UDC 811.111'25
DOI https://doi.org/10.28925/2412-2491.2026.2618

ADEQUACY IN THE TRANSLATION OF ECONOMIC TERMINOLOGY: ADVANTAGES OF HUMAN TRANSLATION COMPARED TO MACHINE TRANSLATION

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The article examines the specific features of translating economic terminology and the problem of ensuring its adequacy. The translation of economic texts serves as an important means of interinstitutional communication, directly steering market behaviour and helping assure observance of international norms and standards. The importance of specialised translation of economic texts is confirmed by the practice of multilingual publication of documents by international organisations. Institutions such as the World Bank, the European Central Bank (ECB), the Organisation for Economic Co-operation and Development (OECD), and others provide access to their documents in multiple languages, making translation accuracy crucial.

Accordingly, consistency and accuracy in rendering economic terminology are essential, since ambiguous interpretation of terms or expressions in documentation may lead to misinterpretation of provisions, create legal gaps, or complicate the fulfilment of contractual obligations by the parties involved. In this context, the problem of evaluating the quality of economic terminology translation – particularly by comparisons between human translation and neural machine translation systems – gains special scientific and practical relevance.

The active implementation of machine translation technologies contributes to the optimisation of translation processes and the reduction of translation costs. The economic efficiency of automated solutions facilitates their broader adoption in modern workflows. Therefore, a comprehensive study of the performance parameters and capabilities of machine translation systems has attracted notable attention from both the academic community and the business sector.

The study analyses the terminological adequacy of translated economic vocabulary and provides quantitative calculations of translation errors. The results prove that the translation produced by a neural machine translation system contained approximately 43 errors (about 8.15% of the total), whereas the human translation contained only about 3 errors (about 0.56%). The results show that although neural machine translation can achieve a relatively high level of adequacy (approximately 91%), but this level still falls short of the requirements for translating specialised economic texts.

Keywords: *machine translation, human translation, specialised translation, translation adequacy, DeepL, economic translation, economic terminology.*

Рудов Є. С. Адекватність перекладу економічної термінології: переваги перекладу, виконаного людиною, порівняно з машинним перекладом

У статті розглянуто особливості перекладу економічної термінології та проблему забезпечення її адекватності. Переклад економічних текстів виступає важливим засобом міжінституційної комунікації, що безпосередньо впливає на функціонування ринку та слугує інструментом дотримання міжнародних норм і стандартів. Значущість галузевого перекладу економічних текстів підтверджується практикою багатомовних публікацій документів міжнародних організацій. Такі інституції, як Світовий банк, Європейський центральний банк (ЄЦБ), ОЕСР та інші, забезпечують доступність своїх документів для широкої аудиторії різними мовами, що робить перекладацьку точність у цих текстах принципово важливою.

Відповідно, послідовність і точність відтворення економічної термінології мають вирішальне значення, оскільки неоднозначне трактування термінів або фраз у документації може призвести до помилкового тлумачення положень, створити правові прогалини або ускладнити виконання договірних умов сторонами. У цьому контексті особливої наукової та практичної актуальності набуває проблема оцінки якості перекладу економічної термінології, зокрема у зіставленні перекладів, виконаних людиною та системами нейронного машинного перекладу.

Активне впровадження технологій машинного перекладу сприяє оптимізації перекладацьких процесів і зниженню витрат на переклад. Економічна ефективність автоматизованих рішень зумовлює їх дедалі ширше використання у сучасних робочих процесах. У зв'язку з цим комплексне дослідження експлуатаційних параметрів і можливостей машинного перекладу привертає увагу як наукове середовище, так і представників бізнесу.

У межах дослідження здійснено аналіз термінологічної адекватності перекладу економічної лексики та проведено кількісні підрахунки перекладацьких помилок. Результати показали, що у перекладі, виконаному системою нейронного машинного перекладу, зафіксовано приблизно 43 помилки (близько 8,15 % від загальної кількості), тоді як у перекладі, виконаному людиною, виявлено лише близько 3 помилок (приблизно 0,56 %). У висновках наголошується, що переклад економічної термінології системами нейронного машинного перекладу може демонструвати відносно високий рівень адекватності (приблизно 91 %), однак цей показник все ще не відповідає вимогам до перекладу спеціалізованих галузевих текстів.

