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# Some Peculiarities of Word-Formation Mechanisms in the Area of Civil Engineering

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## ABSTRACT

The purpose of this paper is to give emphasis to the issue of civil engineering terminology, more precisely word-formation mechanisms in this field of study. Terminology is the science studying the structure, formation, development, usage and management of terms. Dissimilar and sometimes contrasting definitions are given to terminology and terms, however there is a common denominator, which shows that terms behave differently within certain morphological and syntactic rules. With reference to the above, for the acquisition of the civil engineering terminology be done appropriately, one should have some general knowledge regarding word-formation mechanism of terms in a certain specialty, respectively, civil engineering.

From this perspective, as far as terminology acquisition is concerned, a great importance should be given to the inner and outer (loanwords) word-formation mechanisms. In the main, in this paper a detailed observation will be implemented on a terminological dictionary concerning civil engineering. Special attention will be devoted to the morphological aspects of word formation, such as prefixes, suffixes and compounds in civil engineering terminology. These three word-formation peculiarities predominate by being the most frequently used mechanisms. From the observation it was determined that compound terms (around 2000) are the mechanisms prevailing, referent to the frequency of productivity, followed by prefixes and suffixes.

Concerning prefixes, it should be emphasized the fact that there were more than 30 prefixes present in this dictionary but only 10 were really productive. The prefixes having negative connotations were distinguished to have a high frequency of productivity throughout the observation, such as in-, anti-, non-, un etc. While suffixes on the other hand, being the third most productive mechanisms in this dictionary, were distinguished for their productivity on creating mostly nouns out of other word classes and expressing processes actions or states.

**Keywords:** affixes; compounds; morphological; civil engineering; terms

## Introduction

It is an absolute truth that English language is the international language of science, technology, engineering etc. It provides an ocean with career opportunities for future professionals if they obtain the right technical vocabulary and other language skills. In view of this, English for Specific Purposes (ESP) is beginning to gain popularity as the need for language instruction, particularly English language instruction connected to future careers, increases.

Accelerating development of the civil engineering, not only in Albania but worldwide, has given this field of study a much greater attention and importance. The last years the building industry in Albania has undergone tremendous growth, therefore students' (not only) interest in this domain is huge.

In any given environment, language acquires or forms differential and specialized variants of expression, which are known as, and have usually been referred to as, register
for special purposes or language for special purposes (Halliday, McIntosh and Strevens
1964; Firth 1968; Halliday 1994). Civil Engineering, as well as any other discipline makes use of specialized terminology in order to denote specialized concepts.

When tackling with terms and terminology, the specialist/ student/professional should be punctilious. According to (Boonkongsaen & Intaraprasert, 2014), university students are now expected to be able to read and comprehend the reading materials that are related to their field of study. However, while learning foreign languages, students in general and students of civil engineering in particular in this paper, encounter a number of obstacles: perceiving and remembering new vocabulary, understanding its meaning and connotations. The ways of forming terms are the same ways of forming words in the literary language. Nevertheless, the main ways of forming the terms in general language but also terms that are applicable and tangible in engineering terminology are:
a) morphological ways (derived words, composites)
b) semantic way (semantic borrowings etc)
c) syntactic way

In this paper, the morphological way of forming new words will be on spotlight. When it comes to technical engineering terminology being taught and learned in a polytechnical university, it plays entirely pertinent. One should be meticulously careful, because sometimes you might come across terms that are identical, being used in different areas of study while on the other side there may be different terms used for the same concept in the same domain. Teachers or lecturers do their outmost for students to obtain and learn terminology of the respective field of study. One of the strategies employed in learning terminology refers to

word formation. Undoubtedly, word formation plays a crucial part in expanding and enriching vocabulary. The creation and formation of new terms by morphological ways is one of the strategies mostly used. Rules of word formation are the ones which actually on one hand determine and direct the birth of innovations in the vocabulary of a language or the terminology of a certain domain and, on the other hand, clarify the connections amongst lexical units that already exist.

From this perspective, good understanding or even better, mastery of the rules of word formation, the ability to break down lexical units into constituent elements, determining the meaning and role of particular parts in the structure of each lexical unit create the necessary premises for the correct understanding and adequate use of derived and compound terms. Different from other lexical units, morphemes such as prefixes and suffixes and some compounds remain unchanged. Most of them are very productive and easy recognizable, which is why most of the lexical units coming from derivation or compounding can easily be broken apart into morphemes. For example, *blackboard*, is formed by joining two derivational bases, *black + board.* These two lexical units are independent morphemes, meaning that they can occur alone as words and have a meaning or fulfill a grammatical function. One can easily determine that there are two main parts, two free morphemes and therefore dictate the meaning of the composition by understanding and translating each of them separately. These two morphemes are both lexical morphemes that have semantic content, one denoting a quality (an adjective) and the other a thing (noun). When attached, a noun is formed.

