency of terminology, the independence of the term from the context, the brevity of the term, its absolute and maximum unambiguity, clarity and ease, ease of perception, etc.

Discussion

Terminological systems are characterized by a number of positions. First, there is a logical principle behind every position, which enables the selection of terms that denote basic, derivative and complex concepts in the same system of concepts. Such a classification is established by the theory (concept) and objects of the same field, which are based on the system of concepts. Second, the linguistic position answers the question of what lexical units of a terminological system are represented in terms of form and semantics. Since terms can be expressed in various forms, they can be combined into one system only in terms of semantic proximity. The third terminological position connects the first two positions mentioned above and defines the relationship between the term and the terminological system, indicating the place of the terminological unit in the same terminological system. In addition, the importance of the terminological system is also determined by a few criteria: unity criterion, a terminological system must consist of a set of terms that implement the same concept; element criterion: the terminological system must consist of a set of elements; structural criterion: the terminological system must have structural relationships between elements determined by terminological fields, series, hierarchical dependencies, genus-species, and so on, and must also be included in a system at a higher level than it is, because the terminological system is considered part of the general language system; acceleration criterion: terms may change in terms of type boundaries, as well as content boundaries; and expenditure criterion: terminology serves a specific area of human activity.

The study revealed that the dependence of any term on the system of concepts should also be clearly reflected in the specifics of its paradigmatics and the nature of its combination with other terms in the same terminological system. This is in line with [Anisimova and Tikhonova \(2021\)](#), a study which emphasized on the codification of terminology. Thus, compliance with the above requirements allows us to talk about the quality of the term as a unit of scientific language. This is consistent with [Kobrin \(2003\)](#), a study which highlighted the scientific picture of the universe in the context of interdisciplinary interaction and globalization of scientific knowledge. Terms are defined as the semantic core of a special language and provide basic substantive information. The formation and development of terminology, which occupies a central place in special languages, has a certain degree of independence. The study also made evident that a vast majority of terms do not meet semantic requirements. This is because the semantic requirements for terms are crucial in terminology, as they ensure a correspondence between the term and the concept it represents. This is consistent with [De Paoli \(2024\)](#) which reiterated that lexical and semantic aspects of language sustain the scientific communication; and with [Telia \(1986\)](#), who had drawn established correlation between semantic structure, conceptual content and the conceptual system of science. This suggests that, in scientific and professional communication, the term serves as a carrier of strictly defined information. Therefore, even the slightest deviation in its meaning can lead to distortion or loss of meaning.

One of the main semantic requirements is unidirectionality: the term should mean only one concept in a particular field of knowledge. This is necessary in order to eliminate inconsistencies and ambiguities in the process of professional interaction. Another semantic proposition is the terminological accuracy, which presupposes a strict correspondence of the term to the volume and content of the concept. The term should not include superfluous or

minor features that are not included in scientific conceptualization. Violation of this principle leads to blurring of terminological boundaries and loss of scientific clarity. In addition, the term must be included in the terminological system of a particular field of knowledge, that is, it must be related to other concepts. This systematic requirement provides the possibility of logical classification and contributes to the formation of a scientific picture of the universe. It is important to limit the term from the general application vocabulary, especially in cases where the word has a terminological and domestic meaning (for example, power, wave, energy). In terminological practice, such cases require strict semantic refinement. Thus, semantic requirements are the basis for the scientific accuracy, logic and consistency of terminological systems. They allow the terms to fulfill their main function: to serve as a means of cognition, description and transmission of scientific knowledge.

Conclusion

In the course of the study, the semantic, formal and pragmatic characteristics of the established terminology in relation to the Social Sciences were analyzed. It was found to show a high degree of variability due to the interdisciplinary nature of the terminological system of the field and the diversity of scientific discourses. The terms perform not only a nominative, but also a pragmatic function, contributing to the structuring of scientific knowledge and the implementation of the author's communicative goals. In the course of the study of fixed terms, it was concluded that the relevance of the term to the sphere of the terminological system in most cases was not taken into account. It was also discovered that the ambiguity and accuracy of the concept expressed by the term are inherent only in terminology. When approving terms, this requirement must be strictly observed. Secondly, there is consistency seen when a term belongs to a specific terminological system; and in its meaning, the term is based on the parameters used in it. Third, there is linguistic correctness, which is the correct use of word-forming tools based on the legality of referring to certain models of any types and categories of titles, taken into account when establishing terms. Fourth, there is the criterion of applicability, which regulates the frequency of use in a legalized way (in official documents); however, the priority of use in some scientific discourses should also be taken into account features that are directly related to national traditions, oral professional communication. Finally, there is the language orientation, whose significance lies in choosing a concept in different situations that occur between an input term and a term created on the basis of a native language. The use of a systematic approach is of particular importance, because without it, the separation of terminology from concepts will continue to increase. For this reason, the linguistic standard is a tool that provides the relationship between the structure and semantics of terms, the relationship between the content and the type of lexical unit.

The study relied on a limited corpus of social sciences and analyzed terms mainly according to the fact that different years were approved by the terminological commission. In future, however, it is proposed to expand the corpus at the expense of additional materials, that is, natural and technical sciences. The study recommends several new avenues for future research namely, dynamics of terminological variation in scientific communication; the influence of socio-cultural factors on the formation and use of terms; and pragmatic strategies in the interdiscursive interaction of terms. The study findings have several significant practical implications. These results can be useful in the design of training courses on terminology and academic writing; in compiling glossaries and dictionaries of socio-scientific terminology; and professional development programs in scientific communication for researchers and teachers.

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