***Ключові слова**: машинний переклад, людський переклад, галузевий переклад, адекватність перекладу, DeepL, економічний переклад, економічна термінологія.*

Introduction

Economic translation constitutes a key instrument within the global economy, facilitating the international exchange of information related to economic, financial, market, regulatory, and monetary policy domains. The significance of such texts is directly linked to the level of responsibility required for their translation, as economic communication has a direct impact on institutional decision-making, regulatory policy and the behaviour of market participants. The medical, legal, technical and economic fields are characterised by a high level of risk due to the high concentration of terminology, regulatory constraints and the critical importance of accuracy. Terminological inaccuracies or semantic shifts can

have serious consequences. They can lead to misreadings, for example, disrupting patients' recovery, unfavourable court rulings, or financial shocks and instability in the financial system.

Theoretical background

The spread and evolution of MT (hereinafter MT) systems, particularly neural machine translation (hereinafter – NMT) and systems based on large language models, have opened up both new opportunities and significant risks for the translation industry. Software developers have responded to market demand by focusing on translation quality. In turn, ensuring terminological consistency could be a top priority. The further development of NMT has called into question the economic viability of traditional human translation, as the advantages in terms of time efficiency and cost reduction for individuals and organisations become obvious. Consequently, the choice between machine and human translation increasingly boils down to a comparison of their functional capabilities and limitations.

In this context, Bojar et al.'s research confirms that NMT has become the most promising development of recent years; however, the study's conclusions also note that *human post-editing remains the gold standard*, as no automated system at that time could match the quality of translation achieved by experts in the field (Bojar et.al., 2016, p.131-198).

Koehn and Knowles point out that, despite significant progress in NMT, the system still faces several challenges, including a decline in translation quality outside the domain and under resource-constrained conditions. A common feature of these problems is the instability of NMT systems when conditions differ from those during training. Such difficulties may be caused by both the limited volume of training data and the atypical characteristics of the input texts (Koehn & Knowles, 2017, p. 28–37).

The widespread adoption and increasing performance of NMT systems in specialised translation are largely due to their ability to generate grammatically correct, stylistically fluent text. Such translations are often perceived by the reader as 'natural', yet they do not always fully meet the communicative expectations of the target audience or the requirements for the accurate reproduction of specialised terminology. In this regard, for a systematic analysis of potential translation deviations, it is advisable first to define the concept of 'terminology'. According to Yu. Sager's definition, terminology is a science and field of activity concerned

with the collection, description, processing and presentation of terms – lexical units functioning in specialised fields of one or more languages (Sager, 1996, p. 2). In view of this, economic terminology can be defined as a set of terms that reflect the conceptual system of the economic sphere in cross-linguistic communication. It is precisely these terms that convey key economic concepts, and any distortion in translation alters the interpretation of economic processes.

A review of the academic literature indicates that specialised texts, which include economic texts, are characterised by a high degree of structure and standardisation. In this context, economic language serves to clearly define terms and explain the principles governing the economic system. For an adequate translation, terminological consistency must be maintained, as errors in economic translation can lead to financial losses for individuals or companies. The use of machine translation, primarily NMT, offers individuals and companies the opportunity to obtain translations (if not free of charge, then at a lower cost than those by professional translators). Thus, previous studies show that modern NMT systems achieve a high level of formal text quality, but the problem of terminological accuracy and semantic adequacy remains relevant. This necessitates a comparative analysis of human and machine translations of economic terminology, using clear quality assessment criteria, which is the focus of this study.

The aim of this study is to determine the level of terminological adequacy in NMT of economic texts by comparing the results of machine and human translation.

The significance of this study lies in the increasing demand for precise, efficient, and terminologically accurate translation, particularly in the economic domain, where modern neural machine translation technologies offer only a partial solution.

Economic translation challenges have been the subject of scholarly analysis in the works of L. Biel and V. Sosoni (Biel & Sosoni, 2017), S. Weber and V. Ginsburg (Weber & Ginsburgh, 2016), as well as S. Akpaca (Akpaca, 2023). The issue of machine translation has been addressed by O. Bojar, R. Chatterjee, C. Federmann, I. Graham, B. Haddow, and M. Gutzk (Bojar et al., 2016), and P. Koehn and R. Knowles (Koehn & Knowles, 2017). The specifics of translating economic terminology are examined in a study by E. Museanu (Museanu, 2023).

The object of this study is economic texts translated by human or machine translation. The study centres on the terminological accuracy of translations produced by NMT systems.

The research material included the official English-language text, its authorised Ukrainian translation, and a machine-generated Ukrainian translation of the English source produced using the Pro version of DeepL. The Ukrainian version of the Report is presented as an official translation, with the translator explicitly indicated in the publication (O. Kryzhanivskyi). No evidence of the use of MT in its production is provided; therefore, it is treated in this research as a human translation. The analysis was based on the Organisation for Economic Co-operation and Development (OECD) Ukraine Economic Assessment (2007).

