AI-based Machine Translations in Tourism and Hospitality: An Exploratory Study of Travelers' Perceptions and Future Challenges

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Abstract

With the progress of AI-driven technologies, machine translation has significantly impacted tourists' travel experiences by transforming how they engage with or interpret language at their destinations. However, the body of empirical literature on the benefits, obstacles, and future prospects of these emerging technologies in tourism and hospitality is yet to be fully explored. This study aims to explore and outline 320 travelers' perceptions of machine translation. A distinctive sample of Italian travelers, along with their current and potential customers in the digital environment, is analyzed. Descriptive statistics was used to present the number and main characteristics of travelers' perceptions about AI-based machine translators. Travelers were grouped into two clusters based on perceived benefits and implementation challenges. Our findings contribute to the growing literature on AI-based machine translators and offer practical insights by mapping the benefits, challenges, outlook, and maturity levels of machine translations. The results provide both theoretical and practical insights for improving the use of AI-based machine translations and their role in tourism and hospitality industries. This is among the first studies exploring the tourism and

hospitality approaches adopted by travelers to manage their interactions with AI-based machine translations while traveling abroad.

Keywords: Machine translation, artificial intelligence, tourism and hospitality, destination

Introduction

Technological progress, especially in artificial intelligence (AI), has significantly impacted the tourism and hospitality industries (Gurso and Cai, 2025).

The development of AI-driven technologies has accelerated the development of machine translation, providing a broad array of translation services, including text, voice, and even image translations (Alhaj, 2024). AI-based machien translations has become increasingly prevalent in the travel and tourism sectors (). In particular, AI-based machine translatortravel experience (Wang & Kirilenko, 2024) has significantly influenced tourists' travel experiences by changing how they interact with or comprehend language at their destinations (Carvalho et al., 2023).

With the rapid pace of globalization and increasing intercultural mobility (Fan et al., 2022), tourists often face encounters with different cultures and communication as part of their cross-cultural experiences. However, tourists from various cultural and linguistic backgrounds, especially those with limited language proficiency in the local language of their travel destination, may experience challenges during their trips, as international travel involves interactions between speakers of different languages (Higgins & Ikeda, 2021). The inherent linguistic diversity in international tourism creates language barriers that disrupt smooth intercultural communication (Liu et al., 2023), and language differences can lead to misunderstandings and miscommunications (Fiset et al., 2024). The inability to speak the local language or having limited foreign language skills can result in a wide range of interpersonal difficulties, often accompanied by heightened anxiety or discomfort (Lu et al., 2021). Since language barriers can lead to dissatisfaction among tourists and negatively affect their overall travel experiences (Kim et al., 2020), overcoming these obstacles is crucial.

In this context, AI-based machine translation could be considered an effective tool for assisting tourists with communication challenges during travel in international destination (Cavarlho et al., 2023). Given the substantial impact of machine translation on how tourists engage in multilingual environments and foster intercultural communication with people from different linguistic and cultural backgrounds (Stewart, 2019), it can serve as an effective aid for tourists with limited local language skills, helping them bridge language gaps (Liebling et al., 2020). Tourists may face

greater challenges when evaluating the quality of machine translation in non-native languages, especially when they lack proficiency in those languages.

In the field of tourism research, there is a dearth of research that delves into how tourists have experiences with machine translations and how AI-based machine translations play a role in shaping their travel experiences. It is important to understand how travelers perceive the use of AI-based machine translation in international communication because machine translations not only have revolutionized the way tourists communicate during overseas travel, but it can also affect tourists' performance and the overall quality of tourist experiences (Carvalho et al., 2023).

This study will explore the role of AI-based machine translations in affecting tourist experiences and provide new insights into the usage practices and limitations of AI-based machine translations.

