

TRANSLATION ANALYSIS OF MECHANICAL ENGINEERING TERMS IN SCHAUM'S OUTLINES OF THEORY AND PROBLEMS OF HEAT TRANSFER

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Abstract: Translation frequently conveys information about culture, knowledge, and other social interactions. It is also considered from the perspective of intercultural communication access to developments in the humanities, sciences, and technologies. It is the fastest, most effective, and most efficient approach to transmitting knowledge and technology. Therefore, it is necessary to apply translation methodologies and techniques to ascertain the translator's translation ideology. The research method used in this research is the qualitative research design. This research took samples of the translation of mechanical engineering terms in Schaum's Outline of Theory and Problems of Heat Transfer to look for techniques, methods, and ideologies used by translators to translate these terms from English into Indonesian. The data obtained were 175, with the discovery of 109 single translation techniques, 50 double translation techniques, and six triplet translation techniques. Three translation methods are applied: the literal translation method, the faithful translation method, and the semantic translation method. From the technical data and translation methods, the researcher concludes that the ideology applied by the translator is the ideology of foreignization.

Keywords: translation techniques, translation methods, translation ideology, mechanical engineering terms

INTRODUCTION

Translation is critical in today's world of international communication. The translation is widely used to communicate knowledge, culture, and other social activities. From the point of view of global communication, translation is access to advances in science, technology, the arts, and strategic media. Translation is the fastest, most effective, and most efficient approach for conveying information and technology, especially in Indonesia as a developing country, because cost and time constraints can be overcome, so development is faster. In addition, the number of original works written by Indonesians in

science and technology still needs to be increased. In addition, the ability of most Indonesians to communicate in foreign languages is still limited. Meanwhile, Indonesia has absorbed many advances in science and technology, including translation of literature and studies with international countries, especially those who speak English (Silalahi, 2009).

Translation is the process of transferring the meaning of the source language into the meaning of the receptor language (Larson, 1998). According to Larson, translation is transferring meaning from one language to another. In short, what is being transferred and

must be kept constant is the meaning of the language (Larson, 1998). Larson also believes that only the form of the translation changes in this case. The source language's meaning is translated into the target language, and this meaning must be consistent. (Siregar, 2016). In this process, translation techniques and methods are needed to determine the translation ideology used by a translator. According to Molina and Albir (2002:209), the technique explains the collected results and can categorize different translation solutions. Translation technique, by definition, is a method used to describe the result of translation and identify different types of translation solutions.

Translators perform translation techniques in the early stages of translation, one of which is the reconstruction or translation stage. Translators use translation techniques to achieve high-quality translation results at this stage. Furthermore, translation techniques are related to the language skills of the translators themselves. The translator's essential ability to grammar from both the source and target languages is referred to as linguistic ability (Putra, 2017).

Some experts discuss different types of translation based on their studies. For example, Molina and Albir (2002) offer 18 translation strategies: adaptation, amplification, borrowing, calque, compensation, discursive creation, description, established equivalence, generalization, linguistic compression, literal translation, modulation, particularization, reduction, substitution, transposition, and variation.

The translation method refers to the direction in which the translator wants to take his translation. In other words, a translator chooses or trusts the translation method for a particular task (Molina & Albir, 2002). As a result, the method is a global setting that affects the entire translated text. How the micro units of the text are translated is influenced by the translation method. The method chosen also serves as a guide to translation methods and techniques, ensuring that all work together to produce a translation that works and is acceptable to the intended reader. In contrast, the technique uses translation strategies that directly impact the micro level of the text (words, phrases, or sentences) (Anshori, 2010).

