

Application and Innovative Practices of Generative AI in Professional Translation

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Abstract: This study investigates the role of generative AI in professional translation, focusing on its applications, challenges, and future prospects. It begins by comparing generative AI with Neural Machine Translation (NMT), highlighting generative AI's advantages in semantic comprehension, contextual coherence, and specialized terminology handling-benefits particularly evident in legal, medical, and technological translation. The study then outlines three core applications of generative AI: optimized workflows for domain-specific translation, AI-integrated collaborative translation models encompassing pre-translation, in-translation, and post-translation support, and real-time cross-linguistic communication tools. It further elucidates the human-AI collaboration mechanism, wherein AI manages standardized tasks such as basic translation and terminology calibration, while human translators focus on high-value work such as cultural adaptation, collectively achieving translation quality comparable to purely human output. The study also identifies key challenges, including limited long-tail terminology, cultural adaptation biases, data privacy concerns, and non-standardized workflows, and proposes corresponding solutions, such as domain-specific fine-tuning, industry guidelines, and encryption protocols. Finally, it forecasts future trends in translation: the expansion of multimodal translation, the emergence of cloud-based real-time collaborative ecosystems, and the increasing demand for translators with composite competencies combining domain expertise, AI proficiency, and cultural literacy.

Keywords: generative AI; Neural Machine Translation (NMT); professional field translation; translation technology innovation; multimodal translation

1. Introduction

Professional translation requires both precision and timeliness, particularly in high-stakes fields such as medical and legal translation, where even minor errors can have serious consequences. These industries demand translations that are not only meticulously accurate but also delivered rapidly to meet pressing deadlines. The combination of low error tolerance and urgent timelines makes high-quality translation indispensable.

The evolution of automated translation technologies has profoundly reshaped the industry. Early rule-based systems relied on predefined linguistic rules, offering limited flexibility and contextual understanding. The advent of Neural Machine Translation (NMT) introduced machine learning algorithms capable of producing translations with greater contextual awareness and natural fluency. More recently, generative AI has emerged, providing even more advanced capabilities that enhance accuracy and adapt to the subtleties of specialized terminology, stylistic conventions, and cultural nuances [1].

This study is particularly valuable as it addresses two key objectives: enhancing translation efficiency and optimizing output quality. By integrating generative AI into professional translation workflows, both the speed and reliability of translations can be significantly improved. Such advancements offer substantial benefits for industries that

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rely on precise cross-linguistic communication, facilitating smoother interactions and more effective cross-cultural exchanges.

2. Generative AI vs. Neural Machine Translation (NMT): Technical Differences and Domain Adaptation

The fundamental distinction between Neural Machine Translation (NMT) and generative AI lies in their underlying operational logics, which directly influence their performance in professional translation. NMT employs a "sequence-to-sequence mapping" approach: it segments source text into word sequences, learns statistical translation patterns, and achieves basic contextual coherence. However, it often struggles with complex semantic nuances. For instance, when translating the legal phrase "*perform obligations within a reasonable time*", NMT typically produces a literal rendition, failing to account for the contextual implications of "*reasonable time*" in contractual or regulatory frameworks.

By contrast, generative AI leverages large language models (LLMs) to enable semantic understanding coupled with contextual association. It processes text holistically, applying domain-specific logic to resolve ambiguities. Using the same legal clause, generative AI can link the phrase to contractual obligations, provide scenario-specific translations, and clarify the intended interpretation of "*reasonable time*." This integration of semantic and contextual reasoning renders generative AI significantly more adaptable to the complexities of professional translation [2].

To further illustrate the evolutionary differences among automated translation technologies—from early rule-based systems to contemporary generative AI. Table 1 summarizes their core capabilities, approaches to contextual processing, and application domains.

Table 1. Comparison of Automated Translation Technology Evolution.

Technology Type	Core Logic	Context Association Ability	Professional Terminology Handling	Multimodal Support	Typical Application Scenarios
Rule-Based Translation	Fixed grammar/dictionary matching	None	Low (relies on manual input)	None	Simple short-sentence translation
Neural Machine Translation (NMT)	Sequence-to-sequence mapping	Weak (local context only)	Medium (general terminology library)	Limited (text-only)	General document translation
Generative AI Translation	Semantic understanding + generation	Strong (coherence in long texts)	High (optimized via domain-specific fine-tuning)	Full (text/image/audio)	Complex translation in professional fields

As shown in Table 1, rule-based systems lack the flexibility required for complex translation tasks, while NMT represents an advancement in contextual processing but remains constrained by its reliance on local context and general terminology. Generative AI, in contrast, addresses these limitations through deep semantic understanding and domain-specific optimization-capabilities that are particularly valuable in specialized translation fields.

