CULTURAL ADAPTATION IN AI-BASED MACHINE TRANSLATION AND LINGUISTIC CHALLENGES IN FRENCH-UZBEK TRANSLATION

Nozima Rashotkhonovna Inogamova
nozimainogamova@gmail.com
Lobar Nodirbekovna Uktamova
teb14ilo0@gmail.com
University of World Economy and Diplomacy

Abstract: This paper examines cultural adaptation in artificial intelligence (AI)-based machine translation, focusing on linguistic and intercultural challenges in French-Uzbek translation. It considers translation quality not only in terms of grammatical correctness and lexical correspondence but also in relation to semantic equivalence, pragmatic intention, register, and culturally embedded meaning. Particular attention is given to lexical ambiguity, grammatical and morphological differences, idiomatic expressions, forms of address, culture-specific vocabulary, and discourse conventions. The paper discusses the role of AI tools in producing preliminary translations and the importance of human linguistic and cultural expertise in reviewing their output. It proposes a human-centred approach that combines contextual analysis, machine translation, cultural adaptation, and post-editing. The discussion is especially relevant to French-Uzbek translation in educational, academic, and professional communication.

Keywords: artificial intelligence, machine translation, French-Uzbek translation, cultural adaptation, semantic equivalence, linguistic challenges, post-editing, intercultural communication

The rapid development of artificial intelligence has significantly influenced translation practices and multilingual communication. AI-based systems can generate translations within seconds, support the comprehension of foreign-language materials, and assist users in preparing preliminary versions of texts. These capabilities are relevant to education, research, business communication, and international cooperation, where information is frequently exchanged across linguistic boundaries. At the same time, the speed and fluency of machine-generated output should not be confused with translation accuracy. A sentence may appear grammatically correct while conveying an inaccurate meaning, weakening the author's intention, or failing to reproduce a culturally significant reference. The issue is particularly important in translation between French and Uzbek. The two languages differ in their grammatical organisation, morphological structure, syntactic patterns, and pragmatic conventions. French is a Romance language with grammatical gender, articles, and a distinction between formal and informal second-person address. Uzbek is a Turkic language with an agglutinative structure, suffix-based grammatical marking, and its own system of politeness and social address. These differences require more than the replacement of individual words. A translator must identify the meaning expressed in the source text and reconstruct it according to the linguistic and cultural norms of the target language.

The purpose of this paper is to consider the cultural and linguistic challenges that arise in AI-based French-Uzbek translation and to clarify the importance of cultural adaptation in producing an appropriate target text. The discussion focuses on the relationship between semantic equivalence and cultural meaning, the main linguistic difficulties of the French-Uzbek language pair, and the role of human revision in AI-assisted translation. Particular attention is paid to the fact that machine translation should be treated as a support tool rather than as an independent substitute for professional linguistic judgement. AI-based machine translation relies on computational models trained to identify

patterns in language data and generate a target-language sequence corresponding to a source text. Contemporary systems can use contextual information to select words and construct sentences, but their output remains dependent on the quality and quantity of available language data, the language pair, the subject area, and the context provided by the user. The performance of a system may therefore vary across text types and communicative situations. This is important for French-Uzbek translation because a general-purpose system may not consistently recognise specialised terminology, regional expressions, idioms, or culturally specific meanings.[6]