Consequently, obtaining a morphological perspective (such as derivation and compounds) on word construction, constitutes a first-hand issue in the acquisition of terminology.

Another word, that illustrates and highlights the noteworthiness of having a solid grasp of English word formation which assists in term comprehension and employment, is *derelict. Derelict is a lexeme* which constitutes of two morphemes *de + relict*, the first referring to a bound morpheme, affix, more precisely a prefix which according to Bauer (1983:2017) prefix *de-* along with some other prefixes serve like verbs' base. *Relict* is the other part of the word which is an independent lexical morpheme. The prefix *de* doesn't change the word class, so it still remains a verb. Prefixation is a morphological process of adding prefix to the base, with or without change to the word-class (Quirk, 1973: 430). A prefix is an affix added before a root or stem or base (Katamba, 1993: 44). The vast majority of prefixes in English are class-maintaining, and those can be added to the bases more than one form class (Bauer, 1983: 216).

The meaning of the prefix *de* is a reversative prefix, so in this case the prefix reverses the meaning of the root of the word. Hereby, the meaning of the term is clear.

## II. Affixes and Compounds in Civil Engineering area

As mentioned earlier, one of the strategies followed to form new words or in our case, terms regarding technical terminology, more precisely civil engineering terminology, is derivation

which is affixes, otherwise known as "affixal word formation – a means of word formation by means of affixes" and compounds. Prefixation, being one of the most productive ways of forming new words, is done through modifying the stem by adding a prefix to it. Therefore, a study was undertaken on word formation mechanisms, by revealing some of the peculiarities of this mechanisms in order to determine the most productive ones. The subject of this study is the Oxford Dictionary of Construction, Surveying and Civil Engineering as well as some other authentic materials concerning this field.

There have been studies on the word formation aspect in different native/ one language dictionaries and dictionaries for teaching purposes aaccording to Jackson, 2000, de Caluwe & Taeldeman, 2003; Dardano et al., 2006) (Prćić, 1999, 2005, 2008; ten Hacken et al., 2006).

On the topic of teaching dictionaries, (Hacken, P ten et al. 2006: 254) points out that the correct reveal of word formation in it is an asset in the acquisition of vocabulary" for three main reasons:

a) deciphering words that the student does not know,

b) Creating/ Producing new words when the student has not yet acquired the standard word, and

c) a strong network structure in the mental lexicon, which facilitates vocabulary acquisition.

**2.1 Prefixes**

According to Webster there are 94 prefixes and 345 suffixes in English Language

In general, as for the usage of prefixes, it is necessary to emphasize that there were circa 30 prefixes that were identified, but just some of them resulted to be really productive.

*Arch- (architrave) a- (align) Back- (backset) Co-(co-digestion) counter- (countersink) de- (declination) dis- (displacement) down- (downcomer) em- (embankment)en- (encasing) ex- (extension) geo-(geogrid) half- (half-header) im-(imbrex) in-(incineration) inter- (interpaver) non-(non-ferrous) out- (outrigger ) off- (offsite ) over-(overflow) per- (perpend) pre- (precast) re-(rebar) (self-(self-cleansing) semi-(semi-detached) trans-(transducer) tri- (tripod) un-(unhanging) under-(undercloak) up-(upstand) multi- (multi storey building).*

*Table1. The most productive prefixes*

| *Most productive prefixes* | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *In-* | *Over-* | *Non-* | *Re-Over* | *Geo-* | *Inter-* | *Un-* | *Under-* | *Sub-* | *Back-* |
| *More than 40 units* | *More than 32 units* | *More than 33 units* | *More than 30 units each* | *More than 23 units* | *More than 28 units* | *More than 30 units* | *More than 20 units* | *More than 23 units* | *More than 30 units.* |

Most of the prefixes with the higher degree of new terms productivity, taking into consideration the structural element, are prefixes used in functional words and they are themselves semi-bound morphemes because they operate solely in the language as words. For example, *overhang-* , which constitutes two morphemes, where *over-* is the semi bound morpheme because she can act alone in "he fell over" and still have semantic content.

As shown by the analysis, one can determine that some of the highly productive prefixes such as *"il-, im-, half-, semi-",* lack this satisfactory production or formation of new terms in the system of prefixal civil engineering term formation/word formation.
Prefixes, also termed as number prefixes, such as *mono-, bi, tri-* have an infrequent degree of production of new terms or new lexical units, where *mono-* and *bi-* count only five usages and *tri-* more than six.