Whether to translate literally or flexibly is always essential to translation (Newmark, 1988). In his book, Newmark divides into two translation methods emphasizing the Source Language (SL) and the TL (Target Language), which he calls diagram V. The four-source language-oriented methods are:

- a. Word-for-word translation translates words from one language to another, with the target language immediately below the source language. It is often represented as an interlinear translation. The primary use of this technique is to understand the mechanics of the original language or to interpret complex texts.
- b. Literal Translation is the SL grammatical constructs converted to their closest target language equivalents, but the lexical words are again translated singly, out of context. As a pre-translation process, it indicates a problem to be solved (Newmark, 1988).
- c. Faithful translation tries to reproduce the exact contextual meaning of the original within the constraints of the target language's grammatical structure. It 'transfers' cultural words and maintains a degree of grammatical and lexical 'abnormality' (deviations from source language norms) in translation.
- d. Semantic translation has to consider the aesthetic value (i.e., the beautiful and natural sound of the source language text, at the expense of 'meaning' where appropriate). The difference between faithful and semantic translation is that the first translation is uncompromising and dogmatic, while the latter is more flexible and empathetic.

Besides that four-source language-oriented, Newmark's V diagram also includes the four-target language-oriented, namely:

- a. Adaptation is the 'most free' form of translation, where the culture of the source language is changed to match that of the target language, and the text is rewritten. But unfortunately, the sad practice of a drama or poem being translated and then rewritten by playwrights and poets has produced many poor adaptations.
- b. Free translation reproduces material without means or content without its original form. Usually, these are

paraphrases that are longer than the original, called intralingual translations, often verbose and pretentious.

- c. Idiomatic translation tends to prefer colloquialisms and idioms where this is not in the original (Newmark, 1988).
- d. Communicative translation tries to give the exact contextual meaning of the original in such a way that both the content and language can be accepted and understood by the reader (Newmark, 1988).

Ideology is defined as a principle that is believed to be accurate by a community in a civilization (Siregar, 2016). Ideology in translation can be defined as a principle that a community in civilization believes to be accurate or their opinion about what is right and what is bad in translation (Siregar, 2016). The concept of truth in translation, according to Nida and Taber (2003:1), is based on an assessment of "to whom" the translation was done. A "correct" translation is one that effectively communicates the content contained in the source text to the target readers.

Before translating, a translator must know two things: who he is translating for and why he is translating. It is a process that cannot be ignored when translating because it occurs at the beginning of the process, which can also be said at the analysis stage of the translation material (Siregar, 2016).

Hoed (2006: 67) also suggests that a translator should know the translation stages, often referred to as translation procedures, after determining for whom and for what purpose they are translating. The reproduction of messages included in the source text is known as translation. Basnett and Lefevere's statement that "whatever the goal, every reproduction is always dominated by a certain ideology" is quoted by Hoed (2006: 83).

Ideology in translation is a principle or belief about what is right and wrong, good and bad, in terms of what form of translation is best for the target text reader community or what kind of translation is suitable and liked by the community. As a result, success in deflecting messages is relative. Every translation is entirely right or wrong. In translation, "true-false" is also determined by "for whom and for

what purpose the translation is done" (Hoed, 2004).

The translator's ideology is a tug-of-war between two opposite poles, namely those oriented to the source language and those oriented to the target language (Venuti in Hoed, 2006: 84), which Venuti defines as foreign translation and domestication. Based on Hoed's interpretation, the following describes the two variations (2006: 83-90). The first one is foreignization. Suppose a translation is correct, acceptable, and follows the preferences and expectations of readers who crave the presence of the source language culture or the original author's language. In that case, it shows that the translation benefits the community. It is reflected in Venuti's (1995) statement: "...one is trying to keep the author still while leading the reader to close to the author". The second one is domestication. Domestication is a translation ideology that focuses on the target language to make the translation more familiar to the target language. A good translation, by the ideology of domestication, reflects the tastes and expectations of readers.

Specific translation techniques and methods are needed in the mechanical engineering field because these terms are different from general terms. The term in a particular field sometimes has a different meaning from the general term. For example, in the phrase mechanical properties, where the word *properties* are more often translated into *properti*, in that phrase, it is translated into *sifat mekanis*. The term *properties* can also be translated into *besaran*, depending on the context of the reading. One of the mechanical engineering books is Schaum's Outline of Theory and Problems of Heat Transfer (Pitts & Sissom, 1983) which was translated into Indonesian into Schaum's Outlines Teori dan Soal-Soal Perpindahan Kalor by Thombi Layukallo (Pitts & Sissom, Schaum's outline teori dan soal-soal perpindahan kalor, 2011). This book is one of the handbooks, especially for the Heat Transfer course. A mechanical engineering study program course is used when students learn about heat transfer. This book contains many mechanical engineering terms so that it can be used to represent other mechanical engineering books to be researched.

