

Semantic and structural challenges of translating modern English agro-engineering terminology into Ukrainian

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Abstract. The study analyzes semantic and structural peculiarities of translating modern English agro-engineering terminology. Agro-engineering terms represent the up-to-date level of agriculture development noted for advanced mechanization, application of various technical processes, new technologies, etc., this causing additional translation problems. Besides, agricultural terminology encapsulates field-specific lexis as well as mathematical, mechanical, biological and general scientific terms. Translation difficulties are closely related to lingual characteristics of agro-engineering terms (structural peculiarities, synonymy, homonymy). Playing a significant role in forming this segment of professional lexicon, multi-component units are difficult to translate due to their length and non-prepositional bonds in most cases. The main research methods include comparative and contrastive analysis as well as the quantitative method. The results obtained reveal that a variety of techniques applied to translating English agro-engineering terms into Ukrainian include equivalence, analogue, descriptive techniques, transliteration, grammatical and lexical transformations. Yet, the most frequent technique is equivalence. Application of different translation techniques in multicomponent phrases can cause inconsistencies in the number of components in a terminological phrase in a target language. The authors suggest an algorithm of English-Ukrainian translation of agro-engineering multicomponent terms. The paper is intended for a wide range of specialists interested in translating agro-engineering texts, teaching ESP, students of translation departments and experts in the relevant field of knowledge.

Keywords: agro-engineering, equivalence, multicomponent term, translation technique

1. Introduction

Current achievements in science and engineering accompanied by intensified international economic and technical cooperation highlight the role of terminology in globalizing conditions. There arises a problem of translating large amounts of scientific and technical literature in specific fields of human activity. The investigation field is relevant due to the presence of modern

3L-Edu 2022: 2nd International Conference on New Trends in Linguistics, Literature and Language Education, May 18, 2022, Kryvyi Rih, Ukraine

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ACNS Conference Series: Social Sciences and Humanities

agro-engineering terminology in the period of its formation and optimization, which is caused by transition from previously used Russian-language samples and standards in both formation and translation of terms, as well as the constant need for introduction of new foreign-language concepts into the Ukrainian-speaking agricultural sphere. Processes of harmonization, normalization of the concept system and standardization of professional units in agro-engineering prove that the given terminological professional system is still under development.

The objective of the research is to reveal some difficulties of translating the English-language agro-engineering terms into Ukrainian. To achieve the set aim, the following tasks should be fulfilled:

- to classify English agro-engineering terms according to their structural characteristics;
- to study the influence of synonymy and homonymy on the translation process;
- to examine principal translation techniques of the English agro-engineering terms into Ukrainian;
- to investigate various techniques for translating multicomponent agro-engineering terms into Ukrainian.

In our paper, we use the definition of a term provided by L’Homme [11]: “the term is a word or a phrase that is used to express a concept accepted in a relevant professional field and used in specific conditions” [11, p.55].

Many world-known linguists (e.g., Baker and Saldanha [2], Meister [12], Munday [15], Olohan [16], Rogers [18], Scarpa [20]) investigate into theoretical aspects of terminology translation. Much attention has been paid to some practical issues of terminology translation through the prism of grammatical difficulties [6, 14]; non-equivalent terms [7]; binary terminological units [10]; pragmatic and cognitive aspects of terminology translation [13, 19] as well as technical translation teaching [9, 17, 22].

Terminology translation is one of the most difficult problems in linguistics and translation studies, because terms are referred to rapidly developing vocabulary, which is in demand by specialists in various fields. Translation of terms requires knowledge of the translation area, understanding of a term meaning in English and knowledge of terminology in the target language. The most indispensable issue for terminology translation in Ukraine is standardization of national terminology and compilation of terminology dictionaries.

It is worth noting that the case study under discussion has not been actively analyzed on the English-Ukrainian contrastive basis.

Problems of English agricultural terminology translation into Ukrainian are researched into by such Ukrainian linguists as Amelina [1], Kaporovska and Kozub [8], Tishechkina [21]. Tishechkina [21] examines translation of derivatives of some agricultural terms (agriculture, seed, grain, cereal) through the prism of etymology. Kaporovska and Kozub [8] study mainly the stylistic aspect of the English agricultural terminology. Amelina [1] investigates into some grammatical peculiarities of German-Ukrainian translation of the agricultural discourse. The lack of a well-grounded structural-semantic analysis of terms in the agro-engineering field makes the process of terminology standardization and unification quite difficult, which, consequently, complicates the process of translation. In the given paper, we apply an integrated approach to the issue of translating English agro-engineering (not agricultural) terminology.

