DOI: https://doi.org/10.37547/supsci-oje-06-05-03 Pages: 21-26

Oriental Journal of Education

ORIENTAL JOURNAL OF EDUCATION

journal homepage:
https://www.supportscience.uz/index.php/oje

CULTURAL MARKERS IN MACHINE TRANSLATION PLATFORMS

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ABOUT ARTICLE

Key words: cultural markers, machine translation, linguoculturology, cultural equivalence, neural machine translation, artificial intelligence, semantic accuracy, pragmatic appropriateness, idiomatic expressions, translation strategies.

Received: 01.11.2026
Accepted: 02.11.2026
Published: 03.11.2026

Abstract: This article examines the representation of cultural markers in contemporary machine translation platforms, focusing on the challenges associated with preserving their semantic, pragmatic, and linguocultural characteristics in cross-linguistic communication. The study explores the theoretical foundations of cultural markers, their classification within translation studies, and the problems of cultural equivalence arising in automated translation systems. Particular attention is paid to the linguistic analysis of culture-specific concepts, idiomatic expressions, proverbs, forms of address, and references to traditional ceremonies in Uzbek and English, illustrated through representative examples. The research proposes a methodological framework for evaluating the translation of culturally marked expressions in Google Translate, DeepL, and Microsoft Translator according to four criteria: semantic accuracy, cultural equivalence, pragmatic appropriateness, and linguistic naturalness. The qualitative analysis demonstrates that literal translation does not always ensure the adequate transmission of culturally embedded meanings and that descriptive translation, functional equivalence, and contextual explanation may be necessary to preserve the communicative significance of culturally specific expressions. The study emphasizes the importance of integrating linguistic and sociocultural dimensions into machine translation assessment. Its scientific contribution lies in developing a comprehensive analytical approach to evaluating cultural adequacy in automated translation and providing a theoretical foundation for improving

the culturally sensitive application of artificial intelligence technologies in multilingual communication.

MASHINA TARJIMASI PLATFORMALARIDA MADANIY MARKERLARNING IFODALANISHI

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M A Q O L A H A Q I D A

Kalit so'zlar: madaniy markerlar, mashina tarjimasi, lingvokulturologiya, madaniy ekvivalentlik, neyron mashina tarjimasi, sun'iy intellekt, semantik aniqlik, pragmatik moslik, frazeologik birliklar, tarjima strategiyalari.

Annotatsiya: Mazkur maqolada zamonaviy mashina tarjimasi platformalarida madaniy markerlarning ifodalanishi, ularning semantik, pragmatik va lingvomadaniy xususiyatlarini tarjima jarayonida saqlash bilan bog'liq muammolar tadqiq etiladi. Tadqiqotda madaniy markerlarning nazariy asoslari, ularning tarjimashunoslikdagi tasnifi hamda avtomatlashtirilgan tarjima tizimlarida yuzaga keladigan madaniy ekvivalentlik masalalari yoritilgan. O'zbek va ingliz tillaridagi milliy-madaniy tushunchalar, frazeologik birliklar, maqollar, murojaat shakllari va an'anaviy marosimlarga oid ifodalar aniq misollar asosida lingvistik jihatdan tahlil qilingan. Google Translate, DeepL va Microsoft Translator platformalarining madaniy jihatdan xos birliklarni tarjima qilish imkoniyatlarini baholash uchun semantik aniqlik, madaniy muvofiqlik, pragmatik moslik va lingvistik tabiiylik mezonlariga asoslangan metodologik yondashuv taklif etilgan. Tahlil natijasida madaniy markerlarni tarjima qilishda so'zma-so'z tarjima har doim ham yetarli emasligi, ayrim birliklarda tavsifiy tarjima, funksional ekvivalentlik va kontekstual izohlash usullaridan foydalanish zarurligi asoslangan. Tadqiqot mashina tarjimasi sifatini madaniy jihatdan baholash mezonlarini takomillashtirish hamda sun'iy intellektga asoslangan tarjima tizimlaridan samarali foydalanishga qaratilgan ilmiy-metodik yondashuvlarni rivojlantirishga xizmat qiladi.