Research about translation has been conducted by many researchers and analyzes all the things about translations. Fitria (2018) researched translation techniques used to translate abstracts into articles from a scientific journal. Results show that translation techniques are categorized into five categories. Transposition/Shift is the most dominant type of translation technique found in the abstracts of STIE AAS Surakarta. Sundari & Febriyanti (2016) study examined the technique used to translate informative text for EFL learners. It analyzed the results of the selected translation technique or use of 35 samples. Febryanto, Sulyaningsih, & Zhafirah (2021) have studied how to translate terms in mechanical engineering. Shabitah and Hartono (2020) researched the use of translation methods in translating novel texts. From these previous studies conducted by some researchers, the authors try to analyze the specific terms in the Mechanical Engineering field, especially in analyzing the theories, methods, and ideologies used by translators in translating Schaum's book Outline of Theory and Problems of Heat Transfer.

METHOD

This research uses a qualitative research design since it analyzes the translation techniques, methods, and ideology of translating mechanical engineering terms from English into Indonesian in Schaum's Outlines of Theory and Problems of Heat Transfer. Bogdan & Biklen (2007, 27-30) state that qualitative methodology is a research method that produces descriptive research reports of people and observable behaviors in the form of written or spoken words. Milles & Huberman (2014, 36) state that qualitative research can be used with a smaller population sample. The research that will be carried out is only taking samples of machine-term translation data to look for the methods and ideologies used by translators to translate these terms from English into Indonesian.

The data source is taken from the book Schaum's Outlines of Theory and Problems of Heat Transfer (Pitts & Sissom, 1983) and the Indonesian translated version entitled "Schaum's outlines: Teori dan Soal-Soal Perpindahan Kalor" (Pitts & Sissom, Schaum's outline teori dan soal-soal perpindahan kalor, 2011).

This research begins by collecting data. The research data collected is the terminology in the field of Mechanical Engineering contained in the data source, then juxtaposed between the terms in English and the results of their translation into Indonesian. The glossary of terms is used as primary data by researchers. This data collection uses the see method. In this case, the researcher categorizes the data based on translators' techniques, methods, and ideologies in translating mechanical engineering terms from English into Indonesian.

Furthermore, the researchers conducted data analysis based on the primary data obtained. Analysis of the data through the manual method, namely by analyzing the data that has been collected and categorizing it into three analyzes, namely analysis of translation techniques using Molina and Albir's (2022), analysis of translation methods using Newmark's (1988), and analysis of translation ideology using Venuti's (2003). The researchers used those three theories, which are fundamental, to analyze those three things.

FINDINGS AND DISCUSSION

Finding

Translation Techniques

In this study, after collecting the data, the researchers found 175 items of mechanical engineering terms contained in Schaum's book Outlines of Theory and Problems of Heat Transfer. The 175 items were analyzed using Molina and Albir's (2022) categorizing translation techniques. However, the data were divided into three categories: 109 data used a single translation technique, 50 used a multiplet translation technique, and 6 used a triplet translation technique. The translation was carried out by a book translator, namely Thombi Layukallo, with a technique that can be described as follows.

Table 1. Percentage of Recapitulation of Translation Techniques

No	Translation Techniques	Total	Percentage
1	Single techniques	109	62.29%
2	Couplet techniques	50	28.57%
3	Triplet techniques	6	3.43%
Total		175	100%

Based on the recapitulation percentage of translation techniques above, it is clear that a single technique is 62.29% more dominant than other techniques when the term mechanical engineering from Indonesian as the source text is translated into English as the target text. Here are the analysis and explanations of each technique.

