MEANING EQUIVALENCE IN *MICROBIOLOGY FOR ENVIRONMENTAL SCIENTISTS AND ENGINEERS* TEXT INTO *MIKROBIOLOGI UNTUK ILMUWAN DAN INSINYUR LINGKUNGAN: A Translation Analysis*

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ABSTRACT

The purpose of this research is to know the equivalence and readability on translation of 'Microbiology for Environmental Scientists and Engineers', which is translated into 'Mikrobiologi untuk Ilmuwan dan Insinyur Lingkungan'. This research uses a descriptive-qualitative method. The data source are the documents while and the data are 50 sentences taken from textbook "Microbiology for Environmental Scientists and Engineers" and its translation "Mikrobiologi Untuk Ilmuwan dan Insinyur Lingkungan" The technique of data collecting is the purposive-sampling technique. The finding of this research shows that from 50 translation data, there are 30 data or 60 % belong to the accurate translation and 20 data or 40 % are categorized as inaccurate translation. It means that the translator could translate well. This research is significant for developing linguistics theories applying in translation. It can also be valuable for enriching translation and discourse analysis references in line with translation studies.

Keywords: *equivalence, meaning, scientific book and translation*

1. INTRODUCTION

In recent years, the translation of Science and Technology textbooks in Indonesian is very important to do, especially from English into Indonesian. Basically, from year to year, the translation of science and technology text books from English into Indonesian is increasing. This is partly due to the Indonesian nation's lagging in the field of science and technology from Western or European nations, most of them are written in international languages, especially English.

Then, who should become the of science and technology books? Of course, the answer is anyone who is interested in doing so as long as they fulfill competencies such as following: 1) mastering the material to be translated, 2) mastering the foreign language (source language) that is translated, 3) mastering the target language well, and 4) mastering translation techniques. (Adjat Sakri, 1999: 1).

In translation activities, the translator must be able to convey the exact message or message contained in BSu to BSa by paying attention to the accuracy, clarity and reasonableness of the language. In other words, the translator must be able to re-express the message in Target Language correctly, both concerning the level of structure and the linkages of semantic aspects.

In order the transferring of knowledge and technology to be accurately understood in accordance with the Source Language message, the accuracy of the translation results is needed, which is not only about the accuracy of translating lingual units such as words, phrases, clauses and sentences but also discourse. Therefore, in translation activities, translators must pay attention to relationships, such as relationships between elements in clauses or clauses in cohesive texts or discourse units.

It is like in translating texts on science and technology textbooks, translators must be able to create linkages between elements in clauses or clauses in the text or unit of discourse so that the translation results remain cohesive in Target Language. The cohesive relationship between clauses in a discourse is often found and indeed it is very important role in creating

logical linkages of form and meaning both between elements in clauses and inter-clauses in the text or unit of discourse. Therefore, the analysis of markers of cohesion in a discourse is a very useful in analyzing translations. This is in line with the statement of Newmark (in Baker, 1995: 181) that states *The topic of cohesion ... has always appeared the most useful constituent of discourse analysis or text-linguistics, applicable to translation*."

The textbook of *Microbiology for Environmental Scientists and Engineers*, by Anthony F. Gaudy, Jr. and Elizabeth T. Gaudy which was translated by Ir.Inggrid W and Ir. Priyo Waspodo, M.Sc, with the title *'Mikrobiologi untuk Ilmuwan dan Insinyur Lingkungan'* is one of the types of translations of science and technology text books that is interesting to study, especially regarding the translation of meaning equivalence of the target language. This book is very useful especially for people who want to develop their knowledge and profession in the field of biological sciences. Regarding the field of translation, it is an interesting thing to do, because in this translation book the translator having background is not in line with a field of biology.

Some phenomena that appear in the book are worthy to be analyzed, for example the following example:

SL : *The energy is used for many purposes, such as movement, growth, and maintenance of vitality.*
TL : *Energi tersebut dipakai untuk berbagai keperluan seperti misalnya bergerak, tumbuh, dan pemeliharaan bagian-bagian yang penting.*