The prefix which resulted to be one of the most productive prefixes pertaining to civil engineering terminology, is "*in-*,, a borrowed prefix of Latin origin. It is a semi-bound morpheme, met in English language as a single word; according to the lexico-grammatical character, it can be classified as a deadverbal prefix, but however, throughout the analysis it was noticed that most of the terms consisting of this prefix were adjectives and some nouns, few adverbs were distinguished.
The semantic classification of prefixes makes a general distinguishment in monosemantic and polysemantic prefixes. Most of the prefixes are monosemantic, they convey only one semantic content (meaning). *In-* is a polysemantic prefix.

On the table below, we can determine that prefix in- can be attached to: an adjective, a noun and a verb and create different morphological forms and different semantic contents. Marchand (1966), says that English prefixes rarely change the grammatical classification of the word they are attached to, as seen in the "in" prefix example.

*Table 2. Word formative model- prefix "in"*

| Prefix | Word fomative pattern | Semantic meaning of the prefix | Semantic peculiarity of the term | Terms |
|---|---|---|---|---|
| In- | In+adj (v+suffix) | Reverses the meaning of the stem word | Non flammable liquid | Incombustible, adj |
| In- | In+noun | Indicates direction, orientation | Related to hydro, water enters in a lake* | Inflow |

| | | | | |
|---|---|---|---|---|
| In- | In+verb | Shows inclusion | Detailed Analysis in a construction site | Inspect, v |

Another example of a polysemantic prefix widely used in civil engineering terminology is "over", which in the majority of cases doesn't change the class of the base word. But in spite of that, in the situation where the base word in an adj, it is noticed that the term changes the word class to a noun.

*Table3. Word formative of a polysemantic prefix (re-)*

| Prefix | Word formative pattern | Semantic meaning of prefix | Semantic peculiarity of the term | Terms |
|---|---|---|---|---|
| Over- | Over+verb | Position of sth being above or higher | Projection of a structure | Overhang, |
| Over- | Over+ noun | Suggests sth beyond the usual | Excess water | Overflow, |
| Over- | Over+ verb | Suggests sth covering a certain space | Insulation over ceiling | Overlay, |
| Over- | Over+ noun | Refers to sth being superior , high figuratively | Heads office | Overheads, |
| Over- | Over+ adj | Refers to inversion | Having the tendency to invert (walls) | Overturning, |

**2.2 Suffixes**

Suffixation is forming words with the help of suffixes, by adding a derivational suffix to various kinds of derivational bases. Some of them are of native English origin such as – ness, -er, -en, -ing and some others are of Romanic Languages like: -able, -ation , -ion, -um, -ize etc.

Upon closer observation on the Oxford Dictionary of Construction, Surveying and Civil Engineering and some other authentic texts related to Civil Engineering, it was perceived that

suffixes played a pivotal role in creating new terms in this domain. The suffixes with the highest degree of productivity were:
*-ing* more than 140 technical terms were distinguished,
*-tion*, more than 70 terms
*-ion*-more than 40 terms
*-er*- more than 75 terms
*-ed* more than 65 terms
*-ment* more than 30 terms
- *ic* more than 30 terms
*-al* more than 30 terms
- *Ity* more than 30 terms
*-ance* more than 12 terms
*-able*- more than 20 terms
*-ible* more than 15 terms
- *or* more than 20 terms
*-ar* more than 18 terms
*-ery*, *-ry* more than 10 terms
*-ive*- more than 20 terms
-i*sm* more than 8 terms
- *ness* more than 8 terms

One can distinguish other suffixes, whose productivity degree when it comes to civil engineering terminology is low. These suffixes are*: -ify, -ade (, -age (anchorage), -en, -ice,-ent*, etc.

According to Plag, (2003), there are approximately 45 suffixes and he makes a classification according to the type of the lexico-grammatical character of the base they are added to:
Denominal Suffixes, -age, -ance, -ment, -ing etc.
Deverbal Suffixes, -ing , -ate, -ify, -en etc.
Deadjectival Suffixes, -able, -ible, -ing, -ed, -ive
Deadverbal Suffixes, -ly, -wise.

Nevertheless, some suffixes,same as prefixes, even though used within a field of study may point out different semantic groups of lexemes.