Single Techniques

A single technique is applying one's technique in translating this research data from Indonesian to English. In this study, five single techniques were identified for use by translators: 1) pure borrowing, (2) natural borrowing, (3) literal translation, (4) established equivalence and (5) amplification. The data is shown in the following table.

Table 2. Percentage of single techniques

No	Translation Techniques	Total	Percentage
1	Pure Borrowing	15	13.76%
2	Naturalized borrowing	60	55.04%
3	Literal Translation	27	24.77%
4	Established equivalence	4	3.67%
5	Amplification	3	2.75%
	Total	109	100%

Pure Borrowing

A translation technique called borrowing involves the translator taking words or phrases from the target language. These loans can be pure and natural. Pure borrowing is when a term or statement is taken verbatim from the original language without phonetic modification (Silalahi, 2009). Therefore, this technique shows the same in terms of words and pronunciation.

Table 3. Example of pure borrowing technique data

No	SL	TL
1	engineering	engineering
2	Medium	medium
3	Volume	volume
4	Gas	gas
5	Pascal	pascal

The data above shows no change in the pronunciation and form of the word from the source language to the target language. For example, in the source language, the word

engineering, medium, volume, gas, and pascal are not changed in the target language. Those words still have the same form and pronunciation in the target language.

Naturalized Borrowing

Naturalized borrowing techniques, in contrast to pure borrowing techniques, require adjusting the pronunciation of loan terms to match the typical pronunciation of the target language. This borrowing technique seeks to harmonize the pronunciation of technical terminology in this mechanical engineering field with Indonesian pronunciation, which is different from the previous data.

Table 4. Examples of naturalized borrowing technique data

No	SL	TL
1	thermal science	sains termal
2	thermodynamics	termodinamika
3	conduction	konduksi
4	Convection	konveksi
5	Radiation	radiasi

Literal Translation

A literal technique is a translation technique in which the translator translates an expression. This technique requires lexical matching, which is still related to the source language, but the lexical arrangement that produces an expression has been changed with the rules of the target language (Silalahi, 2009). This literal technique is applied in both translating words, phrases, and sentences, as shown by the following examples:

Table 5. Examples of literal translation technique data in the form of words and phrases

No	SL	TL
1	Equilibrium	kesetimbangan
2	time rate	laju waktu
3	Pressure	tekanan
4	Units	satuan-satuan
5	Newton's law of cooling	Hukum pendinginan Newton

Established Equivalence

Established equivalence is a translation technique that aims to use a recognized phrase or expression (as defined by a dictionary or language rule) as an equivalent in the target text. The use of an established equivalent is to

use a term or expression recognized as an equivalent in the TL (by dictionary or language in use) (Molina & Albir, 2002).

Table 6. Example of established equivalence technique data

No	SL	TL
1	<i>steady-state</i>	keadaan tunak
2	<i>solid body</i>	benda padat
3	<i>combustion engine</i>	motor bakar
4	<i>alloy</i>	Campuran

The equivalence technique is commonly used when the translation process cannot use literal translation techniques. At times, the term cannot be translated literally. For example, the term *steady-state*. Literally, *steady* means *stabil*, while *state* means *keadaan*. If translated literally, it becomes *keadaan stabil*. The established equivalence technique is commonly used in fluid mechanics terminology because no words in two languages can be translated the same. Therefore, the translation process only looks for the closest equivalent and is commonly used.

Amplification

The amplification technique is a translation technique that makes explicit or paraphrased information implicit in the source language. This technique is similar to the addition technique. It is used to clarify the meaning of the translation; therefore, the translator adds the word to the result. For example, in the sentence *Neglecting all drag forces except the viscous shear at the inner surface of the cylinder and assuming a linear velocity profile for the lubricant*. the term *viscous shear* which when translated into *geseran viskos* or *geseran kental*, the translator adds the word *gaya* in the result of the translation to *gaya geser viskos* so that the translation results are more commensurate so that the translation of the sentence becomes *Dengan mengabaikan semua gaya-gaya hambat kecuali gaya geser viskos di permukaan dalam silinder dan mengasumsikan profil kecepatan linier untuk pelumas*. Adding words in the amplification technique can clarify the meaning from the source language into the target language.