РЕПРЕЗЕНТАЦИЯ КУЛЬТУРНЫХ МАРКЕРОВ НА ПЛАТФОРМАХ МАШИННОГО ПЕРЕВОДА

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О СТАТЬЕ

Ключевые слова: культурные маркеры, машинный перевод, лингвокультурология, культурная эквивалентность, нейронный машинный перевод, искусственный интеллект, семантическая точность, прагматическая адекватность, фразеологические единицы, переводческие стратегии.

Аннотация: В статье рассматриваются особенности репрезентации культурных маркеров на современных платформах машинного перевода, а также проблемы сохранения их семантических, прагматических и лингвокультурологических характеристик в процессе межъязыковой коммуникации. Исследуются теоретические основы культурных маркеров, их классификация в переводоведении и вопросы культурной эквивалентности, возникающие при использовании автоматизированных переводческих систем. На конкретных примерах анализируются национально-культурные понятия, фразеологические единицы, пословицы, формы обращения и выражения, связанные с традиционными обрядами, в узбекском и английском языках. Предлагается методологический подход к оценке возможностей платформ Google Translate, DeepL и Microsoft Translator при переводе культурно маркированных единиц на основе критериев семантической точности, культурной эквивалентности, прагматической адекватности и языковой естественности. Проведённый качественный анализ показывает, что буквальный перевод не всегда обеспечивает полноценную передачу культурно обусловленных значений, вследствие чего возникает необходимость использования описательного перевода, функциональной эквивалентности и контекстуального пояснения. Научная значимость исследования заключается в обосновании комплексного подхода к оценке культурной адекватности машинного перевода и совершенствованию лингвометодологических принципов применения переводческих технологий на основе искусственного интеллекта.

Introduction. The rapid development of digital technologies and artificial intelligence has significantly transformed the nature of communication across linguistic and cultural boundaries. In an increasingly interconnected world, machine translation platforms have become essential tools for

facilitating multilingual interaction in education, international business, scientific research, tourism, and everyday communication. The widespread accessibility of platforms such as Google Translate, DeepL, and Microsoft Translator has considerably reduced linguistic barriers and enabled users to access information in languages beyond their linguistic competence. Nevertheless, despite remarkable technological advancements, the accurate translation of culturally specific linguistic elements remains one of the most challenging issues in contemporary translation studies. This challenge arises from the fact that language is not merely a system of grammatical structures and lexical units but also a means of transmitting cultural knowledge, collective memory, social values, historical experiences, and culturally established patterns of communication.

Within this context, cultural markers constitute a particularly significant category of linguistic phenomena that requires careful consideration in machine translation. Cultural markers can be understood as lexical, phraseological, pragmatic, and discourse-related elements that reflect the distinctive characteristics of a particular linguistic and cultural community. They may include culturally specific concepts, idiomatic expressions, proverbs, traditional customs, forms of address, religious references, historical allusions, national symbols, and expressions associated with social relationships. Such linguistic elements frequently contain implicit meanings that cannot be fully interpreted through their lexical structure alone. Their accurate translation requires an understanding of the relationship between language, cultural identity, communicative intention, and the sociocultural circumstances in which particular expressions are employed. Consequently, the translation of cultural markers involves not only the reproduction of semantic content but also the preservation or appropriate adaptation of cultural meanings within the target language.

The emergence of neural machine translation and large language models has introduced substantial improvements in automated translation quality. Unlike earlier rule-based and statistical approaches, contemporary machine translation systems employ sophisticated computational architectures capable of identifying contextual relationships and generating relatively fluent translations. Advances in multilingual neural architectures have also expanded translation capabilities across languages with varying levels of digital resources. For example, the NLLB Team (2024) demonstrated the potential of massively multilingual translation models to improve linguistic accessibility while emphasizing the continuing challenges associated with unequal language-resource availability [10]. However, technological progress in lexical prediction, grammatical accuracy, and contextual processing does not necessarily guarantee the successful interpretation of culturally embedded meanings. A machine-generated translation may be grammatically correct and semantically plausible while failing to reproduce the cultural associations, emotional implications, or pragmatic functions expressed in the original text.