The English-Ukrainian Dictionary in Agro-Engineering by Volianskyi and Berezova [23] published in 2018 has become the source of illustrative materials for our research. The results of our investigation can be applied to teaching English for Specific Purposes (ESP) to students of non-linguistic specialities, as well as teaching translation studies to students of translation departments at Ukrainian universities.

Terminology translation causes some problems for students of technical specialities due to the following reasons:

- 1) structural peculiarities of terms;
- 2) frequent occurrence of homonyms and synonyms;
- 3) application of various translation techniques;
- 4) peculiarities of translating multicomponent English terms into Ukrainian.

English agro-engineering terms are quite difficult to translate into Ukrainian because they represent the contemporary level of the agricultural sphere development with its advanced mechanization, various technical processes, technologies, etc. Besides, the terminology under study is a combination of mathematical, chemical, mechanical, biological and general scientific terms. Moreover, some English agro-engineering terms have divergences in the American and British variants of English.

The research questions include the following:

1. What translation challenges can a translator face working with the English agro-engineering terms?
2. Do the number of components in multicomponent terms coincide in the source and target languages?
3. What are translation strategies for English-Ukrainian translation of those terms?

2. Research methodology

In order to achieve the research objectives and fulfil the set tasks, contrastive and semantic analyses are applied as the major research methods. The data for analysis are taken from the English-Ukrainian Dictionary in Agro-Engineering by Volianskyi and Berezova [23]. The principal method of our research is contrastive analysis. According to Ke [9], contrastive analysis is a set of research techniques and description of a language through its comparison with another language in order to identify its specific features. This method enables analysis of translation changes in the form on grammatical and lexical levels, selection of correct equivalents, and ways of translation of multicomponent terms.

Word-formation analysis is used to identify formation mechanisms of terminological derivatives and structural models of English agro-engineering terms.

The comparative method enables us to reveal in what way a translator overcomes translation difficulties as well as demonstrate what elements of the source text are left untranslated. The comparative method gives us information about correlation of individual elements of the source language and the target one (techniques and methods of translation). That correlation depends on the relationship between language systems involved in translation and some extra-linguistic factors.

The functional approach is used to study lexical-semantic aspects of English agro-engineering terminology taking into account synonymous and homonymous relations, thus allowing us to focus on the specific terminology of agro-engineering in modern English.

The quantitative method is used for calculating frequency of translation techniques.

The research is carried out in five stages. At the first stage, the current research material is selected from the English-Ukrainian Dictionary in Agro-Engineering by Volianskyi and Berezova [23]. The selected terms are divided into three categories (specific terms, cross-industry terms and general terms).

To define the structure of agro-engineering terms, they are divided into simple, derived, compound, two- and multicomponent terms. At this stage, we also define the word-formation models of multicomponent terms. At the third stage, functioning of homonyms and synonyms of English agro-engineering terminology is studied. The data obtained are further used in translation analysis.

At the fourth stage, principal techniques of translating English agro-engineering terms into Ukrainian by applying contrastive analysis are investigated. The component analysis is applied to developing an algorithm of translating English multicomponent terms into Ukrainian.

At the fifth stage, frequency of translation techniques applied is calculated. The final stage of our research provides comprehensive analysis of the data collected and conclusions drawn.

To sum up, combination of different research methods makes it possible to provide optimal accuracy and relevance of the research results obtained.

3. Findings and discussion

Translation difficulties are closely related to lingual characteristics of terms (structural peculiarities, synonymy, and homonymy). Let us consider them in detail.

3.1. Structural characteristics of English agro-engineering terms

In our paper, some difficulties of English agro-engineering terminology translation are determined by structural characteristics of the terms, synonymy and homonymy.

We agree with Bennet [4] who notes that morphological structure of a term plays a crucial role in the translation process. According to their structural representation, terms can be grouped into the following major categories: simple, constituent, compound and multi-word terms. A terminological unit has a variety of manifestations: words, collocations, abbreviations, acronyms, symbols, icons, however, ideally behind every terminological unit "... there should be a clearly defined concept which is systematically related to the other concepts that make up the knowledge structure of a domain..." [5]. According to this approach, we distinguish simple, derived, compound, two- and multicomponent terms in the agro-engineering semantic group.

Simple terms can be easily used as a basis for forming new terminological units [3], they have one component and do not cause any difficulties in translation: e.g. flake – лущення, furrow – борозна, etc. 21.4% of simple agro-engineering terms undergo conversion, i.e. they can be used both as a verb and a noun: e.g. draught – тяга and тягнути.