Research outcomes should shield light on analysing the impact of AI-based machine translations on travelers, understanding how machine translations can influence travel decisions, concluding by offering practical recommendations for etourism commerce, communicating the desired features of AI-based machine translations that influence travelers' purchase intention. Consequently, there are three specific objectives in this study:

1. investigate about the usage of tools of AI-based machine translation and the perception of the effectiveness of AI-based of machine translations. This objective provides much better insight into the existing partial and fragmented knowledge in current trends in AI-based language processing application; and its application in improving the quality of tourism experience;
2. identify strenghts, weaknesses, opportunities and threats of AI-based machine learning;
3. provide managerial implications for practitioners and marketers of tourism sector in order to increase the AI-based machine translations' ability to attract floating consumers thereby achieving competitive advantage.

Literature Review

Machine translation and artificial intelligence (AI) have seen significant advancements in recent years, profoundly impacting translation and cross-border communication. Modern, advanced technology is commonly used for tasks like creating translation memories, aligning texts, managing terminology, checking spelling and grammar, accessing and searching electronic corpora, and performing translations. Additionally, the development of Neural Machine Translation (NMT) has made it possible to interpret context and linguistic nuances, leading to more accurate and contextually informed translations. This rapid progress has opened up new

opportunities in various fields, including tourism and hospitality, where the demand for cross-language communication and cultural exchange continues to grow.

A major advantage of these technologies is their ability to quickly and efficiently produce translations. By automating the complex process of language conversion, they facilitate the rapid dissemination of information to a global audience, greatly minimizing the time and effort required. Additionally, AI technology plays a key role in maintaining consistency in both language and style across diverse content, which is essential for ensuring clarity in tourism-related communication.

Despite these benefits, machine translation and AI technology have limitations that can affect the quality of translated tourism messages. One significant drawback is the potential for inaccuracies and mistranslations, especially when dealing with culturally specific references and idiomatic expressions. Additionally, the technology still struggles to fully adapt to the target audience, take into account local cultural norms, or handle languages that are less commonly spoken, such as those beyond English, German, or Spanish.

Recent academic studies have explored the transformative impact of advanced AI models, particularly ChatGPT, on translation and content retrieval in the tourism sector. For instance, ChatGPT's effectiveness in translating English into Hindi, Telugu, and Kannada can assist tourists in India's diverse linguistic landscape (Kolar & Kumar, 2023). Their findings indicated that while Hindi translations were notably accurate and fluent, Telugu translations were less effective. Furthermore, several studies examined ChatGPT's potential contributions to various tourism operations, including accommodation, transportation, and food services (Erul & Işın, 2023). They concluded that ChatGPT could significantly enhance customer service by providing instant assistance and personalized recommendations, thereby improving the overall tourist experience.

However, despite these advancements, challenges persist. Authors highlighted potential risks associated with ChatGPT's application in tourism, such as the dissemination of inaccurate information and the lack of human empathy in customer interactions (Carvalho & Ivanov, 2024). They emphasized the necessity of human oversight to mitigate these issues and ensure the delivery of reliable and culturally sensitive information to travelers.

In summary, while AI technologies like ChatGPT offer promising enhancements in translation and information retrieval within the tourism industry, it is crucial to balance automation with human intervention to address inherent limitations and uphold service quality.

Methodology

To investigate our research propositions, researchers adopted an exploratory descriptive approach, which emphasizes identifying patterns in data rather than testing theory-driven hypotheses (Mason et al., 2010). This approach is suitable when a field is relatively new or underexplored (Denzin & Lincoln, 2005) and when there is limited or no existing theory to comprehensively explain the phenomenon (Truong et al., 2020) Exploratory descriptive research aims to propose causal relationships by examining and outlining connections between variables, helping to build a foundation for understanding those relationships before formally testing them through explanatory research. This research design has been successfully utilized in many tourism and hospitality studies.

An exploratory design is essential in the initial stages of investigating a phenomenon in tourism and hospitality field (Pantano & Servidio, 2011), especially for emerging and widely discussed technologies. The limited practical and theoretical understanding of machine translactions in tourism and hospitality inspired our methodological approach. Additionally, there have been numerous calls in the tourism and hospitality literature for more empirical observations and descriptions of machine translations adoption and usage (Lee and Lee, 2024).

An introduction to the questionnaire was just below the seven questions on the cover page, including an assurance to respondents that their responses would be kept confidential.