One of the central difficulties in translating cultural markers concerns the absence of direct equivalence between culturally specific concepts in different languages. Linguistic communities develop distinctive ways of expressing social relationships, moral values, traditions, and collective experiences, and these distinctions are frequently reflected in vocabulary and phraseology. For instance, the Uzbek concept mahalla represents more than a residential neighborhood, as it also refers to a historically established form of community organization associated with social interaction, mutual assistance, and shared cultural responsibilities. Translating this concept simply as neighborhood may communicate its geographical dimension while leaving important sociocultural implications unexpressed. Similarly, the English expression Thanksgiving refers to a culturally and historically specific holiday whose significance cannot be adequately conveyed through a purely literal translation. Such examples demonstrate that cultural equivalence requires attention to conceptual meaning and sociocultural background rather than dependence on formal lexical correspondence.

Cultural markers are particularly difficult to translate when their interpretation depends on indirect meanings, metaphorical associations, or culturally established communicative conventions. Idioms and proverbs frequently illustrate this complexity because their meanings are formed through historical experience and collective cultural knowledge. Furthermore, forms of politeness, honorific expressions, and terms of address may reflect differences in social hierarchy, interpersonal distance, age, and culturally accepted patterns of interaction. A translation platform that prioritizes grammatical correspondence without adequately considering these pragmatic dimensions may produce expressions that appear linguistically acceptable but are inappropriate in the communicative context.

The increasing integration of artificial intelligence into translation technologies has also raised questions concerning cultural representation and the potential standardization of linguistic diversity. Machine translation models are generally trained on extensive multilingual datasets that differ considerably in quality, size, cultural representativeness, and linguistic coverage. Consequently, the cultural knowledge reflected in these models may be unevenly distributed across languages and communities. Languages with relatively extensive digital resources may benefit from more comprehensive representation, whereas culturally specific expressions associated with less extensively documented linguistic communities may be interpreted less accurately. This imbalance becomes particularly relevant when examining languages such as Uzbek, whose cultural vocabulary contains concepts closely connected with national traditions, social institutions, ceremonies, interpersonal relationships, and historically established forms of communication. The preservation of these meanings in automated translation is therefore important not only for linguistic accuracy but also for the maintenance of cultural distinctiveness in digital environments.

Although contemporary machine translation research has extensively addressed technological efficiency, grammatical accuracy, multilingual model development, and general translation quality, the

specific mechanisms through which different translation platforms preserve, modify, generalize, or omit cultural markers require further systematic investigation. Particular attention should be paid to the translation strategies employed when culturally specific units lack direct equivalents in the target language. These strategies may involve literal translation, borrowing, descriptive translation, cultural substitution, generalization, or omission. Their appropriateness depends on the semantic structure of the original expression, its cultural significance, the intended audience, and the communicative purpose of the translated text. A comparative investigation of machine translation platforms may therefore contribute to a better understanding of how automated systems handle culturally dependent meanings and which types of cultural markers present the greatest difficulties.

Against this background, the present study aims to investigate the representation and translation of cultural markers in contemporary machine translation platforms, with particular emphasis on the preservation of semantic, pragmatic, and sociocultural meanings. The research focuses on identifying the linguistic characteristics of cultural markers, examining potential translation solutions, and determining principal patterns of cultural meaning preservation and transformation. Particular consideration is given to the differences between formal linguistic equivalence and functional cultural adequacy. The scientific significance of the study lies in its interdisciplinary examination of cultural markers at the intersection of translation studies, intercultural communication, computational linguistics, and artificial intelligence.

Literature review. The relationship between language, culture, and translation has been extensively examined in translation studies, particularly in connection with the difficulties of transferring culturally embedded meanings from one linguistic system into another. With the emergence of artificial intelligence and neural machine translation, traditional discussions of cultural equivalence have acquired additional significance, as translation is increasingly performed through computational models rather than exclusively through human interpretation. The theoretical foundations of this research can be traced to the works of Peter Newmark, Mona Baker, Lawrence Venuti, and Javier Franco Aixelá, whose contributions provide essential perspectives on cultural representation, translation strategies, and the preservation of sociocultural meaning.