Couplet Translation Techniques

In addition to the single technique, the couplet technique was also found. It is a combination of two translation techniques applied to determine the equivalent in the target language. The combination of the two translation techniques is a combination of literal translation and established equivalence, literal translation and natural borrowing, literal translation and pure borrowing, natural borrowing and established equivalence and natural borrowing with pure borrowing.

Table 7. Percentage of couplet translation technique data

No	Translation Techniques	Total	Percentage
1	Literal + established equivalence	4	6,9%
2	Literal + naturalized borrowing	29	50%
3	Literal + pure borrowing	11	18,97%
4	Naturalized borrowing + established equivalence	5	8,62%
5	Naturalized borrowing + pure borrowing	9	15,52%
Total		58	100%

The table above shows that of the five variants of multiple techniques, the combination of literal translation techniques and natural borrowing occupies the most dominant position applied (50), followed by a combination of natural borrowing and established equivalence (11), then natural borrowing and pure borrowing (9), literal translation and pure borrowing techniques (5), and the last is a literal translation and established equivalence techniques (4). Therefore, these five couplet translation techniques are described below.

Literal and Established Equivalence

In this study, 4 data were translated using the couplet technique with variants of literal translation techniques and established equivalence. One of the data that uses the technique variant is *The engineering area, frequently referred to as thermal science, which includes thermodynamics and heat transfer* translated to *Wilayah engineering yang sering*

kali disebut sebagai sains termal meliputi termodinamika dan perpindahan kalor. The data included in this category are dominated by the application of literal translation techniques as indicated by the adjustment of word order based on the rules that apply in the target language. However, in addition to the literal technique, a common equivalence technique is also applied, namely *heat transfer*. The word *heat* is translated using an established equivalence to *kalor*. The established equivalence technique maintains the language style in the mechanical engineering field under the language style of the SL text.

Literal and Naturalized Borrowing

In the previous section, we have described the combination of literal and established equivalence techniques used to translate some source data into Indonesian. This section will focus on research findings regarding the combination of literal and natural borrowing techniques. In this study, 29 data were identified and translated using the couplet technique with variants of literal and natural borrowing techniques. One of the data is *The minus sign in Fourier's law (1.)*, which is required by the second law of thermodynamics: *thermal energy transfer resulting from a thermal gradient must be from a warmer to a colder region* which is translated to *Tanda minus di dalam Hukum Fourier, (1.1). diharuskan oleh hukum kedua termodinamika: perpindahan energi termal yang dihasilkan dari suatu gradien termal harus terjadi dari daerah yang lebih panas ke yang lebih dingin.*

The target data, as a result of applying the literal translation technique, is characterized by the adjustment of the structure of the source language to the structure of the target language in each sentence element. Structural adjustments are mandatory to avoid distortion of meaning and to keep the translation acceptable to the target audience. In some cases, applying this literal technique is accompanied by a natural borrowing technique, namely in the phrase "thermal energy," which is translated into "thermal energy."

Literal and Pure Borrowing

In this study, 11 data were translated using the couplet technique with variants of literal translation and pure borrowing techniques. One of the data intended is "the next layer out from the wall slides along this stationary layer, and its motion is impeded or slowed because of the frictional shear between these layers" which is translated to "*Lapisan berikutnya ke arah luar dinding bergerak di sepanjang lapisan stasioner ini dan pergerakannya terganggu atau diperlambat oleh shear gesekan di antara lapisan-lapisan tersebut*". The data included in this category are dominated by the application of literal techniques, as indicated by the adjustment of the arrangement of words based on the rules that apply in the target language. However, in addition to the literal technique, pure borrowing is also applied in translating the term "shear." This word is not translated into the target language. Instead, it is borrowed purely by the translator in expressing terms from the source language to the target language.