Methodological notes

The research methodology is based on a comparative analysis of translations of economic terminology produced by both humans and a machine translation system. The study adopts the following research methods: sampling, contrastive, comparative, and descriptive methods, as well as contextual analysis, semantic, lexical and translation analyses.

The empirical basis of the study consists of 527 units of economic terminology. During the selection and processing of the empirical material, each term was analysed within the relevant context of its usage. Contextual analysis made it possible to avoid an isolated examination of lexical units and to take into account the specific nature of economic discourse.

Since evaluating the selected terminological units is impossible without a deep understanding of their functioning within the text, it is necessary to apply relevant translation studies categories. In view of the arguments presented, it is methodologically justified to proceed to a theoretical examination of the basic parameters of translation quality.

Distinguishing between the concepts of equivalence and adequacy is essential for assessing the quality of economic terminology translation, particularly when comparing human translations with those produced by machine translation systems.

Equivalence is defined as the correspondence between individual meanings of a word, converted to its basic form (lemmatised), and its equivalents in the target language (Kromann, Riiber, and Rosbach, 1991).

Adequacy of translation is defined more broadly and involves reproducing the content and form of the source text using the target language's tools. An adequate

translation is defined by its ability to preserve the meaning of the source text without distortion while ensuring both semantic and pragmatic equivalence (Yablochnikova, 2019). In economic texts, adequacy is often more important than formal equivalence, as terms operate within established discursive and conceptual frameworks.

In order to define and distinguish adequacy and equivalence, it is necessary to define the term ‘economic texts’, which is essential for establishing clear criteria for assessing adequacy. A clear definition of the nature of these texts allows us to demonstrate, with sound reasoning, why MTs typically lack the background contextual comprehension required to reproduce terminology correctly, which is the main advantage of a human translator. Akbarova notes that an economic text functions as a specialised form of professional discourse, with the conceptual purpose of recording, preserving, and conveying sector-specific knowledge. Accordingly, such texts accumulate the verbalised results of economic discussions and are characterised by high information density, as well as the representation of predictive models, which accounts for the complexity of their logical and argumentative structure (Akbarova, 2024, p. 105). Thus, economic texts are a type of specialised text designed to accumulate and convey the results of economic research and discussions in verbal form.

The assessment of translation quality was based on expert evaluation of terminological adequacy. A translation was considered inadequate if it: (1) distorted the conceptual meaning of the source term, (2) failed to correspond to established usage in Ukrainian economic discourse, or (3) resulted in a non-normative or unnatural text in the given context.

The evaluation relied on the combined approach, i.e. the use of specialised economic dictionaries, relevant official Ukrainian publications, and parallel texts produced by international and national institutions. In cases where multiple variants are attested in usage, preference was given to contextually appropriate and established terminology.

It is worth mentioning that the distinction between "correct" and "incorrect" terminology is not always absolute, because different variants may coexist in Ukrainian economic discourse. In such cases, the analysis emphasises contextual appropriateness and terminological consistency rather than prescriptive correctness alone.

Results and Discussion

Research involved a comparative analysis to assess the accuracy of translations of economic terminology produced by an NMT system and a human translator. The research material covered 527 economic terms and terminological phrases. It was based on the OECD Economic Survey: Ukraine, 2007, published in English (OECD Economic Surveys, 2007) and its official Ukrainian translation (OECD, 2007).

The corpus selected for analysis is well-suited to the aims of the study, as it contains a substantial amount of economic terminology and consists of sector-specific texts published by an international organisation.

The study compares the English source text (column ST) with the official Ukrainian translation (column TT) and the machine translation produced by DeepL (Pro) (column MT). Thirty-three terminological units were selected from the overall corpus and subjected to a more detailed analysis.

Table 1. Comparative analysis of errors in specialised economic terminology (selected examples)

Source text (ST)	**Target text (TT)**	**Machine translation Deepl (MT)**
Capital transfers	Трансферти капіталу	Капітальні трансферти
Catch-up growth	Зростання навздогін	Наздоганяюче зростання / Зростання «наздоганяння»
Command GDP	Наявний ВВП / Реально наявний ВВП	Командний ВВП
Comparative disadvantages	Порівняльні вади / Явні порівняльні вади (ЯПВ)	Порівняльні недоліки
Cyclically adjusted balance	Циклічно відкориговане сальдо / Сальдо, відкориговане на цикл	Циклічно скоригований баланс
Exchange-rate anchor	Наріжний камінь (монетарної політики) (стосовно прив'язки курсу)	Номінальний анкер (стосовно прив'язки курсу)
Fixed investment	Інвестиції в основний капітал / Інвестиції в основні засоби	Фіксовані інвестиції
General government	Загальний державний (наприклад, «загальний державний бюджет»)	Загальний уряд
Gini coefficient	Індекс споживання Джіні	Коефіцієнт Джині
Import bill	Стаття імпорту	Імпортний рахунок
Imports of capital goods	Імпорт засобів виробництва	Імпорт капітальних товарів
Input-price shock	Шокове зростання цін на фактори виробництва	Шок цін на сировину