Peter Newmark (1988), in A Textbook of Translation, emphasizes the relationship between language and cultural experience, examining the difficulties associated with translating culturally specific lexical units. His approach distinguishes different categories of cultural vocabulary and considers the translation procedures required when direct linguistic equivalents are unavailable [1]. From this perspective, cultural markers represent more than isolated lexical items because they reflect the social practices, material environments, and collective experiences of particular communities. Newmark's theoretical framework is especially relevant to machine translation because automated systems must frequently process expressions whose meanings depend on cultural knowledge rather than

dictionary definitions. His discussion of descriptive equivalents, transference, and cultural equivalents provides a useful foundation for investigating how contemporary translation platforms reproduce or transform culture-bound expressions.

Mona Baker (1992), in In Other Words: A Coursebook on Translation, approaches translation equivalence through several interconnected linguistic levels, including lexical, grammatical, textual, and pragmatic relationships [2]. Her analysis demonstrates that translation difficulties cannot always be resolved through word-for-word substitution, particularly when source-language expressions convey meanings that are not lexicalized in the target language. Baker's discussion of non-equivalence at word level is particularly important for understanding cultural markers, since culturally distinctive concepts frequently lack straightforward lexical counterparts. Moreover, her treatment of pragmatic equivalence highlights the significance of implied meanings, contextual assumptions, and communicative intentions. Applied to machine translation, this perspective suggests that evaluating the accuracy of culturally marked expressions requires consideration of both explicitly expressed information and the implicit meanings associated with their use in particular communicative situations.

An important contribution to the cultural dimension of translation was made by Lawrence Venuti (1995) in The Translator's Invisibility: A History of Translation. Venuti examines the cultural consequences of translation choices and discusses the relationship between linguistic fluency and the representation of foreign cultural identities [3]. His distinction between domestication and foreignization offers a valuable conceptual framework for examining the treatment of cultural markers in automated translation. Domestication involves adapting expressions to the linguistic and cultural expectations of the target audience, whereas foreignization seeks to retain recognizable elements of the source culture. Although these concepts were originally developed within the analysis of human translation practices, they can also serve as interpretive categories in the evaluation of machine-generated translations.

Javier Franco Aixelá (1996) further developed the study of cultural representation through his examination of culture-specific items in translation [4]. His approach highlights the contextual nature of cultural specificity, demonstrating that the status of a linguistic expression as culturally marked depends on the relationship between the source and target cultures. This understanding is particularly significant because the same expression may present different degrees of translation difficulty depending on the target language, cultural familiarity, and communicative context. Aixelá's distinction between conservation-oriented and substitution-oriented procedures also offers a practical basis for classifying translation solutions. Within the present research, this framework can be applied to determine whether machine translation platforms preserve culturally specific forms, provide explanatory renderings, replace source-culture references with target-culture alternatives, or omit culturally relevant information.

The development of machine translation technologies introduced a different methodological perspective into the study of linguistic equivalence. Rather than relying exclusively on human

knowledge and conscious translation strategies, computational systems generate translations through patterns identified in linguistic data. An influential contribution to this technological transformation was made by Vaswani et al. (2017), whose study Attention Is All You Need introduced the Transformer architecture [5]. The proposed architecture demonstrated the effectiveness of attention-based mechanisms for sequence transduction tasks, including machine translation. Transformer-based models subsequently became central to the development of numerous neural language technologies. Nevertheless, the ability to identify contextual dependencies within a linguistic sequence should not be equated with complete understanding of its cultural implications.

Koehn and Knowles (2017), in their study Six Challenges for Neural Machine Translation, identified several limitations of neural translation systems, including domain mismatch, insufficient training data, rare lexical units, long sentences, word alignment, and decoding-related difficulties [6]. Their findings remain relevant to the translation of cultural markers because many culturally specific expressions occur relatively infrequently in general-language datasets or are used predominantly within particular social and cultural contexts. Rare culturally marked lexical items may therefore be vulnerable to inaccurate translation, semantic generalization, or inappropriate contextual interpretation.

The evaluation of machine translation quality has also received substantial scholarly attention. Papineni et al. (2002) introduced BLEU, an automatic evaluation metric based primarily on the correspondence between machine-generated translations and reference translations [7]. Although this metric contributed significantly to the standardization of machine translation evaluation, lexical overlap alone cannot fully determine whether cultural meanings, pragmatic implications, or culturally appropriate expressions have been preserved. A translation may differ from a reference in wording while successfully communicating its cultural significance, whereas another translation may demonstrate considerable lexical similarity without adequately representing the intended cultural meaning.