Naturalized borrowing and established equivalence

In this section, we find 5 data using the couplet technique with natural borrowing variants and established equivalence. One of the data referred to is "the third mode of heat transmission is due to electromagnetic wave propagation, which can occur in a total vacuum as well as in a medium" which is translated to *Mode ketiga dari transmisi kalor disebabkan oleh perambatan (propagasi) gelombang elektromagnetik, yang dapat terjadi baik di dalam vakum total maupun di dalam medium.* In this data, two translation techniques are used to translate the phrase "heat transmission." The term "heat" is translated into "kalor" in Indonesian using the established equivalence technique, while the term "transmission" is translated into "transmisi" in Indonesian using a natural borrowing technique. The established equivalence technique is used to find the exact equivalent of the source language to the target language. The term "heat" itself, if translated literally, will be "panas." However, in terms of mechanical engineering, the term "heat" is more often translated into "kalor" because its meaning is more accurate with the context of the reading than translated into "panas."

Naturalized Borrowing and Pure Borrowing

In this study, 9 data were found using multiple translation techniques with variants of natural and pure borrowing techniques. One of the data found is "Determine the dynamic viscosity and the kinematic viscosity v of hydrogen gas at 90 OR and 38.4 atm," which translates to *Tentukanlah viskositas dinamis ... dan viskositas kinematis v dari gas hidrogen pada 90oR dan 38,4 atm.* In this data, two translation techniques are used to translate the phrase "hydrogen gas." The term "hydrogen" is translated into "hidrogen" in Indonesian using the natural borrowing technique, while the term "gas" is still translated into "gas" in Indonesian using the pure borrowing technique. The pure borrowing technique is used to translate terms that are purely borrowed from the source language into the target language. The same with *fluid manometer* where the term *manometer* is translated using borrowing pure, while *fluid* is translated using natural borrowing to *fluida*, so the phrase translates to *fluida manometer*.

Triplet Translation Techniques

The triplet technique combines three translation techniques in translating a phrase or sentence. In this study, three variants of the triplet technique were identified, namely:

Table 8. Percentage of triplet translation technique data

No	Translation Techniques	Total	Percentage
1	Naturalized borrowing/literal/established equivalence	3	50%
2	Pure borrowing/naturalized borrowing/literal	2	33,33%
3	Pure borrowing/naturalized borrowing/established equivalence	1	16,67%
Total		6	100%

Naturalized Borrowing, Literal Translation, and Established Equivalence

The difference in structure between English, as the source language, and Indonesian, as the target language, requires translators to apply literal techniques in translating all of this data. The goal is that the resulting translation is acceptable to the target language readers. Besides, he uses natural

borrowing techniques to translate borrowed terms and adapt them to the target language's pronunciation and standard equivalence techniques for terms with translated results whose meaning is equivalent to the source language.

One of the sentences containing data that includes three translation techniques is *This equation defines the convective heat transfer coefficient has the constant of proportionality relating the heat transfer per unit time and unit area to the overall temperature difference.* which is translated into Indonesian into *Persamaan ini mendefinisikan koefisien perpindahan kalor konvektif h sebagai konstanta proporsionalitas yang menghubungkan perpindahan kalor per satuan waktu dan satuan luas dengan selisih temperatur keseluruhan.* In the phrase *convective heat transfer coefficient*, to translate the words *convective* and *coefficient*, the translator uses a natural borrowing technique to become *konvektif* and *koefisien*. To translate the word *heat*, the translator uses the established equivalence technique to become *kalor*, and translating the word *transfer* using the literal translation technique becomes *perpindahan*. Therefore, the phrase is translated using three techniques to *koefisien perpindahan kalor konvektif*.

Pure Borrowing, Naturalized Borrowing, and Literal Translation

In this triplet technique section, translators also use literal translation techniques to adapt the structure of the source language to the target language. In addition, natural borrowing techniques are also used because the data found is in the form of terms whose translation results are loanwords adapted to the target language's pronunciation. Finally, in addition to natural borrowing techniques, translators use pure borrowing techniques to translate terms that cannot be translated into the target language, so they only borrow in full from the source language.