Derived terms can be created by suffixes (e.g. grader – грейдер, сортувальна машина, сортування, granulator – гранулятор, дробарка) and prefixes (e.g. detrash – очісувати листя

зі стебел цукрового очерету, desticker – сепаратор для відокремлення плодів і рослинного сміття).

Compound terms consist of two words linked together (e.g. windmill – вітродвигун, seed-box – насінневий ящик, rowcrop – обробляти просапні культури, shelterbelt – лісова позахисна смуга). Compound terms are characterized by various translation techniques applied: loan-translation, transformations, descriptive translation.

Two- and multicomponent terms can occur in a variety of models. Two-word terms are created on the basis of five models:

1. N + N: bale separation – поділ паків, potato set – картопледжалка;
2. Adj. + N: eccentric shaft – ексцентриковий вал;
3. Participle I + N: shearing set – стригальний агрегат; milking shed – доїльне приміщення, доїльний майданчик;
4. Participle II + N: suspended stacker – начіпний копнувач;
5. Proper Name + N: Venturi spraying – розкидач із соплом Вентурі.

It should be noted that in the target language the two-word terms can be turned into three- and more-word terms: mechanical shaker – струшувач з механічним вібратором, divided shovel – розрізний (секційний) підкопувальний леміш.

Multicomponent three-word terms are predominant and amount to 38%. They are created on the basis of the following five models:

1. Adj + N + N: basic wind velocity – базова швидкість вітру;
2. N + Adj + N: cast detachable chain – ланцюг з литих гакових ланок;
3. N + N + N: gang bush breaker – секційний кущоріз;
4. Participle II + N + N: trailed forage box – причіпний візок для силосу;
5. Participle I + N + N: rotating feed bunk – обертальна годівниця.

Four-word terms are created on the basis of such models as:

1. Adj. + N + N + N: hydraulic bale tension control – гідрорегулювання щільності пресування паків;
2. N + N + N + N: gravity flow grain box – кузов для зерна із самоплинним розвантаженням;
3. Adv. + Adj. + N + N: most unfavourable action of load – найбільш несприятливий вплив навантаження;
4. N + Participle II + N + N: force-fed auger elevator – шнековий елеватор із примусовою подачею;
5. Participle II + N + N + N: combined grain-and-fertilizer drill – комбінована зернотукова сівалка;
6. Adj + N + Adj. + N: internal gear final drive – кінцева передача з внутрішніми зубцями;
7. Adv + Participle II + N + N: hydraulically powered silage grab – гідрофікований силосний грейфер.

Five-word terms are not so numerous and they have the following formation models:

1. Participle II + N + N + N + N: slotted floor confinement swine building – свинарник з решітчатого підлогою над гнойовими канавами;
2. N + N + N + N + N: knife-and-feed auger stop lever – важіль зупинки різального апарата й шнека (комбайна);
3. N + N + Adj + N + N: reel height hydraulic adjuster lever – важіль гідравлічного регулювання підійманням мотовила;
4. N + N + N + Adj. + N: grassland spike-tooth flexible harrow – борона для обробітку луків зубова шарнірна;
5. Adj. + N + Adj + N + N: single disk deep-furrow opener – однодисковий глибокоборозний сошник.

As can be seen, multicomponentity of terms is achieved by specifying the meaning of a head word which is expressed by a noun and mainly takes the final position in the phrase. In the target language, the number of components does not coincide with the source one.

It should be pointed out that term formation models in Ukrainian translation may not coincide with the source term. This fact is determined by grammatical differences of both languages (English is an analytical language, while Ukrainian is a syntactical one). For example, the Nominative Case in the English term is conveyed with the Genitive Case in Ukrainian: land grading – вирівнювання ґрунту; fertilizer grinder – подрібнювач добрив. In some cases, a preposition can be introduced into the target term: grass-seed attachment – пристрій для висіву насіння трав; cane bundler – копнувач для цукрового очерету. The formation model N + N in the source term can be replaced by Adj. + N: garden sprinkler – садовий дощувальний апарат, irrigation sprinkler – дощувальний апарат. The two-word English terms can be translated as compounds: manure spreader – гноєрозкидач; bale stacker – пакоукладач.

3.2. Translation of multicomponent terms

Multicomponent terms cause the most numerous difficulties in translation process, e.g. declutching safety device – запобіжник з розчіплюванням муфти (трактора) в разі перевантаження знаряддя, bulk-handling potato digger – картоплекопач з бункером.