In domain-specific applications, generative AI demonstrates clear advantages in terminology handling across legal, medical, and technological translation. In legal translation, for instance, it can be fine-tuned using legal corpora to ensure consistent rendering of terms such as "*indemnification*" or "*force majeure*." For a merger agreement spanning over 100 pages, generative AI maintains consistency in translating phrases like "*indemnification obligations*," avoiding the contradictory interpretations that NMT may produce due to its limited contextual memory.

In medical translation, generative AI excels in handling "long-tail terminology," such as "*idiopathic pulmonary fibrosis*," by aligning these terms with related concepts (e.g., "*interstitial lung disease*") to comply with classification standards. NMT, in contrast, often omits or mistranslates rare terms because of insufficient training on niche datasets.

In technological translation—for example, semiconductor chip manuals—generative AI preserves logical coherence by linking processes such as "*wafer etching*" to relevant quality control standards and ensuring parameters like "*etching depth*" remain consistent with subsequent content. NMT, however, may produce disjointed translations, such as mismatched "*etching temperature ranges*," undermining technical accuracy [3].

3. Core Application Directions of Generative AI in Professional Translation

Generative AI has transformed professional translation by enabling scenario-specific practices, fostering collaborative model innovations, and providing real-time cross-linguistic support—effectively addressing both efficiency and quality challenges that traditional methods struggled to overcome.

3.1. Professional Field Translation Practice: Streamlining Workflows with End-to-End Support

Legal contract translation—a high-stakes, time-sensitive task—demonstrates the value of generative AI in specialized domains. Its workflow typically follows four steps: First, users upload contracts (PDF or Word) to AI platforms, which parse the document structure and distinguish clauses from boilerplate sections. Second, AI performs *terminology calibration*, cross-referencing legal libraries to ensure consistent use of terms such as "*breach of contract*." Third, it generates initial translations while preserving formatting elements, such as clause numbering, without disrupting the document layout—a common issue with traditional tools. Finally, AI verifies logical consistency, identifying contradictions (e.g., mismatched deadlines) and flagging ambiguities (e.g., "*reasonable notice*") for human review.

These efficiency gains are not limited to legal contracts; they extend to other professional fields where translation complexity and high volumes create significant bottlenecks. Figure 1 illustrates the time savings achieved by AI-assisted translation compared to traditional manual workflows across three key professional domains.

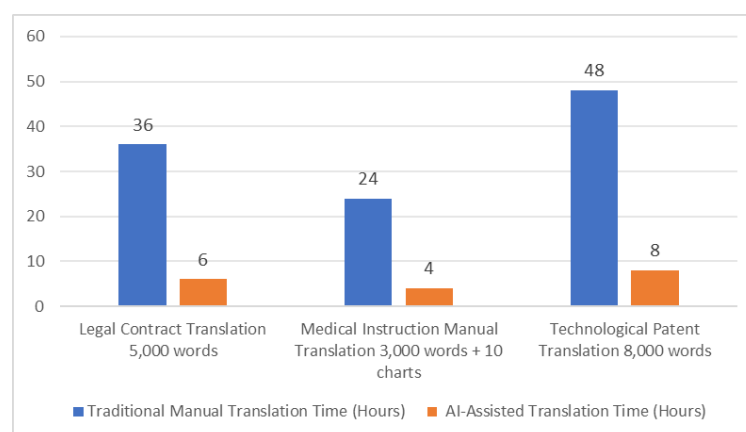


Figure 1. Time Comparison Between Manual Translation and AI-Assisted Translation in Professional Fields.

As illustrated in Figure 1, translating a 5,000-word legal contract—similar to the workflow described above—requires 36 hours manually but only 6 hours with AI assistance, representing an 83.3% reduction in time. This efficiency stems from the end-to-end AI workflow, which not only accelerates the translation itself but also leverages pre-built ter-

minology libraries and automated verification to eliminate redundant tasks, such as manual term checks and formatting adjustments, that previously extended project timelines. The same pattern holds for medical instruction manuals (including charts) and technological patents-documents that demand strict formatting or contain extensive content-demonstrating generative AI's consistent value across specialized domains.