***The suffix (-er), is used to refer to:***

a. A profession such as on the *engine-er*.
b. one that is a suitable object of a specified action, in rip-er, ladder, ris-er, *lac-er = is a reinforcing bar used to create a mesh*

c. the agent of the action (non-person), extinguish-*er = something that ends or removes something, such as a fire extinguisher*
d. The agent of the action (person), *labour-er*
e. The place of the action, *gutt-er*, which means *a narrow channel used to convey rain water; contain-er etc.*

Here, the suffix modifies the lexical meaning of the base and transfers words to a different part of speech, such as in *extinguisher, ripper* or *container.*

Other suffixes however, do not change the part of speech of the morpheme they are attached to, such as in: **groove-groov*er;* landscape-landscap*ing;* damp-damp*ness*-damp*ing.***
As forementioned, one of the most productive word formative morphemes in the specialized terminology of civil engineering is the suffix -ing. When "-ing" suffix is attached to a morpheme, it creates either a noun, an adjective or noun in the form of a gerund (not including the continuous form of the verb). Below will be listed a word formative model of the suffix -ing.

*Table 4. Word Formative morpheme "-ing"*

| Suffix | Word-formative pattern | Term | Part of Speech of the term | Semantic peculiarity of the suffix |
|---|---|---|---|---|
| -ing | noun+ing | Scaffolding | No | Refers to a process |
| -ing | Verb + ing | Hanging | Adj | Refers to state of something |
| -ing | Verb+ing | Heating | No | Refers to a process connected to a certain thing |

**2.3 Affixal Negation**

The presence of the negative affixes, most predominantly of prefixes is really noticeable in the Oxford Dictionary of Construction, Surveying and Civil Engineering.
Affixal negation is a process of word-formation, where a negative affix, be it a prefix or suffix is attached to a stem by building a new word/term.
(David Crystal, 2003) and (Karl.E.Zimmer,1964) have described 6 basic negative affixes, where 5 of them are prefixes are : *a-, dis-, in-, non-, un-* and one is a suffix *-less.* The prefix *-less* is not a productive one in our observation so our focus will be on the most productive prefixes only.
The most productive prefixes with negative connotation resulted to be:

1. The prefix *in-* which was discussed earlier in this paper.
2. The prefix *non-*, of Latin origin, which as (Quirk et al,985) states, means "not" or "absence of something", and is mostly attached to an adjective as in (non-flammable,

non-renewable, non-cohesive, non -ferrous, non-biodegradable, non- trafficable roof etc.) or to a noun as in (non-combustibility test, etc.) and when attached to verbs such as in "non-slip" it forms an adjective, which is a peculiarity of this prefix.

3. The prefix *un-* of Old English origin, constitutes many meanings, but only two of them were present in the observation, the first one being "not" as in "undressed (timber), referring to a timber which is left in its rough cut.

The second, being a reversative prefix such as in "unlock", referring to the door. What was distinguished, was the fact that it was widely attached to adjectives made of participles (being part of a compound in most of the cases): *unframed*, *undrained* test, *undressed* timber, and to deverbal derivates (uninterruptible power supply, *unsustainable* etc.)

**2.4 Compounds**

Compounding is a way of word-formation, where a new word is formed by adding two derivational bases, and so creating inseparable lexical units.

(Lieber, 2005) distinguishes two forms of compounds; 1) synthetic compounds (also called verbal, deverbal, or verbal nexus compounds) are ones in which the second stem is derived from a verb, and 2) root compounds (also called primary compounds) are ones in which the second stem is not deverbal.

Regarding graphical features (Stefanllari.I, 2011: 179) compound words can be written in three different ways:

Open, i.e., with a space between the parts of the compound; e.g air leakage, critical flow, ductile fracture etc.

Hyphenated, i.e., with a hyphen (-) separating the elements of the compound; e.g., damp-proofing, fire-grading

Solid, i.e., the components being together, not separated or hyphenated as in: handpull, dragline, flushvalve etc.

According to the observation of Oxford Dictionary of Construction, Surveying and Civil Engineering, there is a considerable number of compounds present in this dictionary compared to the suffixes and prefixes.

More than 75% percent of the compounds are open ones, followed by solid and hyphenated compounds.

Concerning the classification according to the structure of derivational bases, the predominant compounds are the ones consisting of simple stems: needle scaffold, night lock, notch board, pebbledash, spine wall, splay brick, data drop,

derived stems such as: hammer-dressed, auxiliary equipment, forklift truck, foundation inspection, contraction joint, motorized valve, moulded brick, open boarding, pad footing, patterned glass, percussive drilling, pile foundation, spreader bar.

**Conclusions**

The close observation and the analysis of the main word formative models regarding civil engineering terminology, based mostly on the Oxford dictionary of Construction, Surveying and Civil Engineering led to the following conclusions.