There is a contradiction between a tendency to link different meanings or different shades of meanings resulting in multicomponent terms, and, on the other hand, a global tendency for compression of information. This group of English agro-engineering terms mostly causes problems due to their complicated structure. Formation of such terms is carried out through step-by-step specification of a head word of the source term with a number of attributes. So, a multicomponent term consists of a head word and a number of attributes, which can specify and modify its meaning. This structure is typical for a non-prepositional terminological phrase in English:

$$LPA_n \leftarrow \dots \leftarrow LPA_2 \leftarrow LPA_1 \leftarrow HW,$$

where *HW* is the head word, $LPA_1, LPA_2, \dots, LPA_n$ are one or more left-position attributes that clarify the meaning of the whole term.

The algorithm of translating English agro-engineering multicomponent terms should be as follows. In non-prepositional attributive word-groups, we should start translating from the

head word that takes the final position in the phrase and direct further translation from the head word to the left (e.g. chilled water jacketed tank – танк із сорочкою для циркуляції охолодженої води). The number of components in the source term and the target term may not coincide.

Students should remember that in most cases the final component in an English terminological phrase becomes the first one in Ukrainian translation: chilled water jacketed tank – танк із сорочкою для циркуляції охолодженої води. The right “unrolling” is typical for the Ukrainian language. Prepositional terminological phrases are not so numerous in English agro-engineering terminology. In some cases, word-for-word translation is applied: loader for loading flat stored grain – машина для навантажування зерна з плоских майданчиків.

Application of different translation techniques can cause inconsistencies in the number of components in a terminological phrase. For instance, three-component terms in the source language become four-component ones in Ukrainian: cast detachable chain – ланцюг з литих гакових ланок, threshing mechanism clutch – муфта привода молотильного барабана. And, vice versa, four-component terms can be turned into two-component ones: tractor-mounted combine harvester – начіпний комбайн, rod-type elevating conveyor – прутковий елеватор. This inconsistency is determined by the following reasons: differences in grammatical systems of the source and target languages and a translator’s intention to find semantic, not literal, correspondences. A translator has to decide what constituents of the entry term in the source language could be sacrificed and how some of them could be compensated by applying the linguistic means of the target language in order to create the same degree of informativity at a particular level for target readers.

Thus, a large number of multicomponent terms in English agro-engineering are determined by a relatively limited number of term formation tools and the need to identify the agro-engineering system in a more terminological and accurate manner.

3.3. Synonymy as a translation challenge in agro-engineering terminology

Synonyms are lexical items which have the same meanings. In scientific language, it is desirable to avoid synonyms, but they still exist. Sometimes, synonymous and polysemic terms are not only inevitable but also necessary as they allow us to express both minor and major meaning shifts without changing the grammatical form of a term, or inventing a new one, which still should be similar to the existing one as it refers to the same concept. Extensive application of many synonyms is especially typical of dynamically developing terminology when the process of terminology categorization is already finished, but the search for a preferred term is still in progress.

The following means of synonym formation in the English agro-engineering terminology are revealed:

- 1) usage of the synonymous attribute components: conveyor canvas – полотняний транспортер, draper canvas – полотняний транспортер; warm house – теплиця; green house – теплиця; glass house – теплиця;
- 2) usage of divergences from American English and British English: maize (AmE) grinder – кукурудзодробарка, corn (BrE) grinder – кукурудзодробарка;

- 3) parallel functioning of an obsolete term and a common one: byre (obs.)– хлів, корівник; cow building – корівник;
- 4) alternation of nuclear components: cow building – корівник; cowshed – корівник; grass cutter – газонокосарка; grass mower – газонокосарка.

3.4. Homonymy as a translation challenge in agro-engineering terminology

A homonym is a word that has the same pronunciation and spelling as another word, yet with a different meaning. Cross-industry homonymy is a linguistic phenomenon when a term from one knowledge area enters terminology of another area and changes its meaning, e.g. a beam is брус, балка in construction terminology and гряділь (плуга) in agro-engineering; a bank is крен in automobile terminology and жмут (труб) in agro-engineering; a gin is лебідка in mechanical engineering and бавовноочисна машина, волокновідокремлювач in agricultural terminology.

Within the context of cross-industry homonymy, we should mention the fact of changing a term meaning due to addition of different attributes to a head word. For example, the term bed has a general technical meaning – підстава, фундамент. After adding different attributes, we can observe the shift in translation of this term in agro-engineering: drying bed – стелаж сушарки; fluidized bed – киплячий шар; husking bed – качаноочисний апарат, качаноочисник; louvre bed – жалюзійний лоток (сушарки); moving bed – рухоме дно, подовжній транспортер (причеп-розкидача); shaker bed – грохот (решето), віброгрохот, вібраційне сито, струшувальний пристрій; soilless bed – гідропоніка; tilting bed – перекидна платформа.