Further evidence concerning the limitations of machine translation evaluation was presented by Toral, Castilho, Hu, and Way (2018), who reassessed claims of human parity in neural machine translation [8]. Their investigation demonstrated the importance of professional translation expertise, the original language of source texts, and broader textual context when evaluating translation quality. These findings are relevant to cultural markers because the identification of culturally inappropriate translations frequently requires specialized linguistic and sociocultural knowledge.

A related investigation was conducted by Freitag et al. (2021), who examined the effectiveness of expert-based human evaluation using the Multidimensional Quality Metrics framework [9]. Their research demonstrated that the evaluation of advanced machine translation systems may produce different results depending on the qualifications of evaluators and the assessment methodology employed. The study emphasized the importance of explicit error analysis and access to broader document context. This approach is particularly applicable to cultural markers, where translation errors

may involve not only incorrect lexical choices but also the loss of cultural associations, inappropriate levels of politeness, altered social relationships, or changes in communicative intention.

More recent developments in multilingual neural machine translation have expanded technological opportunities for processing languages with limited digital resources. The NLLB Team (2024), in Scaling Neural Machine Translation to 200 Languages, presented a massively multilingual translation system designed to improve language coverage and translation performance across numerous language pairs [10]. The investigation demonstrated the potential of multilingual approaches for reducing linguistic inequality in digital communication, while also identifying persistent difficulties associated with the availability and quality of parallel training data.

A comparison of the reviewed literature reveals two complementary but insufficiently integrated research traditions. Classical translation studies primarily examine the nature of cultural equivalence, the classification of culture-specific items, and the strategies through which cultural meanings may be preserved or adapted. Computational approaches, in contrast, concentrate on translation architectures, training conditions, linguistic performance, and evaluation procedures. Integrating these perspectives provides an opportunity to examine automated translation not merely as a process of generating linguistically acceptable text but as a form of intercultural mediation. Despite these contributions, further comparative investigation is required to establish how individual machine translation platforms deal with different categories of cultural markers under comparable translation conditions.

Research methodology. The present study employs a comparative descriptive research design combining qualitative linguistic analysis with a proposed quantitative evaluation to investigate the translation of cultural markers across three machine translation platforms: Google Translate, DeepL, and Microsoft Translator. The methodological framework is based on the principles of cultural equivalence, semantic accuracy, pragmatic appropriateness, and functional correspondence. The study focuses on identifying how machine translation systems may reproduce, modify, generalize, or omit culturally specific meanings when translating between Uzbek and English.

The proposed research corpus comprises 100 culturally marked linguistic units representing five categories: culture-specific vocabulary, idiomatic expressions, proverbs, forms of address, and cultural references, with 20 units per category. The selection criteria include cultural specificity, relevance to Uzbek sociocultural practices, contextual interpretability, and the potential difficulty of establishing direct English equivalents. Each selected unit should be presented within an appropriate linguistic context to minimize ambiguity and allow evaluation of its communicative function.

The translation procedure is designed in three consecutive stages. First, selected cultural markers are classified according to semantic characteristics and sociocultural functions. Second, source-language expressions are translated from Uzbek into English using Google Translate, DeepL, and Microsoft Translator under comparable input conditions. The same source texts are submitted to each platform

without lexical or grammatical modification. Translation outputs are recorded in their original generated forms. Platform versions, access dates, and translation settings are documented to support reproducibility. Third, generated translations are compared with source expressions and evaluated according to predefined criteria.

The analytical framework incorporates four evaluation dimensions: semantic accuracy, cultural equivalence, pragmatic appropriateness, and linguistic naturalness. Semantic accuracy measures preservation of the principal meaning. Cultural equivalence concerns preservation or explanation of culturally specific concepts. Pragmatic appropriateness evaluates whether communicative functions are maintained, while linguistic naturalness measures grammatical correctness, lexical acceptability, and idiomatic quality in English.

Each dimension is to be assessed using a five-point rating scale, ranging from 1 (very poor) to 5 (excellent). The overall translation quality score is calculated as $Q = (S + C + P + L) / 4$, where S denotes semantic accuracy, C cultural equivalence, P pragmatic appropriateness, and L linguistic naturalness. The mean score is calculated separately for each platform and category using $\bar{Q} = (\Sigma Qi) / n$, where n denotes the number of evaluated translations.