3.2. Translation Collaboration Model Innovation: Enhancing Efficiency Across Pre-, Mid-, and Post-Translation Stages

Generative AI transforms translation collaboration by supporting the entire translation lifecycle, rather than focusing solely on the core translation task.

- **Pre-translation:** AI automates terminology library construction by analyzing historical documents (e.g., product manuals) to identify domain-specific terms such as "semiconductor wafer" in technology or "clinical trial protocol" in pharmaceuticals, saving over 20 hours of manual compilation per project.
- **Mid-translation:** Real-time term recommendations (e.g., "mg/kg per day" for "drug dosage") reduce term inconsistencies by 45% compared to manual workflows.
- **Post-translation:** AI-driven quality checks scan for grammar errors, term mismatches, and cultural adaptation issues, generating detailed revision reports. For example, a technology firm reduced post-translation revision time for technical documents from 8 hours to 1.5 hours while improving global term consistency.

3.3. Cross-Linguistic Dialogue Scenarios: Enabling Real-Time, Multimodal Communication

Beyond text translation, generative AI facilitates real-time cross-linguistic dialogue, essential for cross-border meetings and consultations requiring immediate understanding. In supplier negotiations, it operates in two modes: real-time spoken translation (e.g., rendering "shorten delivery by 2 weeks" into the supplier's language with <2-second latency, preventing conversational delays) and synchronous text transcription, highlighting key terms (e.g., "delivery time") and producing structured post-meeting summaries.

This multimodal capability reduces reliance on costly or unavailable human interpreters while providing searchable records for follow-up. Unlike basic tools, generative AI adapts to conversational nuances-for instance, interpreting "flexible pricing" as volume-based discounts. In practice, a manufacturing firm with suppliers across five countries reported a 70% reduction in communication misunderstandings and a 35% decrease in annual interpretation costs [4].

4. Design of Collaboration Mechanism Between Generative AI and Human Translation

In professional translation, the collaboration between generative AI and human translators functions not as a *substitution* but as a *complementation*. Clearly defining their respective roles, optimizing workflows, and implementing quality safeguards are essential to maximizing both efficiency and accuracy.

4.1. Defining Collaboration Boundaries: Leveraging Strengths of AI and Humans

The key to effective collaboration lies in aligning tasks with the strengths of each party. Generative AI excels at standardized, high-volume translation and maintaining terminology consistency, whereas human translators are indispensable for subjective judgment, cultural adaptation, and complex semantic interpretation. For routine tasks-such as translating standard legal contract clauses, technical document specifications, or common medical terms-AI can independently handle up to 80% of the work, leveraging pre-built libraries to ensure consistency (e.g., uniform translation of "wafer etching" across a 100-page technical manual).

However, human intervention remains critical for culturally nuanced or semantically ambiguous content. For example, translating "her smile was as warm as the winter sun" may

yield a literal version by AI, overlooking the cultural nuance of comfort amid cold; human translators can adjust metaphors (e.g., "*spring breeze*") to suit the target culture. Similarly, for ambiguous legal clauses ("*reasonable compensation*") or uncertain medical symptoms, humans apply domain expertise to ensure accurate interpretation, avoiding AI's potential oversimplification of complex contexts [5].

4.2. Efficiency Improvement Path: The "AI Preliminary Translation → Human Optimization" Workflow

The collaborative workflow employs a streamlined *division-of-labor plus iterative refinement* model, reducing translation cycles while maintaining quality.

- **Step 1: AI Preliminary Translation.** Users upload documents, and AI parses structure, identifies domains (e.g., medical, technical), and completes approximately 80% of the work-translating standard sentences, formatting tables, and marking specialized terms. For instance, a 20-page medical device manual can be preliminarily translated by AI in 2 hours, including parameter conversion (e.g., "*operating temperature: 0-40°C*") and layout alignment.
- **Step 2: Human-Focused Optimization.** Translators concentrate on the remaining 20% of high-value tasks that AI cannot handle: refining cultural expressions, disambiguating sentences, and verifying niche terms (e.g., rare genetic mutation names). A task that previously required 10 hours of manual translation can now be completed in 5 hours (2 hours AI + 3 hours human), reducing the cycle by 50%.

