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Patent Translation Quality Assessment: A Weighted Multidimensional Framework Adjusted to Scope Preservation and Claim-Description Asymmetry with a Risk Index Indicator System

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Article

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Patent Translation Quality Assessment: A Weighted Multidimensional Framework Adjusted to Scope Preservation and Claim-Description Asymmetry with a Risk Index Indicator System

Abstract: The currently popular translation quality assessment (TQA) models prove inadequate for the unique challenges of patent texts. Inappropriate handling in translation can lead to unintended narrowing of claim scope, terminological inconsistency, or added-matter risks, thereby compromising the legal and commercial value of the patent. This paper proposes a weighted multidimensional framework for patent translation quality assessment, drawing on legal translation theory, CNIPA claim interpretation principles, and Multidimensional Quality Metrics (MQM). The framework evaluates translations across seven weighted dimensions, with particular emphasis on claim scope preservation and claim-description differentiation. Through a detailed parallel textual analysis of a high-stakes English-Chinese patent featuring the coined terms “Clutch” and “Boom,” the study demonstrates how the proposed rubric can systematically identify risks related to scope preservation and the maintenance of appropriate abstraction levels between claims and description. The paper also introduces a “Risk Index” system to provide practitioners with a practical overview of potential vulnerabilities. Findings indicate that effective patent translation requires not only linguistic accuracy but a sophisticated understanding of legal function and the distinct rhetorical purposes of different patent sections. The framework offers practical value for translators, patent attorneys, and machine translation post-editing workflows, while laying the groundwork for larger-scale corpus-based research.

Keywords: patent translation; translation quality assessment; claim-description asymmetry; scope preservation; Risk Index; legal translation

MSC Classification: 91F20, 68T50

JEL Classification: K11, O34, O31

1. Introduction

Patent translation occupies a uniquely demanding position in specialized translation. While technical translation in fields such as medicine, engineering, or law requires high accuracy and domain knowledge, patent translation carries significantly higher legal and commercial risks. A flawed translation of patent claims can result in the complete loss of exclusive rights, invalidation,

or unenforceability — consequences that may directly affect billions of dollars in market value and innovation incentives.

Patent translation must navigate a deliberate rhetorical and legal asymmetry: claims are intentionally drafted in abstract, functional language to maximize protective scope and cover equivalents, while the description and embodiments provide concrete, enabling support that must not improperly limit the claims. This asymmetry is central to the patent system's balance between public disclosure and private monopoly. Poor handling of this distinction during translation can lead to unintended narrowing of claim scope, introduction of added matter, or terminological inconsistencies that become fatal in examination or invalidation proceedings.

The unique stakes of patent translation are clearly reflected in CNIPA practice. According to CNIPA's annual compilations of typical re-examination and invalidation cases, issues relating to claim interpretation, support from the description, and the scope of functional features frequently appear among high-impact disputes. Within this functionalist ecosystem, achieving structural symmetry between Western drafting traditions and Chinese statutory interpretation requires a specialized understanding of legal-functional equivalence. As Cao (2014) demonstrates, specific syntactic structures in Chinese legal-technical registers carry rigid judicial constraints that direct-word mapping cannot replicate, meaning that localized equivalents must be chosen based on their institutional and interpretive consequences rather than literal semantic alignment. In both 2023 and 2024 Top 10 cases, problems concerning the relationship between claims and specification, priority claims, and inventive step frequently turned on precise textual interpretation — areas highly vulnerable to translation inaccuracies. Translation errors or ambiguities have been exploited in invalidation proceedings, sometimes leading to partial or full invalidation even for otherwise robust inventions.

Existing translation quality assessment (TQA) models, developed primarily for general technical, literary, or localization purposes, have proven inadequate for these genre-specific challenges. Most models do not sufficiently prioritize the preservation of claim breadth or the maintenance of appropriate abstraction levels between claims and description.

This paper proposes a weighted multidimensional framework for patent translation quality assessment tailored to the English-Chinese language pair. The framework integrates legal translation theory, CNIPA claim interpretation principles, and Multidimensional Quality Metrics (MQM), while

introducing patent-specific dimensions and weightings. It is developed and illustrated through a detailed case study of a user interface manipulation patent (ZL201280055598.3) together with other functionally significant terms. Through parallel textual analysis of the original English specification and its Chinese translation, this study demonstrates how the proposed rubric can systematically identify risks related to claim scope preservation and the differentiation between claim and description. The findings highlight that effective patent translation requires not merely linguistic accuracy but a sophisticated understanding of legal function and the distinct rhetorical purposes of different patent sections.

Materials mentioned for the case under discussion are put in a bilingual file to be found at https://doi.org/10.5281/zenodo.20389109.

2. Literature Review

The evaluation of patent translation quality operates at a high-stakes convergence of technical exposition, linguistic mediation, and statutory interpretation (Tsai, 2014). An imprecise translation of patent claims or functional limitations can directly result in the partial or complete loss of patent rights through invalidation, rejection, or narrowed protection (Cross, 2010; Interlex, 2025). This risk is particularly evident in China, where the China National Intellectual Property Administration's (CNIPA) annual compilations of typical re-examination and invalidation cases demonstrate that issues relating to claim interpretation, support from the description, and the legal scope of functional features frequently dominate high-impact intellectual property disputes (CNIPA, 2023, 2024).

Historically, the evaluation of patent translation quality has faced a distinct operational paradox. A national phase application must structurally behave as a "covert" translation (House, 1997, 2015)—functioning seamlessly as an independent, native document within the target legal system to avoid frustrating administrative actions from examiners. Yet, it simultaneously remains bound by strict "overt" fidelity to the original filing document to preserve cross-border priority dates and prevent the unlawful introduction of unsupportable new subject matter (EPO, 2026). Consequently, assessing this literature requires a multidimensional view that balances functionalist translation principles (Nord, 1997; Vermeer, 1989) with the pragmatic realities of global patent prosecution.

2.1 Foundational Strands in Patent Translation Research

Corpus-based translation studies have significantly advanced the empirical tracking of specialized translation shifts and stylistic norms (Baker, 1993, 1995; Laviosa, 2002). However,

research dedicated specifically to patent translation quality assessment from a rigorous corpus perspective remains relatively limited. Existing intellectual property scholarship can be generally grouped into three main strands.