One data uses this technique, namely in the phrase *internal thermal power generation rate* where the *internal* word is translated using pure borrowing techniques, *thermal* using natural borrowing techniques to *termal*, and the phrase *power generation rate* is translated using literal translation techniques to *laju pembangkit daya*. Therefore, the phrase

translates to *laju pembangkit daya termal internal*.

Pure Borrowing, Literal Translation, and Established Equivalence

The difference in structure between English as the source language and Indonesian as the target language requires translators to apply literal techniques in translating all of this data. The goal is that the resulting translation is acceptable to the target language readers. In addition, translators use pure borrowing techniques to translate terms that cannot be translated into the target language. Hence, they only borrow in full from the source language and common equivalence techniques for terms that have translation results whose meaning is equivalent to the source language.

One of the sentences that include the data translated using a combination of these three techniques is *Begin with an appropriate form of the general conduction equation for the steady state radial flow in a single-layered spherical shell* which translates to *Awali dengan bentuk yang sesuai dari persamaan konduksi umum untuk aliran radian keadaan tunak di dalam sebuah tempurung bulat satu lapis*.

Translation Methods and Ideology

In the subsection above, it has been explained that there are 109 data translated using a single technique, 50 data using a couplet technique, and 6 data using a triplet technique. Based on the description in the previous subsection, five translation techniques are used, including the single technique, the couplet technique, and the triplet technique. The five translation techniques are pure borrowing, natural borrowing, literal translation, established equivalence, and amplification. The following is data on the frequency of use of the five techniques:

Table 9. Frequency of using translation techniques

No	Translation techniques	Variations			Total
		Single	Couplet	Triplet	
1	Pure Borrowing	15	20	3	38
2	Naturalized borrowing	58	43	5	106
3	Literal translation	29	44	6	79
4	Established equivalence	4	9	4	17

5	Amplification	3	0	0	3
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Based on the frequency of its occurrence or use in the comprehensive data of this study, it is known that natural borrowing techniques rank first (106), followed by literal translation techniques (79), pure borrowing (38), established equivalence (17), and amplification (3). In theory, among the five translation techniques above, four translation techniques, namely natural borrowing techniques, pure borrowing, established equivalence, and literal translation, are oriented to the language and culture of the source language. In contrast, amplification is one technique oriented to the target language and culture. The following is the orientation of the translation technique:

Table 10. Orientation of translation techniques

Orient ation	Transl ation Techni ques	Total	Total	Percentag e
SL	Pure Borro wing Natura lized borro wing Literal transla tion Establi shed equival ence	38 106 79 17	240	98,77%
TL	Amplifi cation	3	3	1,23%

The table above shows that overall, source language-oriented translation techniques were used 240 times (98.77%), while the frequency of occurrence of target language-oriented translation techniques was three times (1.23%).

Translation Ideology

In the translation of terms in mechanical engineering in Schaum's Outlines of Theory and Problems of Heat Transfer, the use of terms tends to be dominated by the source language. This dominance can be proven by the dominant use of natural borrowing translation techniques to translate the terms

found. Ideally, a translation does not favor any one text. However, the translation of terms in mechanical engineering still adopts many terms from the source language, either directly or by adjusting the pronunciation of the source language. Therefore, the researcher concluded that the ideology used by the translator in translating Schaum's *Outlines of Theory and Problems of Heat Transfer* (Pitts & Sissom, Schaum's Outline of Theory and Problems of Heat Transfer, 1983) book into Indonesian was the ideology of foreignization.

Discussion

From the data obtained from Schaum's *Outlines of Theory and Problems of Heat Transfer*, there are three translation analyses: translation techniques, translation methods, and translation ideology. Translation techniques are divided into three variants, namely single technique, couplet technique, and triplet technique. The single most dominant technique translators use in translating Schaum's *Outlines of Theory and Problems of Heat Transfer* is the natural borrowing technique. Because many terms in English have yet to find many equivalents in Indonesian, translators tend to use borrowing techniques in translating terms in the field of mechanical engineering. Analysis of the data revealed that there needed to be more precise standards for pronunciation. However, it is possible that the phoneme *c* in the source language is changed to *k* in the target language. For example, the phoneme *c* in *thermodynamics*, *convection*, and *conduction* is changed to *k*, and the translation reads *termodinamika*, *konveksi*, and *konduksi*. The phoneme *θ* in the source language is changed to *t* in the target language. The phoneme *θ* in *thermodynamics* and *thermal* is changed to *t*, and the translation reads *termodinamika* and *termal*. The phoneme /*fən*/ in the source language is changed to /*si*/ in the target language. The phoneme /*fən*/ in *conduction*, *convection*, and *radiation* is changed to /*si*/, and the translation reads *konduksi*, *konveksi*, and *radiasi*.