In addition to numerical assessment, qualitative error analysis is used to identify patterns of cultural meaning transformation: literal translation, borrowing, descriptive translation, cultural substitution, generalization, and omission. These categories are informed by the translation procedures discussed by Newmark (1988) and Aixelá (1996). Particular attention is paid to cases in which grammatically acceptable translations fail to communicate culturally embedded meanings.

Quantitative data, once collected, may be analyzed using descriptive statistics, including mean scores, standard deviations, frequencies, and percentages. Differences across three matched platform samples may be assessed using the Friedman test, followed by adjusted Wilcoxon signed-rank comparisons where appropriate. A significance threshold of $p < 0.05$ is proposed. Two bilingual evaluators familiar with Uzbek and English cultural conventions should independently rate the translations; weighted Cohen's kappa may be used to assess agreement. The initial independent ratings should be retained for reliability analysis.

The present manuscript reports an illustrative qualitative analysis; the proposed 100-item corpus, platform comparison, inter-rater evaluations, and inferential statistical tests have not yet been conducted. The above procedures specify a reproducible protocol for future empirical validation.

Results and analysis. The analysis of cultural markers focuses on the relationship between lexical equivalence, semantic interpretation, and the preservation of cultural meanings in Uzbek–English translation. The selected examples demonstrate how culturally embedded expressions may create translation difficulties when their meanings depend on historical traditions, social relationships, national

customs, and context-specific communicative conventions. The English renderings below are analytical examples rather than verified outputs from Google Translate, DeepL, or Microsoft Translator.

1. Translation of Culture-Specific Vocabulary. Culture-specific vocabulary constitutes one of the most challenging categories of translation because certain lexical units represent concepts that do not have direct equivalents in the target language. Uzbek contains numerous expressions associated with traditional community organization, ceremonies, social relationships, and national customs.

Table 1. Comparative analysis of Uzbek culture-specific vocabulary

Uzbek cultural marker	Literal English meaning	Contextually appropriate translation
Mahalla	Neighborhood	Traditional neighborhood community and local self-governance institution
Hashar	Collective work	Community-based voluntary collective labor
Beshik to‘yi	Cradle celebration	Traditional Uzbek celebration marking the placement of a baby in a cradle
Kelin salom	Bride’s greeting	Traditional ceremony in which a bride greets her husband’s family and relatives
Oqsoqol	White-bearded man	Respected community elder

The Uzbek term mahalla combines geographical, institutional, and social dimensions. Its translation as neighborhood preserves the spatial meaning but does not fully communicate its role in community organization, social responsibility, and the maintenance of traditional relationships. Similarly, hashar refers to an established practice of collective labor performed for the benefit of individuals or the wider community. The phrase collective work does not explicitly represent the traditions of cooperation, mutual support, and voluntary participation associated with the concept. Beshik to‘yi illustrates another form of cultural non-equivalence. Although cradle celebration provides some semantic information, it does not sufficiently explain the traditional ceremony associated with placing a child in a cradle. These examples indicate that culturally specific vocabulary frequently requires explanatory translation.

2. Translation of Idiomatic Expressions. Idiomatic expressions represent another important category of cultural markers. Their meanings are generally determined by figurative associations rather than the direct meanings of their individual lexical components.

Table 2. Analysis of Uzbek idiomatic expressions

Uzbek expression	Literal translation	Functional English equivalent
Og‘zi qulog‘ida	His mouth is at his ears	He is smiling from ear to ear
Boshi osmonga yetdi	His head reached the sky	He was overjoyed
Yuragi orqasiga tortdi	His heart moved backward	He was frightened
Ko‘z ochib yumguncha	While opening and closing an eye	In the blink of an eye

Uzbek expression	Literal translation	Functional English equivalent
Qo‘li ochiq	His hand is open	He is generous

For instance, boshi osmonga yetdi communicates an intense feeling of happiness or satisfaction. Its literal translation preserves the metaphorical image but may fail to communicate the intended emotional meaning. The functional rendering he was overjoyed reproduces that meaning. By contrast, og‘zi qulog‘ida has a close English idiomatic counterpart, smiling from ear to ear. The phrase qo‘li ochiq may indicate generosity, hospitality, or a willingness to help. A literal rendering does not reliably communicate these qualities, whereas he is generous provides greater semantic clarity.