The questionnaire has three sections and five two questions. The first section included demographics questions. Another section asked respondents to report their travel habits in a series of dichotomous questions. In order to explore the relationship between respondents and usage of IA-based machine translations for travel, intensity has been measured using 5-points Likert scale that varies between not useful at all = 5 to very useful = 1. The remainder of the questionnaire focused on the general knowledge of IA-based machine translators and their influence on holiday, including an exhaustive list of strengths, weaknesses, opportunities and threats.

The questionnaire was written in Italian because all respondents are Italian to limit nationality and social influence. To facilitate interviews, participants live in Italy and used smart phone apps or at least had experience and knowledge of using smart devices.

A eleven-page questionnaire was used as the survey instrument and it was developed with four main constructs including scale items. Further, to collect required information from many respondents, interviewers used a face-to-face survey method.

Two-period pretests were conducted to test the questionnaire among tourism experts to enhance the length of the questionnaire. Validity of the

research instrument can be appraised by a panel of able professionals whose expertise can judge whether the scale measures what it intends to measure and the questions are clear (Zikmund et al., 2013).

The first pretest (n = 32) employed interviews with experts in restaurants and hotels. Some basic formatting issues were addressed because of the pretest. A second pretest (n = 12) was conducted with experts of travel agencies. Modifications and reviews, including a radical change of seven questions, were made because of this second test.

Based on the input received, modifications and reviews, including a cancellation of few items in the questionnaire and a radical change of seven questions, were done and wordings change to enhance understandability.

This study adopted a one-stage questionnaire survey approach to address concerns about non-temporal causal relationships in cross-sectional studies. Data collection occurred in September 2024. Questionnaires were sent out through email, and steps were implemented to verify IP addresses and avoid duplicate submissions. A total of 380 completed questionnaires were received, resulting in a response rate of 46.38%. Respondents were explicitly asked to reflect on online context when filling out the responses to the questionnaire items. Fifty responses were eliminated due to their non-random missing value. The non-response biases was tested and compared the "early" and "late" respondents' responses, based on the date of the received replies to the questionnaire (Tjuatja et al., 2024). Useable responses in the sample set from the face-to-face survey, from the total of 320 collected surveys (Table 1).

The data for the main study were collected, coded, and entered into the SPSS (Statistical Product and Service Solutions) program and tested via descriptive statistics.

Table 1. Descriptive information of sample

Item		Per-cent (n) 100 (320)
SOCIODEMOGRAPHIC CHARACTERISTICS		
Gender	Male	37,30 (119)
	Female	62,70 (201)
Age (20-over 60)	20-29	29,68 (95)
	30-39	25,02 (80)
	40-49	18,12 (58)
	50-59	17,18 (55)
	Over 60	10 (32)
Nationality	Italian	100 (320)
Origin	Milan	91,88 (294)
	Milan suburbs	8,12 (26)
Relationship status	Single	20,94 (67)
	Living with another	16,56 (53)
	Married	50,31 (161)

	Widowed	0 (0)
	Separated	9,69 (31)
	Divorced	2,5 (8)
Education completed	High School	28,13 (90)
	Undergraduate	33,75 (108)
	Graduate	25,63 (82)
	Other	12,50 (40)
Occupation	Not employed	1,56 (5)
	Student	30,31 (97)
	Self-employed	3,75 (12)
	Professional	42,5 (136)
	Work in a firm	15,00 (48)
	Other	6,88 (22)
VACATION CHARACTERISTICS		
Vacation destination	Italy	92 (420)
	EU	4,84 (25)
	Outside EU	3,16 (10)
Principal means of transport	Ferries and boats	5,4 (25)
	Plane	7,2 (33)
	Train	13,7 (62)
	Rental car	5 (23)
	Personal car and motorbike	68,7 (312)
Motivations	Scout	0,4 (2)
	Family	38,2 (174)
	Sport	8 (36)
	Religion	1,7 (8)
	Business	4,1 (19)
	Education	28,7 (131)
	Culture and leisure	18,9 (85)

Source: Authors' own creation

Findings and Discussion

The results of this study yield several insights that confirm previous findings and shield light on the future of AI-based machine translations in tourism and hospitality.