The first strand focuses primarily on error identification and taxonomical classification. Tsai (2014) proposed an integrated translation quality assessment (TQA) model for patent abstracts, categorizing translation defects into three structural dimensions: meaning, form, and compliance (subdivided into readability, clarity, and concision). Subsequent studies have actively extended this descriptive error analysis to full patent texts and machine translation outputs within specialized English-Chinese contexts (Chen, 2024; Tsai, 2017). This strand highlights the necessity of weighting translation defects based on text type, noting that an error in a binding claim carries substantially different legal weight than an identical linguistic slip in the surrounding prose.

A second major strand concerns machine translation (MT) performance and system evaluation. Large-scale international campaigns, most notably the NTCIR Patent Translation Tasks, have generated extensive parallel corpora and benchmarked statistical and neural machine translation frameworks across highly disparate language pairs (Fujii et al., 2008; Goto et al., 2013). Crucially, this computational thread of research exposes a major empirical bridge to legal vulnerability: when automated systems or unverified manual workflows struggle with hyper-dense technical terminology or complex clausal structures, they introduce localized semantic drift. This linguistic distortion directly compromises the document's standalone legal utility, transforming surface-level machine translation errors into deep-seated litigation and enforcement risks under hostile administrative review. Recent research has expanded this computing focus to examine the capabilities and systemic limitations of large language models (LLMs) in handling the highly rigid "patentese" register (Silverman, 1996).

The third strand addresses the complex legal, technical, and linguistic nuances that govern how a localized patent behaves under adversarial scrutiny. Researchers have investigated the structural presence of textual redundancy in translated patent abstracts (Tsai, 2011), the direct impact of translation quality on public patent disclosure and administrative enforcement (Larroyed, 2018, 2019), and the severe commercial implications and economic distortions caused when poor translations disrupt global asset portfolios (Araghi et al., 2024). This dynamic confirms that language barriers represent a material, quantifiable hazard during cross-border enforcement. As

Burk and Lemley (2003) note, because patent interpretation guidelines are inherently technology-specific and dependent on regional examiner standards, any translation lacking strict internal structural coherence gives competitors the precise semantic ambiguities needed to challenge an invention's validity during administrative re-examination hearings.

Crucially, Chen (2024) offers a valuable case study of these legal-technical challenges in English-Chinese patent translation based on an invalidated patent, mapping exactly how an unexamined translation accident can result in a total collapse of a patent's inventiveness step during re-examination. These studies confirm that language translation faults are a material source of legal vulnerability in the global patent system (see Table 1).

Table 1 Theoretical Landscape of Existing Patent Translation Literature

Research Strand	Representative Scholars	Core Evaluation Unit	Critical Blindspots for Patent Survival
Error Taxonomies	Tsai (2014), Chen (2024)	Patent Abstracts / Isolated Sentences	Flattens legal weight; treats all terms equally.
System Evaluation	Fujii (2008), Goto (2013)	MT Outputs & Corpora	Focuses on statistical fluency over scope protection.
Legal Nuances	Cross (2010), Araghi (2024)	Litigation Briefs & Court Records	Lacks a structured linguistic scoring framework.

2.2 Multidimensional Quality Metrics (MQM) and Its Functional Limitations

Among general translation evaluation frameworks, the Multidimensional Quality Metrics (MQM) framework represents one of the most comprehensive advancements in modern translation quality assessment (Lommel et al., 2014; Melby, 2015). Developed under the EU-funded QTLaunchPad project, MQM provides a highly flexible, hierarchical error typology containing over 100 explicit issue types organized under major core dimensions such as Accuracy, Fluency, Terminology, Style, Locale Convention, and Verity (themqm.org). The primary contributions of MQM to the broader discipline include its high degree of customizability according to project specifications, its transparent severity weighting tiers (Critical, Major, Minor), and its ability to improve metrics comparability across human and machine translation outputs. Due to this structural

rigor, MQM has been widely adopted across the localization industry and has significantly influenced modern international translation standards, such as ISO 5060.

Nevertheless, MQM exhibits clear limitations when applied to the specialized field of patent translation. It is predominantly product-oriented and error-counting in its execution, not prioritizing claim scope preservation as the overriding legal goal of the document, nor providing specific mechanisms to evaluate the critical claim-description asymmetry — the deliberate, strategic use of abstract, functional genus language in the claims versus the concrete, enabling species disclosures required in the detailed description (WIPO, 2003).

Furthermore, MQM's highly detailed error typology, while a strength in broad commercial settings, can become overly complex and resource-intensive for patent workflows. Most critically, it lacks fine-tuned categories capable of capturing the legal-functional implications of central coined terms or functional limitations that ultimately determine a patent's validity and enforceability under cross-border judicial review (Tsai, 2014).

Significant gaps remain in the existing literature. Most corpus-based and tool-based studies concentrate almost exclusively on isolated, brief sections of the patent—especially titles or abstracts—which are of minor importance for patent survival, implementation, and litigation. No studies systematically investigate the asymmetric claim-description relationship using a complete text design.

Furthermore, existing frameworks do not care whether the translated claims provide substantially the same breadth of legal protection as the original filing, while simultaneously functioning as a standalone legal document that satisfies the formal, interpretive, and public-notice requirements of the target jurisdiction.

3. Theoretical Framework

This study directly builds upon previous research on error analysis, machine translation evaluation (Goto et al., 2013; Larroyed, 2023), legal-linguistic impact studies (Araghi et al., 2024; Larroyed, 2018, 2019), and multidimensional quality metrics (Lommel et al., 2014). It proposes a tailored multidimensional framework that foregrounds:

1. systematic extraction and classification of technical features as a mandatory baseline step,
2. absolute preservation of legal claim scope, and

3. operational differentiation between claim and description registers as core components of the assessment.

A weighted multidimensional framework for patent translation quality assessment is developed specifically for English-Chinese patent translation. The framework integrates insights from corpus-based translation studies, legal translation theory, patent-specific claim interpretation principles (particularly CNIPA practices), and existing quality assessment models, while addressing the unique rhetorical and legal characteristics of the patent genre.

The central argument of this framework is that equivalence in patent translation should be defined primarily as equivalence in patent scope. A high-quality translation must enable the Chinese version to afford substantially the same breadth of legal protection as the original English text, while simultaneously functioning as a standalone legal document that satisfies the formal requirements and interpretive conventions of the Chinese patent system.