3. Translation of Proverbs and Traditional Sayings. Proverbs transmit collective experiences, traditional knowledge, moral principles, and socially accepted patterns of behavior. Their translation may involve both semantic and stylistic difficulties.

Table 3. Comparative analysis of Uzbek proverbs

Uzbek proverb	Literal English translation	Communicative interpretation
Yetti o‘lchab, bir kes	Measure seven times, cut once	Think carefully before acting
Birlik bor joyda tiriklik bor	Where there is unity, there is life	Unity supports collective strength and well-being
Mehnatning tagi rohat	The result of labor is comfort	Hard work brings rewards
Oltin olma, duo ol	Do not take gold, receive a blessing	Spiritual blessings are more valuable than material wealth
Qush uyasida ko‘rganini qiladi	A bird does what it sees in its nest	Children imitate the behavior they observe at home

Yetti o‘lchab, bir kes communicates the importance of careful consideration before making decisions. English has the similar proverb measure twice, cut once, permitting functional equivalence without preserving the original numeral. Oltin olma, duo ol is more challenging: duo denotes a blessing or prayer and carries religious, moral, and interpersonal associations. Translating the expression literally preserves the lexical structure but may not communicate the importance attributed to receiving blessings from elders. Qush uyasida ko‘rganini qiladi uses natural imagery to express a principle of upbringing and social learning. A translator must balance the original imagery against the intended moral lesson.

4. Translation of Forms of Address and Politeness Markers. Forms of address are connected with social hierarchy, age, interpersonal relationships, and culturally specific norms of respect.

Table 4. Analysis of culturally marked forms of address

Uzbek expression	Basic English equivalent	Cultural and pragmatic meaning
Aka	Older brother	Respectful address to an older male, including non-relatives

Uzbek expression	Basic English equivalent	Cultural and pragmatic meaning
Opa	Older sister	Respectful address to an older female, including non-relatives
Ustoz	Teacher	Respected teacher, mentor, or professional guide
Otaxon	Grandfather / elderly man	Respectful address to an elderly man
Siz	You	Formal or respectful second-person address

Aka and opa can designate family relationships and respectful address toward non-relatives. English does not consistently reproduce these functions through equivalent kinship-based forms. Uzbek distinguishes the informal sen from the formal or respectful siz, whereas English generally uses you for both. Consequently, grammatically encoded information about politeness and social distance may disappear. Ustoz can express admiration, professional respect, and mentorship beyond the word teacher. In context, mentor may better represent its interpersonal meaning.

5. Translation of Cultural References and Traditional Ceremonies. Traditional ceremonies, national food, and social customs require attention because their interpretation depends on knowledge of the source culture.

Table 5. Cultural references and translation strategies

Cultural marker	Possible translation	Preferred analytical strategy
Navroʻz	Nowruz festival	Borrowing with contextual explanation
Sumalak	Traditional spring dish	Borrowing with descriptive explanation
Nikoh toʻyi	Wedding celebration	Functional equivalence
Choyxona	Teahouse	Functional translation with contextual clarification
Atlas	Traditional silk fabric	Descriptive translation

Navroʻz is associated with seasonal renewal and culturally established celebrations. A generic spring festival translation does not capture its full identity, whereas the name Nowruz is more culturally specific. Sumalak is a traditional dish prepared from germinated wheat, commonly associated with Nowruz celebrations; preserving its name with a short explanation is appropriate. Choyxona may be rendered as teahouse, but in Uzbek society this institution may also be a location for community gatherings. Atlas denotes patterned silk fabric in Uzbek contexts, whereas English atlas ordinarily refers to a book of maps, making contextual disambiguation necessary.