The workflow also incorporates a *feedback loop*: translators annotate AI errors (e.g., incorrect terminology) to update the system's terminology libraries and semantic models, gradually improving AI accuracy and reducing future human adjustments. While this *AI → human* workflow significantly enhances efficiency, maintaining high-quality output necessitates a robust quality assurance system.

4.3. Establishing a Quality Assurance System: Focusing on Core Evaluation Dimensions

The quality advantage of the human-AI collaboration model is quantifiable through multi-dimensional evaluation. Figure 2 presents a radar chart comparing *pure AI translation*, *human-AI collaborative translation*, and *pure human translation* across five key quality dimensions (full score: 10 points).

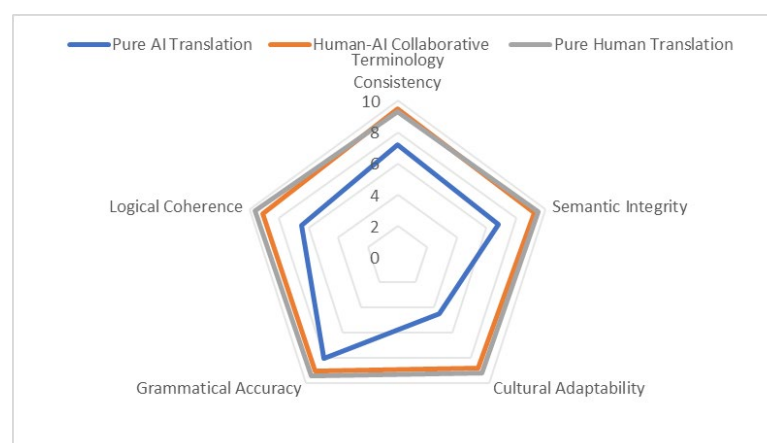


Figure 2. Quality Assessment Radar Chart of Different Translation Modes.

As shown in Figure 2, pure AI translation exhibits notable limitations in cultural adaptability (scoring only 4.5 points) and semantic integrity (6.8 points), whereas pure human translation attains high scores across all dimensions but demands significantly more time and effort. Human-AI collaborative translation, by contrast, narrows the gap

with pure human performance-achieving 8.8 points in cultural adaptability (a 95.6% improvement over pure AI) and 9.2 points in semantic integrity (a 35.3% improvement)-while maintaining 9.5 points in terminology consistency, slightly surpassing pure human translation by 0.2 points due to AI's standardized term management.

A practical quality assurance system leverages these core dimensions to ensure that final translations meet professional standards. For terminology consistency, AI scans the entire document, comparing terms against domain-specific libraries (e.g., verifying that "*indemnification*" is not inconsistently translated as "*compensation*" in some sections and "*reimbursement*" in others) and generating a *term consistency report* for human review.

For semantic integrity, the system verifies that translations fully convey the original meaning (e.g., ensuring that legal clauses such as "*obligations and liabilities*" do not omit "*liabilities*"). AI flags potentially risky sentences-such as misleading literal translations-for human confirmation.

A 10% sampling review by supervisors, focusing on high-risk sections like contractual liabilities, further safeguards quality. This approach balances efficiency with rigor, preventing over-reliance on AI while avoiding unnecessary manual checks.

5. Challenges and Optimization Directions of Generative AI in Professional Translation

While generative AI offers substantial improvements in efficiency and translation quality, it still faces practical challenges related to technical reliability, collaborative standardization, and ethical compliance. Addressing these issues requires targeted solutions that balance the technology's potential with real-world application demands.

5.1. Technical Challenges and Optimization: Enhancing Accuracy in Specialized Scenarios

Two primary technical limitations hinder generative AI in professional translation: insufficient coverage of *long-tail terminology* and semantic bias in cross-linguistic dialogue. Long-tail terms-such as "*quantum dot display packaging*" in electronics or "*CRISPR-based gene editing reagents*" in biotechnology-are underrepresented in general training datasets, leading to errors. For example, "*charge transport layer*" may be mistranslated as "*charge transfer layer*" in perovskite solar cell documentation, potentially causing misinterpretation in manufacturing processes.