Intergovernmental fiscal relations	Міжвідомчі бюджетні стосунки	Міждержавні фіскальні відносини
Market disciplines	Обмеження чи стимули ринку	Ринкові дисципліни
Mirror data	«Дзеркальні» дані	Дані торговельних партнерів
Monetary pressures	Інфляційний тиск	Монетарний тиск
Monetary regime	Грошовий режим	Монетарна політика
Monetary stance	Характер (напрям) монетарної політики	Монетарна політика
Monetary targets	Планові значення грошових агрегатів	Цільові показники грошових агрегатів
Nominal anchor	Номінальна прив'язка	Номінальний анкер/прив'язка
PAYG (Pay-As-You-Go) system	Солідарна система	Система PAYG
Pro-cyclical monetary policy	Монетарна політика, що діє в тому самому напрямку, що й економічний цикл	Проциклічна монетарна політика
Quasi-fiscal deficit	Квазі-бюджетний дефіцит	Квазіфіскальний дефіцит
Recession	Спад/криза	Рецесія
Rent-seeking	Гонитва за рентою	Рентоорієнтована поведінка / Отримання ренти
Rigidities (labour market)	Негнучкість... на ринку праці	Жорсткість... на ринку праці
Spillover effects	Перетікання (досвіду / ноу-хау)	Ефекти переливу (досвіду / ноу-хау)
Technology frontier	Технологічні рубежі	Технологічний фронт
Transaction costs	Транзакційні витрати	Трансакційні витрати
Wholesale / Wholesale trade	Гуртова торгівля	Оптова торгівля
Wholesale power market	Оптовий ринок електроенергії	Оптовий ринок електроенергії
Capital transfers	Трансферти капіталу	Капітальні трансферти
Catch-up growth	Зростання навздогін	Наздоганяюче зростання / Зростання «наздоганяння»

One of the most common mistakes made by NMTs is literalism and insufficient adaptation to the target language's norms. In many cases, a translation done by a human translator provides an established terminological equivalent. NMTs typically employ a strategy of directly copying English sentence patterns, which may not correspond to the norms of Ukrainian economic language.

Thus, the term "*capital transfers"* has been translated by the NMT as «капітальні трансферти», which follows the English model of adjective + noun. However, the official translation uses the construction «*трансферти капіталу*», based on the noun + noun in the genitive case model, which is traditional for the Ukrainian terminological system.

At the same time, it should be noted that the standard terminology set out in documents issued by the Ministry of Finance of Ukraine also uses the term ‘capital transfers’ (Ministerstvo finansiv Ukrainy, 2012, p. 3). This indicates that, in contemporary economic discourse, different structural models of the term coexist, complicating the unambiguous assessment of translation choices.

A similar issue arises in translating the term' *catch-up growth'*. NMT offers the variant *«наздоганяюче зростання»*, which relies on the use of a participle in active voice–a construction less typical of standard Ukrainian academic language. In contrast, the official translation uses the variant *«зростання навздогін»*, which is more appropriately stylistically and consistent with the terminological norms of Ukrainian economic language.

It is necessary to note that the use of the construction *«зростання навздогін»* demonstrates the translator’s desire to adapt the term to the linguistic and stylistic conventions of the target language; however, the NMT renders the structure of the source language more literally.

In the case of the term *Fixed investment*, the Ukrainian term «фіксовані інвестиції» (NMT) is a lexical-semantic calque. The TT employs the variant «Інвестиції в основні засоби/ Інвестиції в основний капітал», which accurately conveys the meaning of the ST.

In terms of translation *Cyclically adjusted balance*–Циклічно скоригований баланс (NMT) is an adequate translation; however, it is used in TT in more precise terms – «Сальдо, відкориговане на цикл/*Циклічно відкориговане сальдо*».

The analysis of translation strategies used in machine and human translation forms a separate category of observations.

In the case of the term " *market disciplines "*, the variant «*ринкові дисципліни*» proposed by the NMT demonstrates the limitations of a literal translation strategy. In contrast, the official translation uses the variant «*обмеження чи стимули ринку*», which conveys the meaning of the original by employing a descriptive translation strategy.