3.1 Relationship with Existing Models

The framework builds upon the Multidimensional Quality Metrics (MQM) (Lommel et al., 2014), one of the most comprehensive and widely adopted translation quality assessment systems. MQM provides a flexible, hierarchical error typology with over 100 issue types organized under major dimensions such as Accuracy, Fluency, Terminology, Style, Locale Convention, and Verity. Its strengths lie in its customizability, transparent severity weighting (critical, major, minor), and ability to produce comparable quality scores. These features make MQM a valuable foundation for analytic evaluation of both human and machine translation.

However, MQM was originally developed for general translation and localization tasks. When applied to patents, several important limitations emerge. It does not sufficiently prioritize claim scope preservation as the overriding criterion. Then, it lacks dedicated mechanisms to evaluate the critical asymmetry between claim and description — the deliberate use of abstract, functional language in claims versus concrete enabling disclosure in the description. This structural blind spot occurs because general metrics fail to recognize that “patentese” functions as a highly distinct, localized legal-technical register possessing its own independent grammar and interpretive syntax (Osenga, 2006). In this specialized register, the strategic deployment of broad genus language in the claims is intentionally designed to secure maximum market monopoly. Also, its detailed error typology, while comprehensive for linguistic issues, is not fine-tuned for the legal-functional

implications of central coined terms or functional limitations that can determine a patent's validity throughout its life.

Similarly, while Tsai's (2014) TQA model for patent abstracts offers a systematic approach to error classification, it focuses primarily on abstracts (which have no legal weight) from the perspective of readers, and does not adequately address the full patent document or the overriding importance of claim scope.

This study extends these models by introducing patent-specific dimensions and re-weighting priorities. The proposed framework gives significantly higher weight to legally decisive aspects and treats the systematic identification of technical features as a foundational step. It comes out with a Risk Index system applicable for many parties.

3.2 Core Dimensions of the Framework

The proposed framework evaluates patent translations across seven dimensions weighted according to the impact they might have on the patent:

1. Identification and Classification of Technical Features (10%)

   This process isolates each structural, functional, or material element of an invention and categorizes it to ensure its legal scope is perfectly preserved in the target language. It assesses the translator's ability to systematically identify central vs. peripheral terms and boilerplate technical features in the claims. Central features are the novel, non-obvious elements that define the invention's inventive step. Peripheral features describe the surrounding environment, optional components, secondary embodiments, and preferred variations. Boilerplate features consist of standard, repetitive legal clauses, transitional phrases, disclaimers, and standard definitions added by patent attorneys to shield the document from adverse judicial interpretations. Coined terms, functional limitations, and other case-specific expressions are of vital importance in translation. Proper classification is a prerequisite for all subsequent evaluation.

2. Claim Scope Preservation (35%)

   This is the highest-weighted dimension. It assesses whether the translation maintains the intended abstract and functional breadth of the claims without unintended narrowing or broadening (added matter). Translation should maintain the same breadth, ambiguity, and limitations as the original English. Particular attention is paid to central terms and

functional limitations. The claims define the monopoly boundaries, and even a tiny language shift can accidentally expand, narrow, or blur those boundaries, risking claim invalidation or loss of protection.

3. Contextual Terminology Fidelity (15%)

   This dimension evaluates the consistent and appropriate rendering of terms throughout the document. This dimension acknowledges that many central patent terms (especially coined terms and functionally defined expressions) are case-specific rather than standardized. Fidelity in patent translation requires high accuracy in both technical terminology and legal scope. A single mistranslation can invalidate patent claims or limit the legal protection of the invention across jurisdictions. The translated text should perfectly mirror the semantic intent and legal weight of the original disclosure. It ensures a native patent examiner in the target jurisdiction understands the structural and functional reality of the invention in exactly the same way.

4. Claim-Description Differentiation (15%)

   This dimension examines whether the translation successfully preserves the rhetorical asymmetry between breadth-oriented claims and the more concrete, enabling description/embodiments. Claims define the legal boundaries of the patent by using broad categories to capture competitors, while the description explains how to make and use the invention often with specific examples. “Claim importing” with narrowing phrasing from the description accidentally leaking into the claims will severely restrict the patent’s scope. Translators must use completely different linguistic registers for claims and descriptions to mirror their differing legal functions (Ikeda et al, 2011).

5. Legal and Jurisdictional Compliance (10%)

   Legal and jurisdictional compliance in patent translation ensures that a translated patent specification conforms exactly to the localized statutory rules, statutory interpretations, and procedural rules of the target country’s patent office. Unlike standard legal translations, patent translations function in a specialized regulatory ecosystem where even a minor formatting or semantic shift can trigger fatal office actions or render a patent unenforceable in litigation. This dimension assesses adherence to Chinese patent drafting conventions (for example, use of “所述”, “配置为”, formal sentence structures, etc.) and CNIPA claim

interpretation principles.

6. Technical Accuracy and Enablement (10%)

   This dimension evaluates whether the translation accurately conveys the technical content and provides sufficient enabling disclosure. China's patent statutes mandate that the detailed description must enable a person having ordinary skill in the art (PHOSITA) to replicate and use the invention without undue experimentation. In addition, when a patent is translated for a foreign jurisdiction, any technical inaccuracy or semantic drift in the specification directly threatens its enablement status, potentially triggering an indefiniteness rejection or invalidating the patent during litigation.

7. Linguistic Fluency and Readability (5%)

   This dimension assesses naturalness and clarity of the Chinese text as a standalone patent document. Patent translation requires balancing two competing priorities: natural readability and rigid legal precision. Fluency in patent translation does not mean creating an elegant literary work. Instead, it means achieving a highly specialized, precise style called "patentese" as previously mentioned: The document must read naturally to a person skilled in the art and a patent examiner in the target country.