3.5. Translation techniques

The results of the conducted analysis suggest that a translator should apply a variety of translation techniques. Frequency of the applied translation techniques is as follows: equivalence – 37%, descriptive technique – 15%, literal translation – 21%, transliteration – 5%, lexical and grammatical transformations – 10%, analogue translation – 12%.

Structural and semantic analysis of English agro-engineering terms enables us to reveal some principal translation techniques into Ukrainian:

- 1) the descriptive technique applied to conveying the meaning of specific terms: forager – машина для брикетування кормів; sarper – плуг-борозноутворювач з бічними дисковими батареями (для обробки відкосів доріг);
- 2) the equivalence technique: baler – прес-підбирач; barley – ячмінь; barnyard – скотний двір, хлів; bat – планка (мотовила); batcher – дозатор;
- 3) the analogue technique mainly used to translate the words which define the form of a machine: poly-V belt – багаторядний клиновий (поліклиновий), (англійська літера V схожа на форму клину); spiral cleaner – гвинтове сортування, “змійка”; front-cut combine – Т-подібний комбайн; side-cutting combine – Г-подібний комбайн.

Sometimes the analogue technique is combined with the descriptive one, e.g. herringbone – доільна установка типу “ялинка”. As a matter of fact, translation of the word herringbone in

common English is скелет оселедця. In the figurative meaning, this pattern is associated with a fir-tree among Ukrainians (in comparison with the British). This is an analogue.

- 4) grammatical transformations: fieldwork – польові роботи; cage cleaner – механізм збирання посліду у клітках для птиці (the change of singular into plural form); trash conveyor – транспортер видалення відходів (addition); tree-seed drill – лісова сівалка (omission);
- 5) lexical transformations: melon-seed extractor – видаляч насіння з баштанних культур (generalization); deseeder – льоноочісувальний апарат, льономолотарка (specification);
- 6) transliteration: aerator – аератор; brooder – брудер; bushel – бушель. Terms that contain an inventor's name are also transliterated. The proper name in this case takes the final position: Hooke's coupling – шарнір Гука; Venturi spreader – розкидач із соплом Вентурі; Venturi meter – витратомір із трубкою Вентурі.

Speaking about translation peculiarities, we should mention the cases where the same adjective in terminological phrases can be translated in different ways: green corn harvester – машина для збирання кукурудзи на силос; green crop harvester – силосозбиральний комбайн, косарка-подрібнювач; green pea harvester – комбайн для збирання зеленого горошку.

Calculation results reveal that the equivalence strategy has the highest frequency (37%), while transliteration (5%) has the lowest. Thus, the equivalence strategy is the most frequent translation technique in this case study. A variety of other translation techniques is explained by complicated structural characteristics of the analyzed terms.

We have not investigated into translation of lexical innovations in English agro-engineering terminology because our case study is not the agricultural discourse, but the terminological dictionary in which neologisms are not represented. Hence, that aspect can be the subject of our further research.

4. Conclusions

The results of the research may be used for training students of technical specialties learning ESP in the fields of agro-engineering, agricultural industry as well as for students of translation departments. Presented findings might also have some implications for translators and experts in the respective fields of knowledge. In the course of the conducted investigation, its objectives have been achieved and the questions advanced at the beginning of the research have been answered.

Translation of English agro-engineering terminology is quite challenging due to the following reasons: diversity of structural models of the terms and cases of synonymy and homonymy. Contemporary agro-engineering terms are more often created by composition from existing lexical items (compounding, affixation) or by applying various meaning formation patterns, i.e. meaning shifts (synonyms, homonyms, etc.).

A great variety of structural models in English agro-engineering terminology demonstrates contemporary trends in term formation and reflects other tendencies in multilingual interaction of various language communities.

We can conclude that many techniques are applied to translating English agro-engineering terms into Ukrainian including equivalence, analogue, descriptive techniques, transliteration, grammatical and lexical transformations. The most frequent technique is equivalence. It can be stated that multicomponent terms play a major role in forming English agro-engineering terminology. They may cause problems due to their length and non-prepositional bonds (in most cases). The most successful algorithm of translating them is to start from the head word (the final position in a terminological phrase) to the left. Notably, the source multi-component terms may become the target two-component terms.

Authors' contributions

Rusudan Makhachashvili, Larysa Mosiyevych and Tetiana Kurbatova contributed to the design and implementation of the research conducted, its computation, analysis of the results and preparation of the manuscript.

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