This translation better conveys the term's functional and semantic meaning in an economic context, whereas a literal rendering yields a formal although semantically inaccurate result.

A similar problem is observed in the translation of *Exchange-rate anchor*– номінальний анкер (regarding exchange rate pegging) (NMT) is a literal translation that does not convey the meaning given in the English text. The TT uses

the construction *«наріжний камінь»*, the result of a descriptive translation strategy appropriately chosen to convey the meaning of the ST.

The translation used in TT is the construction *«наріжний камінь»*, which is the result of applying a descriptive translation strategy appropriate for conveying the semantics of the ST term. Critical discrepancies develop from semantic and literal interpretations, where the NMT is unable to discern the term's correct meaning in context, leading to translation errors.

For instance, the English term Command GDP – Командний ВВП (NMT) is an example of a translator's false friend and literal translation. In an economic context, GDP (GDP at command) reflects the purchasing power of the economy. NMT misinterprets the word *command*, associating it with the lexeme «команда», which leads to an incorrect rendering of the term's meaning. In contrast, the TT uses the variants «*наявний ВВП*» or «*реально наявний ВВП*», which adequately convey the meaning of this macroeconomic indicator. At the same time, whilst in the case of *Command GDP,* the NMT translated the term using a literal approach, when analysing other economic concepts, human translation may be prone to undesirable semantic reduction.

Quasi-fiscal deficit – Квазіфіскальний дефіцит (NMT) – Квазі-бюджетний дефіцит (TT). The meaning of this term lies in the losses or liabilities of the public sector that do not appear in the budget but still have a fiscal effect. This indicates that the focus is not on the budget as such, but on the phenomenon's fiscal nature.

The translation suggested by the human translator, in this case, demonstrates a semantic reduction of the term. In contrast, the version produced by the MT system more correctly captures the meaning of the source term and can therefore be considered more appropriate. At the same time, instances of machine translation being more adequate are rather rare, as evidenced by the study's quantitative results. Among the 527 economic terms and phrases analysed, 46 may have been problematic in terms of translation adequacy. According to the results of the quantitative analysis, of the 46 translation errors identified, 43 (≈93.47%) occurred in the translation produced by the MT system, whilst 3 cases (≈6.53%) were found in the human translation. At the same time, the proportion of errors in the human translation out of the total number of terminological units analysed amounts to only ≈0.56%, which indicates a higher level of terminological accuracy in human translation.

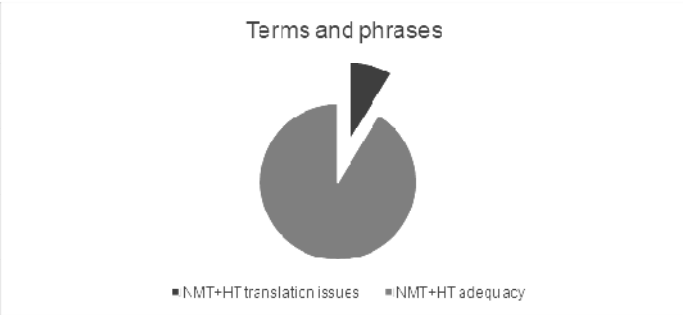

Figure 1. Terms and phrases

Conclusions and perspectives

A human translation is notable for its high level of consistency in the use of established Ukrainian economic terminology, a deep understanding of the context, and the varied application of translation strategies. In contrast, NMT tends towards calquing and literalism. Depending on the context, this can lead to the emergence of stylistically incorrect but comprehensible equivalents, or to serious distortions of meaning.

The quantitative analysis involved counting problematic units and determining their proportion in the corpus. The main evaluation criteria were terminological adequacy, translation consistency, and conformity with Ukrainian economic discourse. This analysis showed that problems related to terminological adequacy and translation consistency of NMT accounted for ~93.47% of the total number of recorded instances, whereas human translation accounted for only ~6.53%. The results confirm the advantage of human translation for economic terminology and highlight the limitations of MT in reproducing sector-specific meanings without in-depth semantic and pragmatic analysis. Prospects for further research lie in expanding the analysis to include the pragmatic and stylistic parameters of translation, as well as in a comprehensive study of the quality of translations produced by AI systems. A further area of investigation involves the formulation of practical recommendations for the effective use of AI tools in translation practice.

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The author declares no competing interests.

Publisher: Borys Grinchenko Kyiv Metropolitan University, Kyiv, Ukraine

Publishing history: Received 25.03.2026 ; Accepted 26.04.2026; Published 30.05.2026