Linguistic fluency and readability were assigned the lowest weight in this framework against common sense. It does not mean fluency and readability are of lesser importance. While it is true that a somewhat "bumpy" or stylistically awkward translation can sometimes be explained and defended in legal proceedings through reference to the description, drawings, and prosecution history, such reliance is inherently risky. Examiners and judges primarily interpret the text as written, and ambiguity tends to be construed against the patentee. However, a fluent but scope-narrowing translation is far more dangerous than a somewhat stiff but legally robust one. Therefore, fluency is subordinated to legal-functional priorities such as claim scope preservation and the asymmetry between claims and embodiments. This weighting choice represents a conscious departure from general TQA models and features distinctively in this framework. This framework extends existing TQA models by placing scope equivalence and other factors at its core, recognizing that patent translation is not merely a linguistic task but a legal-functional one.

3.3 Operational Rubric

The operational rubric consists of two main stages:

Stage 1: Technical Feature Identification (Mandatory Preliminary Step). By separating the technical mapping from the evaluation process, it eliminates subjective bias and ensures that the assessment directly reflects the legal and scientific risks inherent in patent litigation.

- Extract nouns, noun phrases, and functional limitations from the claims.
- Classify them as Central (core inventive concepts, coined terms, key limitations), Peripheral, or Boilerplate.
- Create a working glossary for the specific patent.
- Evaluate the completeness and accuracy of this identification.

Stage 2: Dimension-Based Scoring. Once the technical map is established, the translation is scored across dimensions. Errors are weighted based on how they affect the technical feature classification. Each of the seven dimensions is scored on a 0–10 scale, with risks classified as Critical, Major, or Minor according to their potential impact on patent scope and validity. Scores in higher-weighted dimensions (especially dimensions 1 and 2) carry greater impact on the overall quality rating.

By foregrounding scope equivalence and claim-description differentiation, this framework advances conventional TQA models and underscores the inherently legal-functional character of patent translation instead of upholding it as just a linguistic task.

4. Methodology and Case Background

This section outlines the research design and justifies the methodological choices made in this study. Given the exploratory nature of developing a new multidimensional framework for patent translation quality assessment (PTQA), a single-case, parallel-text approach was adopted. This allows for detailed, contextualized analysis of the complex rhetorical, technical, and legal relationships within a complete patent document—an approach well-suited to legal scope preservation, investigation into the critical asymmetry between claim and description, and the legal-functional implications of central terms.

4.1 Research Design

This study adopts a single-case, parallel-text qualitative analysis within the tradition of corpus-based translation studies (Baker, 1993, 1995; Laviosa, 2002). Single-case designs are well-established in translation studies for their ability to provide rich, contextualized insights into complex phenomena that quantitative approaches often overlook (Susam-Sarajeva, 2009; Neubert,

2004). They are suitable for patent translation research, where the intricate interplay between legal function, rhetorical structure, and technical specificity requires fine-grained textual and contextual analysis rather than broad statistical generalization.

The methodology consists of two main stages, each designed with explicit theoretical and practical justification drawn from existing translation quality assessment literature (Tsai, 2014; Lommel et al., 2014; House, 2015).

Stage 1: Technical Feature Identification and Semantic Mapping

In patent translation, any term or limitation that enters the claims can potentially determine the patent's scope, validity, and enforceability throughout its entire life. Therefore, a systematic identification and classification of technical features is not merely preparatory but foundational. It enables subsequent evaluation to focus appropriate attention and weighting on the most legally significant elements. This step directly addresses a common weakness in existing TQA models, which often treat all terms with similar weight. All nouns, noun phrases, and functional limitations appearing in the claims—the independent claim in particular—were extracted and classified into one of three categories:

- Central: Core inventive concepts, coined terms, and key functional limitations that define the essence of the invention and carry the heaviest legal weight.
- Peripheral: Supporting technical elements that contribute to the description but are not central to the inventive step.
- Boilerplate: Standard patent phrasing that appears across many documents (e.g., "comprising," "configured to," "further comprising").

A patent-specific glossary is compiled from this classification to ensure terminological consistency and to serve as a reference throughout the assessment. Crucially, this stage maps the semantic elasticity of the source terms against the domain-specific rigidity of the target characters. It identifies instances where an elastic English metaphor risks being frozen into an incorrect physical, chemical, or kinematic register in the target language.

Stage 2: Multidimensional Scoring

The official Chinese translation was systematically compared against the original English text using the seven-dimension framework proposed in Section 3. Each dimension was scored on a 0–10 scale. Risk levels (Critical, Major, Minor) were assigned based on the potential impact on claim

scope, validity, or enforceability, drawing on severity weighting principles from MQM (Lommel et al., 2014). A weighted overall score was then calculated.

Critical: Errors fundamentally altering central features, causing fatal enablement breakdowns or unsupportable claim broadening/narrowing.

Major: Structural mismatches in peripheral features or broken antecedent basis chains that trigger indefiniteness.

Minor: Non-standard terminology choices or tangled syntax that degrade linguistic fluency without altering the legal boundaries of the monopoly.

A weighted overall score is then calculated. This stage operationalizes the theoretical framework by combining close textual comparison with patent-specific legal-functional analysis. The scoring system adapts MQM's transparent severity weighting but reorients priorities toward the patent genre's unique requirements. This hybrid qualitative-quantitative approach aligns with best practices in specialized translation research, where purely automated or purely impressionistic methods have proven insufficient (Tsai, 2014; Rossi, 2013). This methodology combines rigorous textual comparison with patent-specific legal-functional analysis. It prioritizes qualitative depth and contextual understanding over purely quantitative metrics, which aligns with the complex nature of patent language.

The methodology implements a strict control over hindsight bias to avoid distorting the quality scoring. To preserve the predictive validity and objectivity of the PTQA tool, the linguistic, technical, and jurisdictional analyses of the target text are executed via a PHOSITA Blind Test. The researcher evaluates the Chinese text purely from the internal technical perspective of a target-country Person Having Ordinary Skill in the Art and the formal guidelines of the China National Intellectual Property Administration (CNIPA). All dimension-based error deductions and risk assignments are completed, documented, and frozen prior to, and completely independent of, any analysis of the external arguments.

4.2 Case Background

The case, titled "Apparatus, Method and Computer-Readable Storage Medium for Manipulating a User Interface Element," relates to innovative touch-sensitive user interface manipulation techniques featuring two central mechanisms: "Clutch" and "Boom." Microsoft actively attempted to dismantle Newman Infinite's patent through three separate administrative

invalidation petitions before CNIPA and subsequent appeals in Specialized IP courts.