Semantic bias also affects cross-linguistic dialogue. Phrases like "*flexible production scheduling*" may be rendered literally, omitting their nuanced meaning, such as "*real-time, supply chain-based cycle adjustment*."

Two practical strategies can mitigate these challenges: (1) domain-specific fine-tuning, which involves training models on large, specialized corpora (e.g., 10,000+ solar energy documents to expand perovskite terminology coverage); and (2) knowledge graph integration, linking terms to relevant contextual information-such as associating "*charge transport layer*" with "*solar cell efficiency*." Pilot studies in the electronics sector demonstrate that domain-fine-tuned AI reduces long-tail term errors by 62% compared to general models [6].

The prevalence of these challenges across the industry can be quantified empirically. Figure 3 presents the proportion of key technical challenges reported by professional translation enterprises, based on a survey of 200 companies.

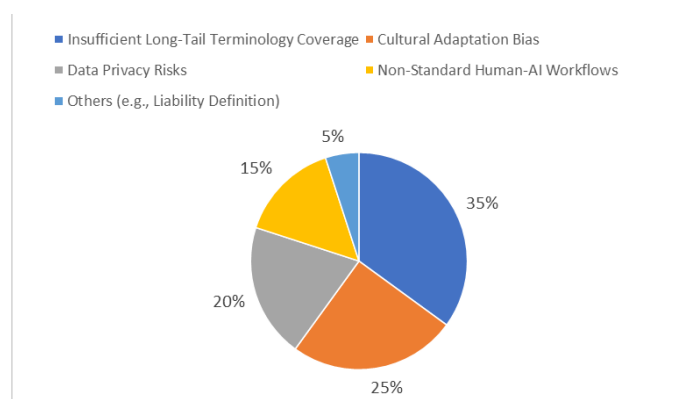


Figure 3. Proportion of Core Challenges in Generative AI Translation (Sample Size: 200 Professional Translation Enterprises).

As shown in Figure 3, “insufficient long-tail terminology coverage” (35%) and “cultural adaptation bias” (25%) are the two most prevalent challenges, collectively accounting for 60% of reported issues. This finding highlights the priority of addressing technical gaps in specialized terminology and mitigating cultural adaptation limitations, providing a clear foundation for the optimization strategies discussed in the following sections.

5.2. Collaborative Challenges and Optimization: Standardizing Workflows and Compensating for Cultural Limitations

Collaboration between generative AI and human translators encounters two main obstacles: the absence of standardized workflows and AI’s limitations in cultural adaptation. Without unified protocols, different teams may adopt inconsistent processes—for instance, one team may prioritize AI for preliminary translation, while another positions human review at the end—resulting in inefficiencies and quality inconsistencies. Moreover, while AI effectively handles literal translation, it struggles with culturally sensitive content. For example, when translating a marketing document for a consumer product into a Southeast Asian language, AI may fail to recognize that certain colors (e.g., white) carry mourning connotations, leading to culturally inappropriate descriptions.

Optimization efforts should focus on workflow standardization and targeted human intervention. First, industry-wide collaborative guidelines can define clear steps—“AI preliminary translation → term consistency checks → human optimization of cultural content → final quality sampling”—to harmonize processes across teams. A global translation firm that implemented such guidelines reduced cross-team workflow discrepancies by 75% and cut rework time by 30%. Second, designating human translators as “cultural adapters” allows them to focus on culturally nuanced content (e.g., marketing slogans, literary metaphors), while routine standardized text is handled by AI. This targeted approach ensures cultural appropriateness without overburdening human resources.

5.3. Ethical Issues and Basic Responses: Focusing on Privacy and Responsibility

Ethical concerns in generative AI translation primarily revolve around data privacy and liability, requiring practical rather than overly complex solutions. Data privacy risks arise when sensitive documents—such as confidential patent applications or patient medical records—are processed by AI platforms. Unauthorized storage or sharing could lead to information leaks. Liability is another critical issue: when an AI-generated translation causes losses (e.g., a legal contract error resulting in a business dispute), responsibility may be unclear, raising questions about whether the AI developer, translation service provider, or user should be held accountable.