Most of the respondents consider it very important to communicate in a foreign language while traveling. 82.6% of the participants reported encountering communication difficulties in a foreign country, but they believe that language barriers are not a major obstacle to traveling. During their trips, many people use AI-based translation apps, such as Google Translate and ChatGPT, mainly to translate images (45.7%) and for voice translation (41.3%). Only 13% of the sample use them to translate message or emails.

The use of AI-based translation software has allowed 52.2% of people to solve language misunderstandings, while 54.3% believe it

increases independence while traveling. Only 34,8% of the sample believe it improves tourism experience.

Despite the use of intelligent translation software, most people believe it can never replace learning a foreign language. While traveling, people primarily use Google Translate and ChatGPT to read tourist information and menus (65.2%) or to communicate with locals (47.8%).

However, the accuracy of translations is still a topic of discussion due to the immaturity of computer algorithms and cultural differences. Additionally, 71.7% of respondents expressed concerns about personal data security, believing that there are risks, but that these risks can be managed with proper data security safeguards.

The questions to the open questions proposed in the questionnaire about strengths, weaknesses, opportunities and threaths are interesting. Out of total of 145 responses, there are some recurring strenghts, weaknesses, opportunities and threats that many respondents are interested in (Table 2).

Table 2. Strenghts, weaknesses, opportunities and threats of AI-based machine translactions

Strenghts	-Speed and efficiency: machine translation can process texts and speech almost instantly, reducing the time needed to translate documents or communications. This is particularly useful in business contexts, travel, or emergencies. -Affordability: many AI-based translation tools, such as Google Translate or DeepL, are free or require a low-cost subscription. This makes them accessible to private users, businesses, and organizations of all sizes. -Multilingual support: AI tools can translate between dozens or even hundreds of languages, including less common dialects, helping bridge the language gap in many areas around the world.
Weaknesses	-Limited precision and quality: despite advancements, IA-based machine translations can contain errors, especially in complex or technical texts. There are still challenges in translating idioms, slang, or creative content such as poetry. -Lack of cultural context: AI struggles to grasp the cultural or emotional context of a phrase. Literal translations or misinterpretations can lead to misunderstandings, particularly in sensitive situations. -Dependence on data: the quality of translations heavily depends on the quantity and diversity of the data used to train the models. Languages that are less represented in datasets may receive less accurate translations.
Opportunities	-Expansion of global markets: AI-based translations enable businesses to communicate with international customers without language barriers, opening new commercial opportunities. -Integration with emerging technologies: AI can be combined with emerging technologies like augmented reality (AR) or virtual reality (VR). For instance, tourists could use AR devices to translate street signs or menus in real-time. -Specific sectors: the development of AI models tailored for sectors

	such as law, medicine, or engineering can lead to more accurate and useful translations for professionals and organizations.
Threats	-Growing competition: The increasing number of AI-based translation service providers can make it challenging for businesses to differentiate themselves and maintain market share. -Privacy concerns: Translation tools that process sensitive data could compromise user privacy or be vulnerable to security breaches. -Risk of misunderstandings: Translation errors in critical contexts (e.g., medical or legal) can have serious consequences, leading to misunderstandings or wrong decisions.

Source: Authors' own creation

Intelligent translation apps are important tools for travelers, primarily used to communicate with locals, translate menus, and obtain tourist information, somewhat enhancing the comfort of the travel experience. However, due to the current immaturity of computer algorithms and cultural differences, translation errors may occur. Additionally, some people have concerns about data security, fearing potential privacy breaches. Despite this, the questionnaires indicate that the use of AI-based translation tools will never replace learning and knowing a foreign language.