- Clutch serves as a selective engagement/disengagement mechanism. It allows a user to target and manipulate specific user interface elements (e.g., moving, coloring, or rotating them) while protecting non-targeted elements from unintended modification.
- Boom provides precision movement functionality, enabling pixel-by-pixel (or otherwise fine-grained) control of targeted elements, often with acceleration based on touch duration or pressure.

The main disputes of the invalidation challenge (Decision No. 4W117583) centered on the interpretation of the self-coined term "clutch user interface element" and whether the claims were sufficiently supported by the description. The petitioner argued for a narrow interpretation based on specific embodiments, while the patentee emphasized the functional definition in the claims.

In its decision dated May 6, 2024, the CNIPA upheld the patent's validity, ruling that self-coined terms should be interpreted from the perspective of a person skilled in the art, taking into account both the claims and the specification as a whole, without unduly limiting the claims by specific embodiments. The case was subsequently selected by CNIPA as one of the Top 10 typical re-examination and invalidation cases of 2024.

This patent is particularly suitable for the present study because it contains several central coined terms and functional limitations, clearly exemplifies the claim-description asymmetry, and offers a real-world example of how translation-related issues can become central in high-stakes legal proceedings.

The parallel corpus used in this study consists of:

- The original English patent specification (including claims, description, and drawings).
- The official Chinese translation submitted to the CNIPA during the Chinese national phase prosecution.

This case provides an excellent opportunity to test the proposed framework in a real-world legal context.

To resolve the cognitive Hindsight Bias (Fischhoff, 1975) issue, contemporary translation studies within single-case qualitative designs emphasize the integration of strict operational guardrails (Neubert, 2004; Susam-Sarajeva, 2009). By implementing a "PHOSITA Blind Test"—where the textual and jurisdictional alignment is audited and frozen entirely independent of the

subsequent litigation history—this study ensures that the proposed PTQA instrument achieves predictive neutrality, successfully isolating structural translation defects before they are ever exposed to a courtroom environment.

5. Case Analysis: Application of the Framework

This section applies the proposed multidimensional framework to the English-Chinese translation of the patent in question. Moving beyond surface-level linguistic auditing, the analysis evaluates how well the translation preserves legal scope, maintains rhetorical balance, and meets patent-specific requirements, highlighting strengths and potential risks in the translation.

5.1 Stage 1: Identification and Classification of Technical Features

The patent files are studied for a general view of the patent. A systematic extraction of terms and technical features from the independent claims is done following the principles detailed in Table 2:

Table 2. Term-Extraction Criteria

Criteria	**Description**	**Examples from this patent**
Technical / Domain-specific	Words that have special meaning in UI, touch interfaces, software, or patents	"clutch user interface element", "engaging touch event", "boom functionality", "target element identifier"
Defined or Repeated	Words/phrases that are used multiple times with consistent meaning across claims and description	"user interface element", "manipulating functionality", "selection touch event"
Legally Significant	Words that affect claim scope or are key limitations	"in proximity to", "while there is an absence of", "in response to determining"
Coined / Invented Terms	New or specially created terms for this invention	"Clutch", "Boom", "clutch user interface element"
Recurring Noun Phrases	Multi-word noun phrases that act as a single concept	"non-transitory computer-readable storage medium", "visual indicator"
Patent Formal Language	Standard patent drafting phrases	"further comprising", "configured to", "associated with"

Terms are then classified as in Table 3. Independent claims were prioritized because they

define the broadest scope of protection and carry the greatest legal significance.

Table 3. Classification of Technical Features

Category	Examples (English)	Frequency	Classification Rationale
Central	clutch user interface element, engaging touch event, target user interface element, manipulating functionality, boom functionality, target element identifier	High	Core inventive concepts, coined terms, key functional limitations defining the invention
Peripheral	touch-sensitive display screen, visual indicator, overlay, selectable virtual buttons, processor	Medium	Supporting technical elements, hardware medium, Software graphic wrapper
Boilerplate	comprising, configured to, further comprising, in response to determining, non-transitory computer-readable storage medium	High	Standard patent phrasing, dictates open-ended claim construction under international and CNIPA guidelines, satisfies software patentability thresholds without invoking structural device limits

This classification serves as the foundation for subsequent evaluation. Central terms receive heightened scrutiny across all dimensions.

5.2 Multidimensional Scoring Results

With related factors of the patent taken into consideration, the translation is scored according to how they might affect the patent. The weight assigned to each factor and how they are scored are listed in Table 4.

Table 4. Multidimensional Evaluation Results

	Dimensions	Weight	Score (0-10)	Risk Level	Weighted Contribution	Brief Assessment
1	Identification and Classification of Technical Features	10%	9.0	Minor	0.90	Systematic accurate extraction and classification
2	Claim Scope Preservation	35%	8.0	Major	2.80	Generally competent, with some narrowing risks
3	Contextual Terminology Fidelity	15%	8.5	Minor	1.275	Good consistency, but contextual fit issues
4	Claim-Description Differentiation	15%	8.0	Major	1.20	Mostly maintained, minor leakage observed
5	Legal and Jurisdictional Compliance	10%	9.0	Minor	0.90	Good formal style
6	Technical Accuracy and Enablement	10%	9.0	Minor	0.90	Technically sound
7	Linguistic Fluency and Readability	5%	8.5	Minor	0.425	Generally natural
	Overall Weighted Score	100%	8.39	Low-Medium	8.39	Acceptable quality with room for improvement

As a key difference between patent translation and translation in other fields, Claim-Description Differentiation plays a vital role during the lifecycle of the patent. By “differentiation”, we do not simply mean they are “different”; Claim and Description are very closely related in a very particular manner. How the selected examples are assessed is listed in Table 5.

Table 5. Selected Examples of Claim-Description Differentiation

Term / Phrase	Claims (English) Usage	Description Usage	Translation Handling	Assessment
Clutch user interface element	Functional engagement switch	Specific UI button	Consistent	Acceptable
Engaging touch event	Abstract activation condition	Finger touching specific area	Adequate	Minor narrowing risk
Boom functionality	Precision movement mechanism	Pixel-by-pixel + acceleration functions	Consistent	Acceptable

5.3 Visual Summary

For a direct overall view of what role each dimension plays and how each dimension contributes to the final outcome of the translation quality, see Fig. 1, Fig. 2, Fig. 3 and Fig. 4. Fig. 1 shows the weight assigned to each dimension in comparison with each other. As can be clearly seen, claim scope preservation is given the greatest priority. Fig. 2 shows how each dimension for assessment contributes to the final overall outcome calculated according to the scoring process. Fig. 3 shows the boundary set by the translation for the patent. Fig. 4 shows the achievement rate of the translation per dimension as measured against a 10-score scale.