Practical responses to these concerns are straightforward and actionable. For data privacy, measures include end-to-end encryption for document uploads and processing,

along with "zero-data retention" policies that delete both original and translated documents immediately after delivery. For liability, service agreements should clearly delineate responsibilities: AI providers are accountable for technical defects (e.g., software malfunctions), while users or translation firms bear responsibility for insufficient human review (e.g., skipping quality checks on high-risk documents). These strategies balance innovation with risk management, addressing core ethical concerns without generating unnecessary controversy [7].

6. Future Outlook: Development Trends of Translation Technology Innovation

Generative AI is poised to continue shaping the evolution of professional translation, with future trends focusing on three core dimensions: technology integration, industry ecosystem reconstruction, and talent capability enhancement. Each dimension offers practical value by streamlining workflows, improving translation quality, and expanding the boundaries of translation services.

To contextualize these emerging trends, it is useful to examine the recent evolution of translation technology and anticipate its trajectory. Figure 4 presents a timeline highlighting key technical milestones over the past five years alongside projected advancements for the next three years.

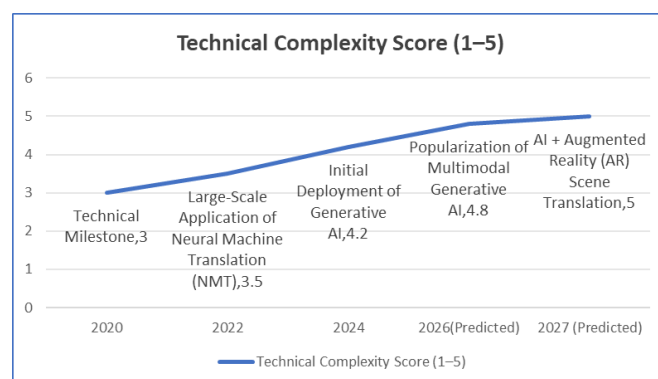


Figure 4. Timeline of Translation Technology Innovation (2020-2027).

This timeline shows a clear progression from text-only tools to integrated, interactive systems-laying the groundwork for the three core trends ahead.

6.1. Technology Integration: Generative AI Empowers Multimodal Translation

Building on the 2024 milestone of multimodal generative AI, future integration will enhance scene adaptability, overcoming the limitations of text-only translation to enable synchronized processing of text, images, and audio [8]. For example, in technical document translation for manufacturing, the technology can simultaneously translate textual instructions (e.g., "equipment maintenance procedures"), annotate diagrams (e.g., labeling "gear transmission components" in mechanical drawings), and transcribe/translate audio guidelines (e.g., converting oral operational instructions into multiple languages). In cross-border e-commerce, it can provide real-time translation of product pages, aligning translated descriptions with visual content (e.g., explaining a jacket's "waterproof function" alongside rain-test images) and synchronizing with customer service voice interactions. This multimodal integration does not require complex technical overhauls but emphasizes user-centric adaptability, making translation more intuitive and efficient for professionals across diverse fields.

6.2. Industry Ecosystem: Deep Integration of Collaborative Platforms and AI

Aligned with the predicted 2027 milestone of cross-linguistic collaboration platforms, future translation ecosystems will combine generative AI with cloud-based collaborative

tools to establish a “*real-time synergy + dynamic knowledge update*” system. Such platforms will allow global teams to co-edit documents simultaneously, while AI continuously updates shared terminology libraries (e.g., automatically adding newly defined “*battery energy storage terms*”) and provides consistent term recommendations. For service providers, the ecosystem will integrate AI-driven project management, automatically assigning tasks based on translators' domain expertise (e.g., matching pharmaceutical translators with medical documents) and tracking progress in real time. This integrated approach will reduce cross-team delays and standardize translation quality across the industry.

6.3. Talent Upgrading: Cultivating Composite Translation Capabilities

The shift toward AI-augmented translation, evident since the 2022 deployment of generative AI, necessitates that translators develop composite capabilities combining domain expertise, AI proficiency, and cultural adaptation skills. Rather than focusing solely on manual translation, translators will leverage AI tools—such as fine-tuning domain models or optimizing terminology libraries—to offload routine work, allowing them to concentrate on high-value tasks like cultural nuance adjustment and complex semantic verification. For instance, a legal translator with AI proficiency can use generative AI to draft initial contract translations and then focus on evaluating legal risk points. This evolution does not replace human translators but redefines their role as essential coordinators in human-AI collaborative workflows [9,10].