6. Synthesis of Translation Patterns.

Table 6. Analytical synthesis of cultural marker translation

Category	Main translation challenge	Appropriate translation approach
Culture-specific vocabulary	Absence of direct cultural equivalents	Borrowing and descriptive translation
Idiomatic expressions	Loss of figurative meaning	Functional equivalence
Proverbs	Loss of cultural imagery or moral implication	Equivalent proverb or explanatory translation
Forms of address	Loss of politeness and social relationships	Context-sensitive pragmatic adaptation
Cultural references	Loss of historical and sociocultural information	Borrowing with contextual explanation

The qualitative examination indicates that cultural adequacy depends on communicating meanings, associations, and pragmatic functions, not solely on lexical correspondence. Literal translation is not inherently inappropriate: ko‘z ochib yumguncha has a closely corresponding English expression, in the blink of an eye. An effective strategy depends on the marker, its linguistic context, and target-language conventions. These examples establish criteria for a controlled evaluation of machine translation systems, but they do not establish which of the three platforms performs best. Verified outputs, expert ratings, and statistical comparisons would be required for such a conclusion.

Conclusion. The present study has examined the linguistic and cultural challenges associated with the translation of cultural markers in contemporary machine translation platforms, with particular attention to Uzbek–English translation. The analysis demonstrates that the accurate translation of culturally embedded expressions requires more than grammatical correctness and lexical equivalence. Cultural markers convey historically established meanings, social values, collective experiences, and pragmatic functions that cannot always be adequately represented through direct translation. Consequently, cultural adequacy constitutes an essential dimension of translation quality, alongside semantic accuracy, linguistic naturalness, and communicative appropriateness.

The qualitative analysis of culture-specific vocabulary, idiomatic expressions, proverbs, forms of address, and traditional cultural references has revealed several recurring challenges in transferring culturally significant meanings between Uzbek and English. Expressions such as mahalla, hashar, beshik to‘yi, and kelin salom illustrate the difficulties arising from the absence of direct conceptual equivalents. Similarly, idiomatic expressions and proverbs demonstrate the importance of functional equivalence, while culturally specific forms of address highlight the role of social relationships, politeness conventions, and pragmatic context in determining translation adequacy.

The examination of representative examples indicates that no single translation strategy can ensure the accurate representation of all categories of cultural markers. Literal translation may be appropriate when the source and target languages share comparable metaphorical structures, whereas descriptive translation and borrowing are often necessary when expressions refer to culturally distinctive institutions, traditions, or practices. Functional equivalence is particularly valuable for idiomatic expressions and proverbs, while context-sensitive adaptation plays an important role in preserving the communicative functions of forms of address. Therefore, the selection of translation strategies should be guided by the semantic characteristics, cultural significance, and communicative purpose of individual expressions.

The theoretical comparison of machine translation approaches also highlights the importance of integrating linguistic and cultural criteria into automated translation assessment. Although neural machine translation technologies have considerably improved the fluency and contextual coherence of translated texts, these technological achievements do not automatically guarantee the preservation of culturally embedded meanings. Accordingly, the evaluation of platforms such as Google Translate, DeepL, and Microsoft Translator should extend beyond lexical correspondence to include cultural equivalence, pragmatic appropriateness, and the accurate representation of culturally specific concepts. However, the illustrative analysis presented in this study does not establish the comparative superiority of any individual platform, as such conclusions require verified translation outputs and quantitative evaluation.

The scientific contribution of the study lies in establishing an integrated analytical framework that connects traditional translation theories with the cultural evaluation of automated translation. By distinguishing between linguistic correctness and cultural adequacy, the research provides a conceptual basis for identifying potential semantic distortions, cultural generalizations, and pragmatic inconsistencies in machine-generated translations. Its practical significance is associated with the development of more comprehensive translation assessment criteria and the promotion of culturally sensitive approaches to the use of artificial intelligence in multilingual communication.

Further research should involve larger multilingual datasets, systematic comparisons of actual platform outputs, expert-based cultural adequacy assessments, and statistical analysis of translation performance across different categories of cultural markers. Particular attention should be devoted to improving the representation of culturally specific expressions in languages with comparatively limited digital resources, including Uzbek. Ultimately, the effective translation of cultural markers requires an approach that recognizes translation not merely as the computational transformation of linguistic structures but as a complex process of intercultural communication. Preserving cultural meanings in machine translation is therefore essential for supporting linguistic diversity, cultural identity, and meaningful communication across different language communities.

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