Fig. 1. Dimension weight assigned

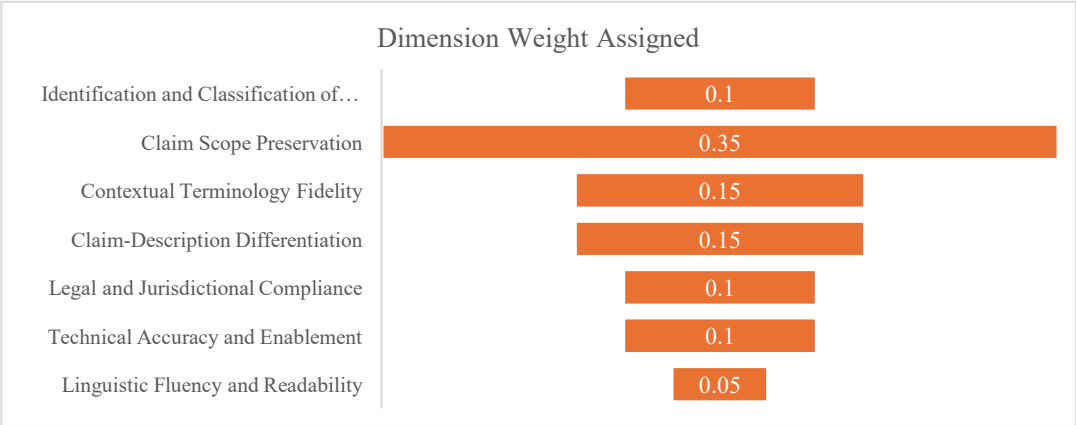


Fig. 2. Patent translation quality contribution calculated from the scoring process

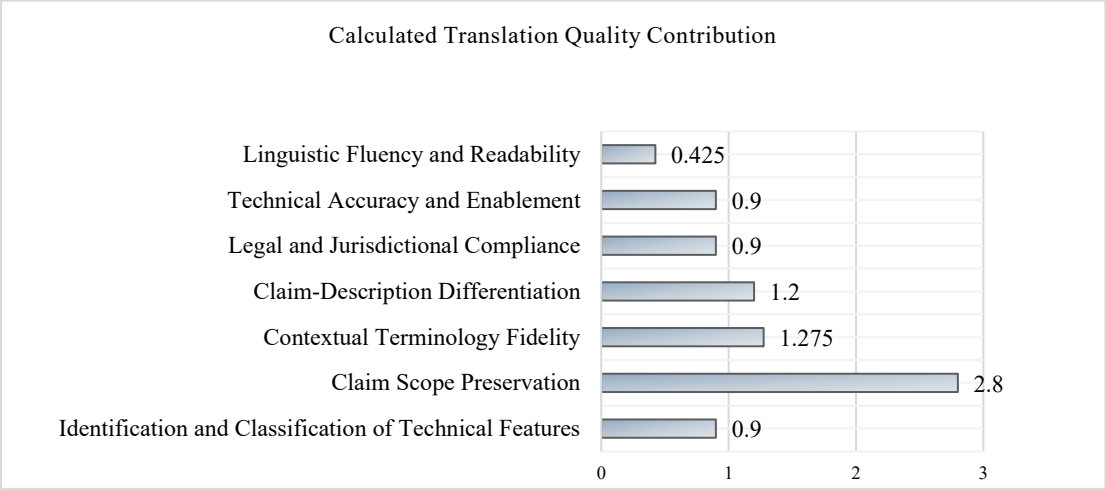


Fig. 3. Patent Scope as Marked by Translation

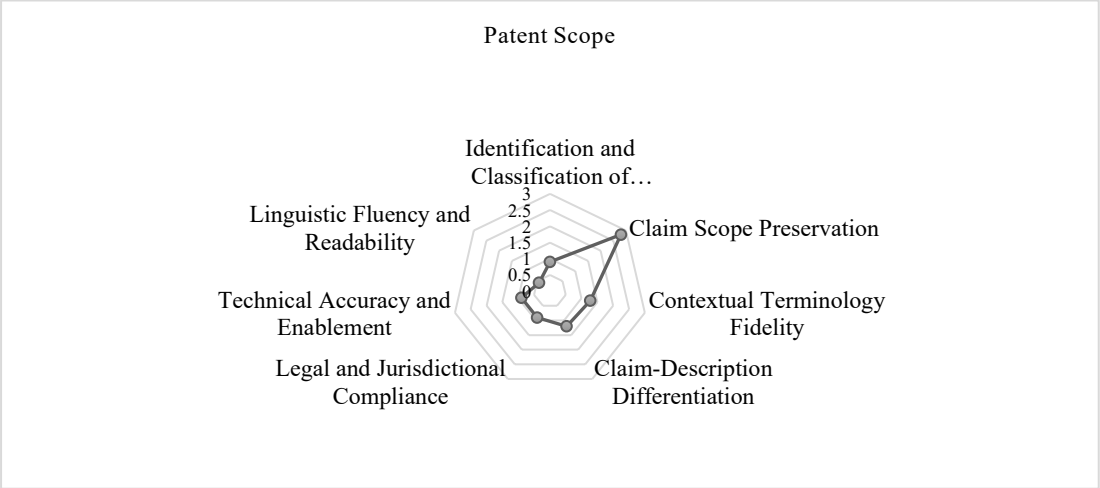


Fig. 4. Achievement Rate per Dimension

Dimension	Achievement Rate
Identification and Classification of Technical Features	90.0%
Claim Scope Preservation	80.0%
Contextual Terminology Fidelity	85.0%
Claim-Description Differentiation	80.0%
Legal and Jurisdictional Compliance	90.0%
Technical Accuracy and Enablement	90.0%
Linguistic Fluency and Readability	85.0%
Overall Weighted Score	83.9%

The figures provide an immediate visual profile of the translation's performance across all seven dimensions. They show relatively strong performance in Legal and Jurisdictional Compliance, Technical Accuracy and Enablement, and Contextual Terminology Fidelity. In contrast, the two highest-weighted dimensions—Claim Scope Preservation and Claim-Description Differentiation—display comparatively lower scores, pulling down the overall weighted result. The visual patterns underscore the framework's emphasis on legally decisive aspects rather than general linguistic

quality.