7. Conclusion

This study investigates the role of generative AI in professional translation, yielding several key findings.

Generative AI surpasses Neural Machine Translation (NMT) in professional contexts by leveraging *semantic understanding* and *contextual association*. It ensures consistency in legal contract terminology (e.g., “*indemnification obligations*”), accurately translates medical long-tail terms such as “*idiopathic pulmonary fibrosis*”, and preserves logical coherence in technical content (e.g., “*wafer etching processes*”). Empirical data demonstrate that AI-assisted workflows reduce translation time by 50%-83.3% (Figure 1), while human-AI collaborative translation narrows the gap with pure human performance in cultural adaptability (8.8 points) and semantic integrity (9.2 points), even surpassing human-only translation in terminology consistency (9.5 points) (Figure 2).

The *complementary* human-AI mechanism is central to these gains: AI handles approximately 80% of standardized tasks (basic translation, terminology calibration), while human translators focus on 20% of high-value tasks (cultural adaptation, ambiguous interpretation). The “*AI preliminary translation → human optimization → feedback loop*” workflow significantly boosts efficiency and is reinforced by a quality assurance system, including term checks and a 10% sampling review, to ensure reliability.

Industry surveys identify top challenges—*insufficient long-tail terminology* (35%) and *cultural adaptation bias* (25%) (Figure 3), which can be mitigated through domain-specific fine-tuning using large corpora (10,000+ industry documents) and knowledge graph integration, reducing errors by 62%.

Looking forward, the integration of generative AI with multimodal technologies, cloud-based collaborative platforms, and the cultivation of composite translator skills promises to further transform the professional translation landscape. This study provides a comprehensive framework for AI-enhanced translation workflows, while future research can investigate specialized applications (e.g., aerospace, pharmaceuticals) and dynamic human-AI collaboration models to optimize both efficiency and translation quality.

References

1. Y. A. Mohamed, A. Khanan, M. Bashir, A. H. H. Mohamed, M. A. Adiel, and M. A. Elsadig, "The impact of artificial intelligence on language translation: a review," *Ieee Access*, vol. 12, pp. 25553-25579, 2024.

2. S. Feuerriegel, J. Hartmann, C. Janiesch, and P. Zschech, "Generative ai," *Business & Information Systems Engineering*, vol. 66, no. 1, pp. 111-126, 2024.
3. Y. Wan, B. Yang, D. F. Wong, L. S. Chao, L. Yao, H. Zhang, and B. Chen, "Challenges of neural machine translation for short texts," *Computational Linguistics*, vol. 48, no. 2, pp. 321-342, 2022. doi: 10.1162/coli_a_00435.
4. L. Barrault, Y. A. Chung, M. C. Meglioli, D. Dale, N. Dong, P. A. Duquenne, and S. Wang, "SeamlessM4T: massively multilingual & multimodal machine translation," *arXiv preprint arXiv:2308.11596*, 2023.
5. K. A. Alkodimi, O. A. Alqahtani, and B. Q. Al-Wasy, "Human-AI collaboration in translation and back translation of literary texts," *Journal of Social Studies*, vol. 30, no. 2, pp. 173-192, 2024.
6. S. H. Ahammad, R. R. Kalangi, S. Nagendram, S. Inthiyaz, P. P. Priya, O. S. Faragallah, and A. N. Z. Rashed, "Improved neural machine translation using Natural Language Processing (NLP)," *Multimedia Tools and Applications*, vol. 83, no. 13, pp. 39335-39348, 2024. doi: 10.1007/s11042-023-17207-7.
7. I. Rivera-Trigueros, "Machine translation systems and quality assessment: a systematic review," *Language Resources and Evaluation*, vol. 56, no. 2, pp. 593-619, 2022. doi: 10.1007/s10579-021-09537-5.
8. O. Caglayan, "Multimodal machine translation (Doctoral dissertation, Le Mans Universite)," 2019.
9. K. Davis, "Human society," 1949. doi: 10.2307/3538042.
10. T. N. N. Nguyen, T. T. Tran, N. H. A. Nguyen, H. P. Lam, H. M. San Nguyen, and N. A. T. Tran, "The Benefits and Challenges of AI Translation Tools in Translation Education at the Tertiary Level: A Systematic Review," *International Journal of TESOL & Education*, vol. 5, no. 2, pp. 132-148, 2025.

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