In this translation, there are five things that need to be studied, namely: First, the word *many* is translated into *a variety*, whereas the right equivalent is *many*. However, equivalence of meaning can be achieved, because both of them imply a concept that is similar, that is *lebih dari satu*, which for the relevant sentence is meaningful enough. Second, translators add word misalnya that are not found in the source language. This is done by the translator as contextual conditioning to clarify the purpose of the sentence. Third, the noun *movement* translates into *bergerak*. Here, the shift in the word class, from noun to verb appears. Fourth, the word *growth* translates into *tumbuh*. Here there is also a shift in the word class, which is from nouns to verbs. But the shift above does not cause a shift in the meaning of the sentence. Fifth, the noun *vitality* is translated into *bagian bagian yang penting*. Here there is a shift in meaning or modulation that changes the meaning quite a lot because the exact equivalent for noun *vitality* is *tenaga*. There are also exist the shifts in categorical forms or transpositions, namely from noun to noun phrase. However, when it is viewed from the essence, the translator has done the translation well. It means that even though there are many differences, overall the meaning or message can be transferred by the translator properly. The messages in source language are the same or not different from the messages in target language, however the use of *Bahasa Indonesia* in the target language was still weak. The sentence in the target language does not look natural, looks stiff and does not show communicative nature. Furthermore, if the sentence is associated with the target language rules that are good and true or more specifically drawn by the connection line with EYD, the sentence is very inappropriate. The sentence is very ineffective and confuses the reader in examining its contents. Thus. this translation is included in the classification of messages until but target language is less precise. The message has been delivered well. Meanwhile, target language is inaccurate, so there needs to be a revision or correction in accordance with the rules in the target language.

Regarding to the phenomenon of the importance of the accuracy of the translation, the researchers are interested in studying more about the translation of *Microbiology for Environmental Scientists and Engineers*, by Anthony F. Gaudy, Jr. and Elizabeth T. Gaudy translated by Inggrid W and Priyo Waspodo with the title '*Microbiology for Environmental Scientists and Engineers'*

This study aims at determining the accuracy of the meaning and readability of the target language in the translation of Microbiology for Environmental Scientists and Engineers, *'Microbiology for Environmental Scientists and Engineers*' conducted by Ingrid W and Priyo

Waspodo. Therefore the problem proposed in this study is the extent of the accuracy of the meaning of the target language in the translation of Microbiology for Environmental Scientists and Engineers, *'Microbiology for Environmental Scientists and Engineers*' conducted by Ingrid W and Priyo Waspodo?

Translation is a product of a translation activity, which is a process of transferring source language messages into target one. In transferring the message, the translator must pay attention to the equivalence of message conveyed in the target language because the main activity in the translation activity is to re-express the commensurate message that does not deviate from the source language message. Catford (Hariyanto, 2000: 13) states that the main problem in translation is how to find the equivalent message or meaning of translation in target language that does not deviate from the source language message. Hoed (2004: 3) states that:

> *... "True", "acceptable" and "good" translations are those that are in accordance with the tastes and expectations of the readers who want the translation text that is in accordance with the target language community culture. In essence, a translation must not be felt like a translation and as far as possible it should be part of the writing tradition in the target language.*

Translation is an attempt to find the equivalence of meaning between source language texts and target language texts (Machali, 2000: 112). The term equivalence of meaning needs to be considered because the meaning must be transferred from the source language text into the target language.

The concept of meaning is closely related to translation activities and even this concept cannot be separated from the field of translation. In other words, meaning plays the most important role in translation (Suryawinata, 2000: 21).

The meaning of a word is not only influenced by its position in the sentence but also by the field of science that uses the words (Nababan, 1999: 47). Meanings can be interpreted as something referred to by words or sentences. The meaning is called referential meaning. Larson (1984: 38-39) classifies meaning into three, namely: 1) referential meaning, 2) meaning of linguistic context, and 3) situational meaning. Nababan (1999: 48-51) distinguishes meaning into lexical meaning, grammatical meaning, contextual or situational meaning, textual meaning, and socio-cultural meaning.

In translation activities, the translator's main task is to find put the equivalence of meaning between the translated text and the translation. Machali (2000: xi) states that equivalence is the match between the content of source language text messages and the target language text; equivalence is the first thing the translator looks for when translating. In measuring equivalence, translators must use a comprehensive measure, namely changes that involve sentences, phrases, or words that must be seen in their higher functions.

In translating a paragraph or texts in the field of science and technology, translators must pay attention to inter-clausal relationships, which are often characterized by markers of cohesion, especially pronoun reference cohesion markers. Soejono (1988: 343) states that cohesion is a harmonious relationship between one element and another element in the discourse so that it creates a neat or coherent understanding. Sumarlam (2003: 23) argues that because language consists of form and meaning, inter-clausal relations in a text or unit discourse can be divided into two types, namely the relationship of forms called cohesion and meaning or semantic relations called coherence. Thus, unified discourse is a discourse that is seen in terms of the relationship of the form or structure of birth to be cohesive, and seen in terms of the relationship of meaning or inner structure is coherent. In line with this discussion, Santoso (2003: 64) states that "cohesion is used to refer to relevance form while coherence is used to refer to meaning relationships."