One of the central challenges is semantic ambiguity. A lexical unit may have several meanings, and the appropriate equivalent can only be identified through context. For example, the French word "avocat" can refer to a legal professional or to a fruit, while "batterie" may denote an electric battery or a musical instrument grouping, depending on the situation. If a system selects an equivalent without correctly identifying the subject matter, the resulting sentence may be fluent but semantically inaccurate. Similar difficulties occur in Uzbek, where the meaning of a word or expression may depend on its syntactic environment, derivational form, and conventional use. Therefore, reliable translation requires contextual interpretation rather than mechanical dictionary substitution. Semantic equivalence is not always achieved by choosing a word with a similar dictionary meaning. In some cases, the source-language expression has no direct equivalent in the target language, or its meaning is distributed across several words. The translator must then decide whether to use a functional equivalent, paraphrase, explanatory translation, or another solution that preserves the communicative purpose. This problem is directly relevant to the study of AI-generated French–Uzbek translations and has also been addressed in the author's research on semantic equivalence in artificial-intelligence translations between French and Uzbek.[2] The issue demonstrates the importance of assessing not only the lexical form selected by a system but also the meaning conveyed in the complete sentence and wider context.[4][5] Grammatical differences create another group of challenges. French nouns have grammatical gender, and gender agreement is reflected in articles, adjectives, and certain verb forms. Uzbek does not have an equivalent grammatical gender category. When translating from French into Uzbek, grammatical gender usually does not need to be reproduced as a separate grammatical feature. However, gender may be relevant to the content if it identifies a person or helps establish a relationship in the text. In the opposite direction, an Uzbek source may not specify the gender of a person, whereas French grammar may require agreement in a particular construction. In such cases, a translation system should avoid adding information that is not supported by the source.

The morphological structures of French and Uzbek also influence translation choices. Uzbek expresses grammatical relations through suffixes that mark case, possession, person, and other functions. French frequently uses prepositions, articles, auxiliary verbs, and word order to express comparable relations. A direct transfer of the source-language structure may therefore produce unnatural or grammatically incorrect Uzbek. Conversely, an Uzbek sentence with several suffixes may require a more expanded construction in French. An effective translation must preserve the relationship between the elements of the sentence while adapting its structure to the grammatical requirements of the target language. Syntax and information structure should also be considered. French commonly uses explicit subjects and relatively fixed word order, while Uzbek allows different arrangements of sentence elements and may omit subjects when they are clear from context. Machine-generated translations can sometimes reproduce the source-language order too closely, resulting in sentences that are understandable but unnatural. Long sentences containing subordinate clauses, participial constructions, and several modifiers are especially challenging. The translator should check whether the logical relations between clauses remain clear and whether the sentence sounds natural in the target language.

Pragmatic meaning is equally important. French distinguishes between "tu" and "vous", and the choice depends on familiarity, social distance, age, institutional roles, and the communicative situation. Uzbek also has forms of address such as "sen" and "siz", but the conditions governing their use do not correspond exactly to French conventions. A machine translation may preserve the basic reference while selecting a form that sounds too informal, too distant, or inappropriate for the relationship between speakers. The correct choice requires consideration of the participants, the setting, the purpose of communication, and the expected level of politeness. Idioms, proverbs, metaphors, and phraseological expressions are among the most difficult elements to translate automatically. Their meanings are often not predictable from the meanings of individual words. A literal translation may preserve the surface image but fail to communicate the intended message. For example, the French expression "mettre la main à la pâte" means to take an active part in a task or to contribute to the work. A word-for-word translation into Uzbek would not normally convey this idiomatic meaning. Depending on the context, an appropriate Uzbek equivalent might be "ishga qo'l urmoq" or "ishga faol kirishmoq". The final choice depends on the register and communicative situation.[5] Cultural adaptation is also necessary when a text contains references to institutions, traditions, food, education, public holidays, social practices, or concepts specific to a particular community. French-language texts may include references that are familiar to French readers but require explanation for Uzbek readers. Similarly, Uzbek texts may contain culturally embedded concepts related to family relations, hospitality, community life, or local customs that cannot always be represented by a single French word. In such cases, the translator may use a functional equivalent, transliteration, descriptive translation, or a brief explanatory note. The decision should depend on the purpose of the text and the knowledge of its intended audience.