5.4 Dimension-by-Dimension Translation Quality Analysis

1. Identification and Classification of Technical Features (10%)

   The translator demonstrated a systematic approach to identifying central coined terms and functional limitations. This foundational step was carried out in depth, providing a reliable basis for the subsequent evaluation. However, a more explicit justification for classifying certain terms as central versus peripheral could further strengthen this stage.

2. Claim Scope Preservation (35%)

   As the highest-weighted dimension, this area reveals the most significant room for improvement. Several functional limitations were rendered in a slightly more restrictive manner than the original English. For example, the critical phrase “while there is an absence of an engaging touch event” was translated as “在…不存在接合触摸事件的同时”. Although functionally understandable, this phrasing is more temporally and conditionally constrained, carrying a Major risk of narrowing claim scope during future examination, invalidation, or enforcement proceedings.

3. Contextual Terminology Fidelity (15%)

   Central terms were translated with high internal consistency. “Clutch user interface element” was uniformly rendered as “离合器用户界面元件” and “Boom functionality” as “动臂功能”. While this consistency is a strength, the choice of “离合器” (a term strongly associated with mechanical clutches in automobiles or machinery) raises questions about optimal contextual suitability in a digital user interface environment. This represents a notable contextual fit issue that may affect how a person skilled in the art interprets the invention.

4. Claim-Description Differentiation (15%)

   The translation largely respects the abstract nature of the claims. Nevertheless, there are occasional subtle influences from concrete embodiments in the description that appear to affect claim phrasing. This minor leakage risks gradually importing limiting details into the claims, which could reduce the patent’s protective breadth over time.

5. Legal and Jurisdictional Compliance (10%)

   The translation adheres well to Chinese patent drafting conventions, making appropriate use of formal structures, referential expressions (for example, the use of “所述”), and standard

phrasing. As a whole, it reads as a natural Chinese patent document from a formal perspective.

6. Technical Accuracy and Enablement (10%)

   The technical content is conveyed accurately. The description provides sufficient enabling disclosure for a person skilled in the art to understand and implement the invention.

7. Linguistic Fluency and Readability (5%)

   The Chinese text reads naturally as a formal patent document. However, some sentences are demanding due to their length and complexity, which, while typical in Chinese patent style, may slightly reduce readability for examiners and third parties.

5.5 Risk Index and Risks Points for Long-Term Patent Preservation

To complement the multidimensional scoring system, this study also introduces a Risk Index (see Table 6) that translates quality scores into a more direct assessment of potential legal vulnerability. While the overall quality score reflects general translation performance, the Risk Index focuses specifically on the likelihood that weaknesses in each dimension could lead to adverse legal outcomes—such as narrowed claim scope, rejection during examination, or successful invalidation challenges. Calculated on a 0–10 scale (where 0 indicates negligible risk and 10 indicates critical or potentially fatal risk to the patent), the index weights each dimension according to its assigned importance in the framework. This provides practitioners with a practical, at-a-glance evaluation of the most pressing risk points. In the case of the patent in question, the Risk Index highlights moderate risks concentrated in the two highest-weighted dimensions, offering concrete guidance for targeted revision before filing or during post-editing.

Table 6. Risk Index Assessment for the Chinese Translation of Patent ZL201280055598.3
(Risk Index: 0 = Negligible risk → 10 = Critical / potentially fatal risk to patent strength)

Dimension	**Quality Score**	**Risk Index (0-10)**	**Risk Level**	**Justification with Specific Examples from the Patent**
Identification and Classification of Technical Features	9.0	1.5	Very Low	Systematic identification of central terms (“clutch user interface element”, “engaging touch event”, “target element identifier”, “boom functionality”). Minor room for more explicit justification of classification.
Claim Scope Preservation	8.0	6.0	Medium-High	Highest-weighted dimension shows notable weakness. Key example: “while there is an absence of an engaging touch event”. The Chinese version adds a stronger simultaneous/conditional tone, which is more restrictive.

				Also, the dynamic speed feature (“at a speed that changes according to the at least one total time and touch area”) appears omitted or significantly weakened. Risk of narrowed scope.
Contextual Terminology Fidelity	8.5	4.5	Medium	High consistency in translation of central terms. However, “离合器” for “Clutch” is problematic. In a user interface context, it evokes mechanical automotive or machinery coupling, which may mislead a person skilled in the art or examiner.
Claim-Description Differentiation	8.0	5.5	Medium	Mostly respected, but minor leakage exists. Concrete examples in the description (specific finger movements, pixel-by-pixel movement, visual indicators, acceleration functions) subtly influence claim phrasing. This risks gradually importing limiting details into the claims.
Legal and Jurisdictional Compliance	9.0	1.0	Very Low	Strong compliance with Chinese patent drafting conventions (“所述”, “配置为”, formal structures). Reads naturally as a CNIPA-style patent document.
Technical Accuracy and Enablement	9.0	2.0	Low	Technical content is generally accurate and provides sufficient enabling disclosure. Minor risk from the weakened speed adjustment feature in Claim 1.
Linguistic Fluency and Readability	8.5	3.0	Low	Generally natural Chinese patent style. Some sentences are long and complex (typical in formal Chinese patents), but this does not significantly impair readability for examiners or skilled persons.
Overall Index Risk	-	3.7	Low-Medium	Moderate risks concentrated in the two highest-weighted dimensions.