Halliday and Hasan (in Santoso, 2003: 64) states that "*cohesion is used to refer to both the link between form and meaning at once. This is because the form is a symbol that realizes its meaning*" Thus what is called cohesion is the connection of forms and at the same time the connection of meaning.

Regarding the translation of pronoun reference cohesion markers, the translator must understand the difference between the reference cohesion markers of source language and target language. This understanding is very necessary because there are often differences between the two. Halliday and Hasan (1976: 181) distinguish between types of referral cohesion to be: pronoun (persona) reference, demonstrative reference, and comparative reference. In English and Indonesian, the types of pronouns can refer to both humans and nouns or not humans which can mean both singular and plural. Pronoun referral cohesion markers can refer to nouns or plural third humans. The reference pronouns may refer to uncommon nouns are translated into them but by repeating nouns that are referred to or changed their syntax while the reference to the one that refers to the individual is commonly translated into them (Suryawinata & Sugeng, 2003: 80).

2. RESEARCH METHOD

Regarding to the problem of the study, namely identifying, analyzing and describing the equivalence of meaning of the target language, this research belonging to the type of descriptive qualitative research whose the implementation relies on humans (researchers) as instruments for collecting data. The field to be examined in this study is a book called *Microbiology for Environmental Scientists and Engineers*, which is translated into *Microbiology for Environmental Scientists and Engineers* by Ingrid W and Priyo Waspodo.

The research strategy used in the study is a case study. In particular, this research is called an embedded case study. The cases in this study are translations of command sentences. The researcher collects the data in the the form of sentences, then describes, analyzes, and classifies them according to the accuracy and inaccuracy of the translation. The data sources used in this study are documents. The document in this study is the *Microbiology for Environmental Scientists and Engineers book*, which is translated into *Microbiology for Environmental Scientists and Engineers*. In this study, researchers used a snippet technique.

Data collection techniques in this study are note-taking and interview methods. In the technique note, the researcher records, analyzes and compares existing data. In analyzing data, researchers used a comparative technique model, namely comparing the source language and target language by looking from four sides. The four sides referred to are 1) messages to good language, 2) messages to bad language, 3) messages not to good language and 4) messages not to bad language.

3. FINDING DISCUSSION

To produce an appropriate translation work, the translator must pay attention to the following three criteria, which are accurate, clear and natural. This is in line with Larson (1984: 485) that states *translation must be tested because the translator wants to ensure the accuracy, clarity and reasonableness*. Accurate means that the transfer of messages from source language text into target one is not added or reduced; clearly means that the translation results are easily understood by the reader; and naturally means the translation results are acceptable according to the standard grammar of target language. On the contrary, the inaccuracy of the translation means that the message of the translation is inaccurate, clear and natural according to the standard grammar of target language. In this study, the researcher used these three criteria to analyze whether the translation of the reference cohesion marker could be categorized as an appropriate translation or an incorrect translation. Examples of the analysis can be seen in the following:

No	SL	TL
MESE/P-1/002	*In order for this cyclic phenomenon to work, it was necessary that water both participate in the overall chemical reaction and act as a carrier of organic matter to the oceans.*	*Agar gejala siklus ini berlangsung, diperlukan air bagi reaksi kimia keseluruhan dan yang bertindak sebagai pembawa bahan organik ke lautan*

From the data above, it can be understood that the results of the translation as a whole can be said to be good because there is no shift in meaning so that source language messages can be conveyed in target language. There are three words in source language, both and participation are not translated into target language by the translator. The use of Indonesian by the translator has also been quite good and accurate. The target language used by translators is also more communicative, natural or not rigid and more effective. When it is viewed from EYD, the sentence is in accordance with the writing according to EYD or in accordance with the rules in *Bahasa Indonesia*. Thus, the translation for this data is included to the translation category of message has arrived well and the target language is also in accordance with EYD. Shorty, it can be said that accurate messages and good language.

No	SL	TL
MESE/P-1/003	*The overstressing of the organic carrying capacity of the earth's drainage system constituted the major reason for insertion of the technological subsystems discussed in Chap.2*	*Pembebanan yang melebihi kapasitas pembawa organik sistim drainase harus merupakan alasan utama bagi penyisipan teknologi subsistem yang telah dibahas pada Bab 2*

It is seen that the translator adds the word must *harus* in target language which is not contained in source language. But this does not affect the meaning of the sentence and the source language message is conveyed in target one. The meaning can be transferred well by the translator. This means that according to the theory of translation, because the essence or core of the message has been transferred properly, then the translation is classified as a good translation or in other words the message is well distracted.