The second dominant technique is the literal translation. This technique is used when the term has the same meaning as the term in the target language and has become a common term, so it is translated literally. Source data, in

the form of words such as *equilibrium*, *pressure*, and *units*, is translated into Indonesian into *kesetimbangan*, *tekanan*, and *satuan-satuan*. The same technique is also applied in translating source data into phrases. For example, *time rate* and *Newton's law of cooling* are translated into Indonesian to *laju waktu* and *Hukum Pendinginan Newton*. It is clear that the matching of the words that make up the phrases is closely related to the source language words, but the arrangement has been adjusted to the wording in the Indonesian phrases. In other words, English noun phrases with head + modifier or modifier + head or modifier + head + modifier are converted into Indonesian phrases with the construction of head + modifier. This method is taken to avoid distortion of meaning and to achieve acceptance of the translation. It is a fact that a noun phrase built from the exact two words' positions are different (Silalahi, 2009). The meaning of the phrase *laju waktu*, for example, is very different from the meaning of the phrase *waktu laju*.

As previously mentioned, the literal technique is the most common of the five singular techniques used, mainly when translating data sources into sentences. *These supplemental laws are based on the three fundamental heat transfer modes: conduction, convection, and radiation*. It is a passive meaningful statement sentence characterized by the use of *are based* verb. The translation is in Indonesian, namely *Hukum-hukum pelengkap ini didasarkan pada tiga mode fundamental dari perpindahan kalor, yaitu konduksi, konveksi, dan radiasi* is also in the form of a passive sentence. There are no changes or shifts except for the adjustment of the structure so that it does not conflict with the rules of the Indonesian language.

Couplet and triplet techniques were also used, although only a little data was found. Finally, from the results of research on translation techniques, a translation method was determined to be used to translate terms in this field of mechanical engineering. Couplet and triplet techniques were also used, although only a little data was found. Finally, from the results of research on translation techniques, a translation method was determined to be used to translate terms in this field of mechanical engineering. Thus, translators tend to apply

translation methods oriented to the source language. The translation methods in question are literal, semantic, and faithful translation methods. Related to the orientation used in the analysis of the translation method, it can be concluded that the translator uses foreignization ideology.

CONCLUSION

Translators perform translation techniques in the early stages of translation, one of which is the reconstruction or translation stage. Translators use translation techniques to achieve high-quality translation results at this stage. The primary ability of the translator to understand the grammar of both the source language and the target language is referred to as linguistic ability. Researchers analyzed 175 items of mechanical engineering terms. The 173 items were divided into three categories, namely 109 data with single translation techniques, 50 with multiple translation techniques, and 6 with triplet translation techniques. Five translation

techniques are used, including the single technique, the couplet, and the triplet technique. The five translation techniques are pure borrowing, natural borrowing, literal translation, established equivalence, and amplification. The source language-oriented translation technique was used 240 times (98.77%), while the frequency of occurrence of the target language-oriented translation technique was three times (1.23%). Thus, translators tend to apply translation methods oriented to the source language. The translation methods in question are literal, semantic, and faithful translation methods. Of the two translation ideologies of foreignization and domestication, the ideology of foreignization is more dominant. Thus, it can be concluded that the translator tends to adhere to the ideology of foreignization in the translation of Schaum's Outlines of Theory and Problems of Heat Transfer (Pitts & Sissom, Schaum's Outline of Theory and Problems of Heat Transfer, 1983) which is the source of the data for this study.

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