Register and style are further dimensions of translation quality. Academic, administrative, legal, journalistic, literary, and conversational texts have different linguistic conventions. A machine-generated translation may convey the general information but flatten stylistic distinctions or select terminology that is inappropriate for the genre. In academic translation, for example, terminological consistency and logical coherence are essential. In personal correspondence, the appropriate level of politeness and naturalness may be more important. The translator should therefore identify the genre and communicative purpose before evaluating the machine-generated version. The author's previous research provides a relevant context for examining the relationship between artificial intelligence, language education, and translation. The use of artificial intelligence for pedagogical purposes in teaching French as a foreign language has been considered in the author's earlier publication.[1] The role of digital technologies in improving French language teaching has also been addressed in her research.[3] These topics are connected with the present discussion because the effective use of AI in language-related activities requires users to understand both its practical possibilities and its limitations. In translation, this means that a generated text should be checked for meaning, terminology, style, and cultural appropriateness before it is used. Research on AI-based language learning systems also provides a relevant pedagogical perspective, although language acquisition and machine translation remain distinct research areas.[8] An effective approach to AI-assisted French–Uzbek translation can be organised as a sequence of related stages. First, the translator analyses the source text and identifies its genre, subject area, intended audience, and communicative purpose. This step helps determine whether the material contains academic, legal, economic, administrative, literary, or everyday language. Second, an AI system can be used to prepare a preliminary translation. The instructions should specify the language direction, the intended register, the target audience, and any terminology that must remain consistent. Providing relevant context can help reduce ambiguity and improve the suitability of the generated version.[7] The preliminary translation should then

undergo linguistic revision. The reviewer checks whether the main ideas have been preserved, whether lexical choices are appropriate, whether grammatical relations are correct, and whether the target-language sentence structure is natural. Particular attention should be paid to negation, modality, tense, pronoun reference, agreement, and the translation of specialised terms. The reviewer should also compare the translation with the source to identify omissions, additions, repetitions, and changes in emphasis. A fluent sentence should not be accepted automatically if it changes the meaning of the original. The next stage is cultural and pragmatic adaptation. At this point, the reviewer examines idioms, forms of address, metaphors, culture-specific terms, references to institutions, and expressions associated with social conventions. If a direct equivalent is unavailable, the translator selects a solution that preserves the function and meaning of the source expression for the intended readership. Some references may be retained with an explanation, while others may be replaced by a functional equivalent. These decisions require knowledge of both cultures and should be made consistently throughout the text.

Final quality assurance includes checking terminology, names, dates, punctuation, formatting, and coherence across the complete document. This stage is especially important in academic, legal, economic, and institutional translation, where an apparently minor change may affect the interpretation of a statement. The final version should be read as an independent text in the target language and compared with the source to ensure that the translation remains faithful while sounding natural. In this process, the human translator retains responsibility for the final result. This approach can be described as a human-centred or human-in-the-loop model of translation. AI systems assist with the generation of a preliminary version and may offer alternative formulations, while the human translator evaluates meaning, context, register, and cultural appropriateness. The purpose is not to reject automation but to use it responsibly. AI can increase productivity and support multilingual communication, but human expertise remains necessary when the source contains ambiguity, specialised terminology, culturally embedded expressions, or information with legal and professional consequences.[7]

The assessment of AI-based French-Uzbek translation should include several dimensions. Semantic adequacy concerns whether the target text preserves the meaning of the source. Grammatical accuracy involves morphology, agreement, word order, and sentence structure. Terminological consistency concerns the stable use of key concepts. Pragmatic adequacy evaluates whether the translation preserves communicative intention, politeness, and register. Cultural appropriateness considers whether idioms, references, and social conventions are understandable and suitable for the target audience. Finally, naturalness concerns whether the translation reads as an idiomatic text in French or Uzbek rather than as a mechanical reproduction of the source structure. These dimensions should be considered together because translation quality is multidimensional. A text may be fluent but inaccurate, semantically correct but stylistically inappropriate, or culturally understandable but inconsistent in terminology. A structured evaluation process enables reviewers to identify the type of error and decide whether minor editing, substantial post-editing, or a new translation is required. In educational settings, students can compare an AI-generated version with a revised translation, identify problematic choices, consult dictionaries and parallel texts, and explain why one solution is more appropriate than another. Such tasks develop critical digital literacy and strengthen translation competence.