The translator also uses the Indonesian well. The target language used by translators is also more communicative, natural or not rigid and more effective. When viewed from EYD, the sentence is in accordance with the writing according to EYD or in accordance with the rules in target language

Thus the translation for this data is included in the translation category whose message has arrived well and BSanya is also in accordance with EYD. Short word messages arrive and good language.

No	SL	TL
MESE/P-1/001	*In Chap. I it was evident that organic matter, its synthesis, its oxidation, and its eventual return to the biosphere as carbon dioxide and water, comprised one of the essential cyclic events permitting the human species and many others to exis.*	*Dalam bab I jelas bahwa bahan organik, sintesanya, oksidasinya, dan akhirnya kembalinya ke biosfir sebagai karbon dioksida dan air, merupakan satu dari siklus penting yang menyebabkan manusia dan makhluk lainnya bisa bertahan hidup.*

In the translation above, it can be seen that there is a categorical form (transposition) shift, namely from clause to word (adjective). It seems the translator does not divert the evident word which means literally bright light. Likewise the word comprised and permitting is not literally translated by the translator. Comprised which means consists of being translated as constituting and permitting which means allowing to be translated into cause. However, equivalence of meaning seems to be achieved and for the relevant sentence meaningfully it is quite appropriate.

Thus when it is viewed from the essence, the translator has done the translation well. This means that even though there are differences, overall the meaning or message can be

transferred by the translator properly. The messages in source language are the same or not different from the messages in target language.

Anyhown the use of *Bahasa Indonesia* in the target language is still weak. This is very evident in the use of clear words that should have been explained, so that the sentence of the target language is less readable, looks rather stiff and does not meet the rules of EYD. The target language sentence should be clear. It was explained in the organic matter, its synthesis, its oxidation, and finally its return to biosphere as carbon dioxide and water, is one of the important cycles that can cause humans and other creatures to survive. Thus this translation is included in the accurate message bust the *Bahasa Indonesia* is not good. The message has been delivered well. Meanwhile, target language is inaccurate, so there is a need to be minor a revision or correction in accordance with the rules in the target language rules

No	SL	TL
MESE/P-3/004	*Its role is even more important than the structural, insulating, or transporting function of most engineering materials.*	*Peranannya bahkan lebih penting daripada fungsi kerangka, penyekaan, atau transport dari kebanyakan bahan-bahan rekayasa.*

In the above translation, there are two things that need to be considered, namely: first, the word transport is translated as transport, although according to the English-Indonesian dictionary (Echlos and Shadily, 1976: 216) the word means transport. Translators seem want to do decentering, namely phonological translation. However, it seems that there is no urgency in using this technique in this context, because in target language the equivalent word is adequate without the risk of message damage.

Second, the noun phrase engineering materials is translated into engineering materials even though the more appropriate equivalent is technical materials. However, when it is viewed from the essence, the translator has done the translation well. This means that even though there are differences, overall the meaning or message can be transferred by the translator properly. The messages in source language are the same or not different from the messages in target language.

Thus, this translation is included in the group of accurate messages but bahasa Indonesia is less precise. The message has been delivered well. Meanwhile, the target language is inaccurate, so there needs to be a revision or correction in accordance with the rules in the Indonesian language.

No	SL	TL
MESE/P-2/001	It cannot be said that all organic matter is made by living organisms through natural or controlled life processes; indeed, the science of organic chemistry came into being only when Friedrich Wohler discovered in 1828 that urea could be made in the absence of living organisms.	Kita tidak bisa mengatakan bahwa semua bahan organik dibuat oleh organisme hidup secara alami atau proses-proses kehidupan terawasi; tentu saja, ilmu kimia organik menjadi berarti hanya ketika Friederich Wohler pada tahun 1828 menemukan bahwa urea dapat dibuat tanpa adanya organisme hidup.

In the translation above, the clause of *it cannot be said* cannot be translated into *kita tidak bisa mengatakan*. There is a categorical form shift (transposition), from passive sentences to active sentences. However, equivalence of meaning seems to be achieved because for the relevant sentence meaningfully it is quite appropriate. Furthermore the word *indeed* which should mean *sesungguhnya* translates into *tentu saja*. Likewise the phrase *came into being* translated into *menjadi berarti* when it should be transferred to *dimulai*.