Overall Risk Index = Σ (Risk Score of Dimension × Weight of Dimension)/100

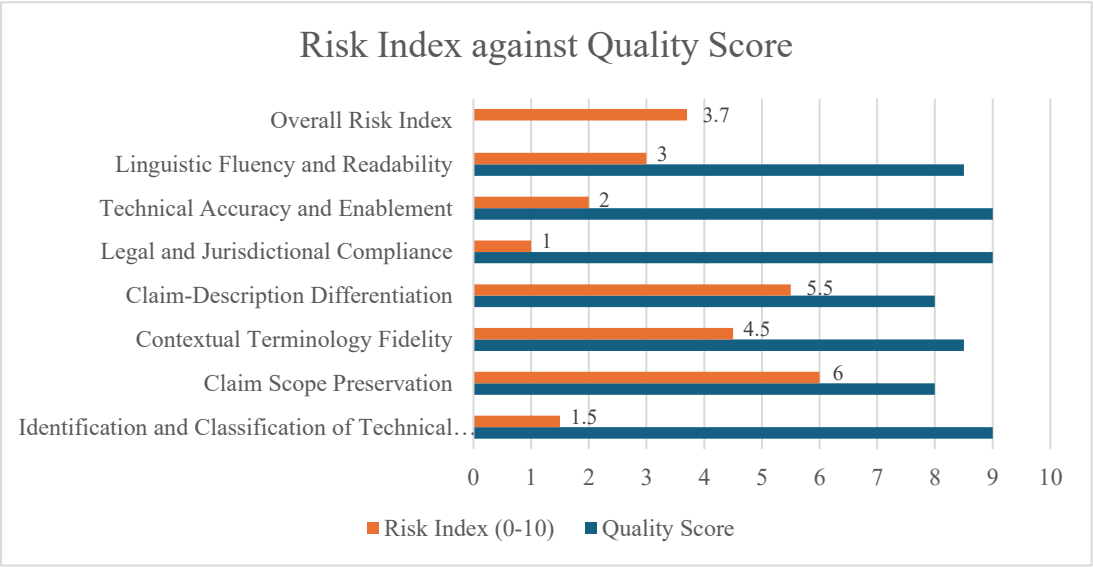
Overall Risk Index: 3.7 / 10 (Low-to-Medium Risk)

Interpretation Guide:

- 0–2.9: Low risk — Generally safe for filing.
- 3.0–5.9: Medium risk — Needs targeted improvement, especially in high-weight dimensions.
- 6.0+: High risk — Significant danger to patent strength.

Accordingly, risk points can instantly be found (in contrast to quality score) as in Fig. 5.

Fig. 5 Risk Index in Contrast to Quality Score



5.6 Overall Assessment

The forensic audit of Patent No. ZL201280055598.3 clearly demonstrates the predictive power of the PTQA framework over retroactive public record reviews. The Chinese translation achieves an overall weighted score of 8.39/10. It demonstrates professional competence in terminology consistency, technical accuracy, and formal compliance with Chinese patent drafting conventions.

However, by running a blind technical audit completely decoupled from the litigation outcome, this framework is optimized to expose deep structural fissures in the text. The evaluation reveals measurable weaknesses in the two highest-weighted dimensions—Claim Scope Preservation (8.0) and Claim-Description Differentiation (8.0). These shortcomings are particularly concerning because they directly affect the patent's legal strength, enforceability, and commercial value. Subtle shifts in functional language and occasional leakage from the description into the claims can create vulnerabilities that may be exploited in future proceedings. Competitors are effectively handed a judicial roadmap to design around the patentee's monopoly by executing identical functionalities on alternative physical boundaries that slip clean through the translated text's unintended limitations.

6. Discussion and Implications

The overall weighted score of 8.39 reflects a professionally competent translation. However, the radar chart and weighted contribution analysis clearly reveal an important pattern: the translation performs relatively well in linguistic, technical, and formal dimensions, but shows noticeable weaknesses in the two highest-weighted dimensions. This imbalance is significant because these

two dimensions have the greatest influence on the legal enforceability and commercial value of a patent.

This study strongly supports the central argument that equivalence in patent translation should be defined primarily as equivalence in patent scope. Traditional notions of linguistic fidelity or semantic equivalence are insufficient. A translation may be accurate at the sentence level and internally consistent, yet still compromise the patent's protective breadth if it introduces subtle narrowing through more restrictive phrasing or allows concrete details from the embodiments to influence claim language. For translators and patent holders and patent attorneys, the framework offers a structured, transparent tool for pre-filing quality control.

6.3 Limitations and Future Research

Although an exhaustive textual audit was structurally necessary to trace the microscopic, cascading legal-functional implications of central terms, the findings are inherently idiom-dependent and case-specific. The specific linguistic asymmetries and genus-to-species collapses identified in this user-interface software patent cannot be broadly generalized to other distinct art units.

Then, the qualitative evaluation of semantic elasticity and domain-specific rigidity ultimately relies on human expert judgment. While the scoring rubric adapts the transparent severity weighting principles of the Multidimensional Quality Metrics (MQM) framework, it lacks a purely automated statistical index. This makes the framework highly resource-intensive and dependent on the evaluator possessing an advanced, dual-competence mastery of both the localized statutory guidelines of the target patent office and the underlying scientific architecture of the invention.

Future research should test and refine the framework on a larger parallel corpus covering diverse technical fields, claim structures, and outcomes (including both upheld and invalidated patents). Additional directions include developing domain-specific guidelines for coined terms, exploring the integration of this framework into computer-assisted translation tools, and investigating how different translation strategies affect outcomes in actual examination and invalidation proceedings.

Conclusion

This study has proposed a multidimensional framework for patent translation quality

assessment specifically tailored to the challenges of English-Chinese patent translation. By foregrounding the systematic identification of technical features and assigning high weights to Claim Scope Preservation and Claim-Description Differentiation, the framework addresses critical gaps in existing TQA models and responds to the unique legal-functional demands of the patent genre.

Through detailed parallel-text analysis of the "Apparatus, Method and Computer-Readable Storage Medium for Manipulating a User Interface Element" patent, the study demonstrates both the strengths and limitations of the examined Chinese translation. While the translation achieves a respectable overall score of 8.39, measurable risks remain in the two most legally significant dimensions. These risks illustrate how seemingly minor translation choices can have material consequences for claim breadth, validity, and enforceability throughout the life of a patent.

The proposed framework, supported by the Risk Index, offers a practical, transparent, and legally oriented tool for parties related to patent rights. It can be used for different stages and legal proceedings. This framework is scalable and adaptable. As international patent activity continues to grow and translation technology evolves rapidly, frameworks that prioritize scope preservation and claim-description awareness will become increasingly vital for safeguarding intellectual property rights across jurisdictions.

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AI application:

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