1. The most productive word formatives are compounds, followed by prefixes and suffixes. There is a total of circa 1200 compounds in this dictionary. Most of the compounds were structurally motivated compound words, which means that the meaning of the compound is derived from the sum of the meanings of the components of the common meaning, as O.D. Meshkov (1985) states. However, on the other side there are also demotivated compound words, the meaning of the components doesn't actually indicate the meaning of the whole term. The majority of the compounds are open compounds, consisting of simple stems and derived stems.
2. A greater number of prefixes used are of negative connotations, reversing the meaning of the stem word and having a high frequency of productivity. However, as O.A.Gracheva et al state, some highly productive prefixes such as super-, half- …, turned out to be not so productive in creating new words in the affixial system of this area.
3. Most of the suffixes are denominal ones, where the majority denote: process, state or action.
   While prefixes tended to create new terms, which means that this mechanism changes the semantic content of the terms, suffixes on the other side created more terms of different word classes, but without affecting the semantic content.

The present study does have some limitations, taking into consideration that is based only on main source. Therefore, using exhaustive research would of course ensure more reliable result concerning the peculiarities of word-formation mechanisms in this area.

Note: *The terms of Civil Engineering and Construction mentioned in this paper are all from Dictionary of Construction, Surveying and Civil Engineering.*

REFERENCES

Ronnie B. Wilbur, West Lafayette, IN (USA), Word formation and technical languages

Azmimurand, A (2019), Vocabulary learning strategies: Learning Engineering Terminology among Engineering Majors for Industry 4.0 Readiness.

Afzal, N., (2019), A study on vocabulary-learning problems encountered by BA English majors at university levels of education, Arab World English J., 10,3, 81-98

Vrapi F. (2020)., Interpreting and treatment of certain terms in English Language, Balkan Journal of Interdisciplinary Research

Zapata.A.A., Types of Words and Word Formation Processes in English

Claira.. D., (2017) THE ANALYSIS OF FORMS AND MEANINGS OF PREFIXES FOUND IN BALI ADVERTISER

I.V. Arnold, (2012), Leksikologiya, sovremonnogo angliiskogo yazyka", [ Lexicology of Modern English, Moscow: Nauka

A.N. Ilina, S.G, Kibasova, (2012), Word formation in Modern English, St . Petersburg: Publishing Houseof SPbGUEF,

Caluwe, J. de; Taeldeman, J. (2003). "Morphology in dictionaries." In Sterkenburg, P. van (ed.). A Practical Guide to Lexicography. Amsterdam & Philadelphia: John Benjamins. 114-126.

Dardano, M.; Frenguelli, G.; Colella, G. (2006). "What Lexicographers Do with Word Formation." In Corino, E.; Marello, C.; Onesti C. (eds.). Proceedings XII Euralex

Prćić, T. (1999). "The treatment of affixes in the 'big four' EFL dictionaries." InternationalJournal of Lexicography 12 (4). 263-279.

Hacken, P. ten; Abel, A.; Knapp J. (2006). "Word formation in an electronic learners' dictionary: ELDIT." International Journal of Lexicography 19 (3). 243-256

Hacken, P. ten; Abel, A.; Knapp J. (2006). "Word formation in an electronic learners' dictionary: ELDIT." International Journal of Lexicography . 243-256

Webesters.M (2002)A Dictionary of Prefixes, Suffixes, and Combining Forms Websters Third NewInternational Dictionary,Unabridged

Marchand, Hans (1969)The Categories and types of present day English word formation (129) Synchronic and diachronic approach. University of Alabama press

Stefanllari 1. (2011), A course in English Lexicology

Plag.I (2006), Word Formation in English, Cambridge University Press

M. Websters (2002) Third New International Dictionary,Unabridged A dictionary of Prefixes and Suffixes

Crystal D. The Cambridge Encyclopedia of English Language.Cambridge University press

R.Quirk el al. (1985) A comprehensive grammar of English Language (1540-1542)

R. Lieber (2005), Handbook of Word-Formation, 315—334.

Stefanllari.I (2011), A course in English Lexicology, Geer

Gorse, Ch, Johnston D., Pritchard M., (2020), Dictionary of Construction Surveying and Civil Engineering, OXFORD UNIVERSITY PRESS

Gracheva.O.A et al (2019) Modeling of Prefixial Word Formation (on the example of the English -Language-Constructuon-Engineering Vocabulary), IJRTE

nnhttps://www.oposinet.com/temario-de-ingles-secundaria/temario-2-ingles-secundaria/topic-10-the-lexicon-characteristics-of-word-formation-in-english-prefixation-suffixation-composition/

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