So when it is viewed from the essence, the translator has done a bad translation. This means that there is a difference between the message delivered and the reality of the translation results. These differences cause a shift in meaning and the shift in meaning itself causes misappropriation of messages. Thus, the result of the translation of this datum fall into the category of incorrect translation or the message does not arrive correctly.

However, the target language used in the translation of this sentence is actually good. Even though the sentence is a long sentence it turns out that the translator is able to apply good use of target language even though the translation is wrong. In addition, the sentence in target language is also in accordance with the target language rules so that the reader is immediately able to understand what the translator has written. Unfortunately the contents of the translation are incorrect. Thus, the translation in this sentence belongs to the message category does not arrive but the language is quite good.

No	SL	TL
MESE/P-1/004	*Furthermore, the most important subsystems for purifying wastewaters were themselves biological and involved the use of organic matter in wastewater streams as a source of carbon energy for the growth of microorganisms.*	*Lebih lanjut, subsistim yang paling penting bagi penjernihan air limbah adalah secara biologi dan melibatkan pemakaian bahan-bahan organik dalam aliran air limbah sehingga suatu sumber energi dan karbon bagi pertumbuhan jasad-jasad renik.*

If it is analyzed in depth, it can be found that in the translation there are three things that need to be highlighted. First, the word *themselves* containing in source language is not translated into target language by the translator. Second, the word *as*, which means *sebagai* is also not translated by the translator. So here there is a modulation of the use of pressure or pitch to express meaning that pretty much changes meaning. Because both words have different meanings. *Sebagai* is not emphasizing cause and effect, while *sehingga* the element of cause and effect. Third, the noun phrase *carbon energy* is transferred to *energy* and *carbon*. So here there is a shift in form or transposition that is categorical, namely from the noun phrase to the word. This causes a shift in meaning or modulation that changes the meaning quite a lot. *Carbon energy* is a phrase which means that *carbon energy* is not composed of two substances, namely *energy* and *carbon*.

Thus when it is viewed from the essence, the translator has done a bad translation. This means that there is a difference between the message delivered and the reality of the translation. These differences cause a shift in meaning and the shift in meaning itself causes misappropriation of messages. So, the translation is not good or the message does not arrive correctly.

So this translation is included in the message that does not arrive and target language is not good. Message is not delivered properly. Meanwhile, the target language is not good enough so that it needs to be a revision or correction in accordance with the rules in Bahasa Indonesia.

NO	CATEGORY	TOTAL	PERCENTACE
1	accuare message and good target language	17	34 %
2	accuare message and not good target language	13	26 %
3	not accuare message and good target language	6	12 %
4	not accuare message and not good target language	14	28 %
Total		*50*	*100 %*

From the general description of the quality of the text *Microbiology for Environmental Scientists and Engineers* in accordance with the category of assessment of aspects of the message and language, it can be explained that the translation of the text with the title *Microbiology for Scientists and Environmental Engineers* includes fairly good translations. This is because of the four categories used as assessment parameters, the first category, accuare message and good target language has the highest amount of data and percentage, with the data amounting to 17 or 34%. Meanwhile, data for the second category, namely accuare message and not good target language as much as 13 data or 26%. Data for the message category is not up to 6 languages or 12% good language. While the amount of data for the last category, namely Not accuare message and not good target language, as many as 14 data or 28%.

NO	MESSAGE	TOTAL	PERCENTACE
1	Accurate	30	60 %
2	Not Accurate	20	40 %
Total		*50*	*100 %*

From the table about the quality of message transfer for the text *Microbiology for Environmental Scientists and Engineers*, it can be explained that out of 50 data available, the data states that the message has been delivered as well (accurate) as 30 data or 60%, while the data stating that the message was not delivered (not accurate) properly 20 data or 40%. From the exposure of the data it can be concluded that the translation of the text *Microbiology for Environmental Scientists and Engineers* is quite good.

4. CONCLUSION

Based on the results of the analysis above it can be concluded that the translation of the text with the title *Microbiology for Scientists and Environmental Engineers* includes a fairly good translation. This is because of the four categories used as assessment parameters, the first category, accuare message and good target language has the highest amount of data and percentage, with the data amounting to 17 or 34%. Meanwhile, data for the second category, namely accuare message and not good target language as much as 13 data or 26%. Data for the message category is not up to 6 languages or 12% good language. While the amount of data for the last category, namely Not accuare message and not good target language, as many as 14 data or 28%.

Besides that, judging from the quality of equivalence of meaning, from 50 existing data, the data states that the accurate message as much as 30 data or 60%, while the data that states that the imaccurate message is 20 data or 40%. Thus, the translation of the text *Microbiology for Environmental Scientists and Engineers* is quite good.

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