The topic is relevant to students of international economics and management, who may encounter French and Uzbek texts in business correspondence, economic reporting, marketing, institutional communication, and international cooperation. In these contexts, translation must preserve factual information as well as the appropriate degree of formality, the relationship between

participants, and the conventions of professional communication. A machine-generated text that changes a financial term, weakens a qualification, or misrepresents a polite request may create misunderstanding. Therefore, the use of AI in professional translation should be accompanied by linguistic review and awareness of the communicative context. Further work in this area may include the development of bilingual French-Uzbek resources representing different genres and registers. Such materials could include academic abstracts, institutional correspondence, economic terminology, media texts, literary passages, idioms, and culture-specific expressions. Evaluation should involve qualified bilingual reviewers and clear criteria for semantic, grammatical, pragmatic, and cultural adequacy. When researchers compare different translation systems, they should identify the tools and versions used, specify the source texts and language directions, describe the evaluation procedure, and acknowledge the limitations of the material. Transparent methodology is necessary if the results are to be assessed and reproduced by other researchers.

The analysis demonstrates that cultural adaptation is an essential component of reliable AI-based translation between French and Uzbek. Differences in grammatical organisation, morphology, syntax, politeness strategies, idiomatic expressions, and culture-specific vocabulary mean that accurate translation cannot be achieved through direct lexical substitution alone. AI tools can support the translation process by producing preliminary drafts and suggesting possible equivalents, but their output requires contextual and linguistic verification. The translator must evaluate whether the intended meaning, register, pragmatic function, and cultural references have been preserved. Consequently, the most appropriate approach is to combine AI-generated translation with human revision and cultural interpretation. This process includes analysis of the source text, preparation of a preliminary translation, linguistic and terminological editing, cultural adaptation, and final quality assurance. Such an approach is particularly important in academic, educational, economic, and institutional communication, where accuracy and appropriateness are equally significant. The development of language-specific resources and transparent evaluation procedures may further improve the quality of French-Uzbek machine translation. Ultimately, artificial intelligence can facilitate multilingual communication, but the quality of the final translation continues to depend on human linguistic competence, cultural knowledge, and professional responsibility.

References

1. Inogamova, N. "The Use of Artificial Intelligence for Positive Pedagogical Purposes in Teaching French as a Foreign Language to Students of International Law and International Economic Relations." Academic Journal of Science, Technology and Education, 1(8), 2025, pp. 25–27.

2. Inogamova, N. R. (2026). "Sun'iy intellekt tarjimalarida semantik ekvivalentlik muammolari (fransuz-o'zbek misolida)." Mahalliy va xalqaro konferensiyalar platformasi, 2(8), pp. 30–33.

3. Иногамова, Нозимахон Рашотхоновна. "Совершенствование процесса преподавания французского языка с помощью цифровых технологий." Педагогик маҳорат, p. 143.

4. Nida, E. A. Toward a Science of Translating: With Special Reference to Principles and Procedures Involved in Bible Translating. Leiden: E. J. Brill, 1964.

5. Baker, M. In Other Words: A Coursebook on Translation. 3rd ed. Abingdon and New York: Routledge, 2018.

6. Koehn, P. Neural Machine Translation. Cambridge: Cambridge University Press, 2020.

7. Bowker, L., and Buitrago Ciro, J. Machine Translation and Global Research: Towards Improved Machine Translation Literacy in the Scholarly Community. Bingley: Emerald Publishing, 2019.

8. Qudratullayevna, X. N. (2026, April). The Effectiveness of Artificial Intelligence Based Language Learning Systems in Acquiring Spanish as a Second Language. In International Scientific and Practical Conference on “Indirect Translation: A Two-Arched Bridge Between Cultures” (Vol. 6, No. 4).