Conclusions

The survey revealed several suggestions that could be applied by manufacturers of AI-based translation devices to improve the product and, consequently, enhance the consumer experience. First and foremost, improving the accuracy of translations, as it is not always guaranteed, was a key point. It is therefore recommended that providers of AI-based translators invest further in optimizing algorithms to improve precision. Regular updates to language databases and the introduction of models that consider cultural nuances could reduce errors and enhance the user experience. Concerns about data security are evident among users. Therefore, it is essential that AI-based translation applications adopt strict data protection measures, such as encryption and transparent privacy policies. This way, users will be more willing to use these tools without fear of compromising their privacy. Additionally, to improve the user experience, translation apps should be easily integrable with other device functions, such as the camera, messages, and voice calls. A single app that offers real-time voice, text, and image translations could be very useful, eliminating the need to switch between different applications. By implementing these improvements, AI-powered translation tools could become even more effective and appreciated by travelers, enhancing the overall travel experience and increasing user trust. However, travelers still perceive the knowledge of a foreign language as highly necessary, and how these new AI-based translator systems are not yet a primary tool for consumers to satisfy this need. In conclusion, there is no

doubt that AI-powered automatic translators are a breakthrough in terms of the tourism experience. They are an evolving and changing tool that is being refined year after year, ensuring smaller margins of error and an increasing number of translatable languages. This new tool could revolutionize the tourism sector, smoothing out language barriers that still exist today and also making the work of industry operators easier. The marketing efforts of the main producers of this service should, therefore, focus on continuously improving the product. In addition, they should tailor their sales approach to highlight the consumer's need to interpret a foreign language as quickly and accurately as possible, while also making their own needs more understandable in a country where they do not speak the local language. While this research offers important insights, it does have some limitations. The study was primarily conducted with participants from Italy, which could affect how widely the results can be applied. Moreover, nearly half of the participants were in their 20s and 30s with strong digital skills. Different age groups often have distinct views on machine translation, especially since older adults may struggle with it due to their unfamiliarity or limited experience with such technology (Panayiotou et al., 2019). Future research could explore how individual characteristics, such as cultural backgrounds or linguistic knowledge, as well as age, influence opinions on machine translactions usage in tourism and hospitality. Gaining an understanding of these differences could offer valuable insights into how different demographic groups perceive and use machine translactions. Furthermore, as artificial intelligence technology continues to advance, the accuracy of machine translations in grammar and vocabulary translation is improving (Chen 2023). As a result, tourists' perspectives on mahine translations may change or evolve over time. Therefore, a longitudinal study would be useful for capturing a more nuanced understanding of context-dependent and individual-specific views on machine translations in tourism and hospitality sector.

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Appendixes

Questionnaire
1) Gender
o   Male
o   Female

2) Age
o   20-29
o   30-39
o   40-49
o   50-59
o   Over 60

3) Nationality
o   Italian
o   Other

4) Origin
o   Milan
o   Milan suburbs

5) Relationship status
o   Single
o   Living with another
o   Married
o   Widowed
o   Separated
o   Divorced

6) Education completed
o   High school
o   Undergraduate
o   Graduate
o   Other

7) Occupation
o   Not employed
o   Student
o   Self-employed
o   Professional
o   Work in a firm
o   Other

8) Vacation Characteristics
o   Italy
o   EU
o   Outside EU

9) Principal mean of transport
o Ferries and boats
o Plane
o Train
o Rental car
o Personal car and motorbike

10) Motivations
o Scout
o Family
o Sport
o Religion
o Business
o Education
o Culture and leisure

11) How important do you think it is to have the ability to communicate in a foreign country?
o Not important at all
o Not very important
o Quite important
o Important
o Very important

12) Have you ever had difficulty in communicating in a foreign country?
o Yes
o No

13) Have you ever been in a country where the language is based on characters different from your own (e.g. Cyrillic, Arabic)?
o Yes
o No

14) Has difficulty with the local language ever been a reason not to visit a country?
o Yes
o No

15) How useful would you find the ability to automatically translate another language using artificial intelligent?
o Not useful at all
o Not very useful
o Quite useful
o Useful
o Very useful

16) Have you ever used a AI-based machine translation during your trip abroad?
o Yes
o No

17) Which services of AI-based machine translation do you think would be most useful in tourism sector?
o   Photo translator (for translating signs or menus)
o   Voice translator (for phone calls or conversations)
o   Message translator (for messages or emails)

18) Which devices of AI-based machine translator would you prefer?
o   An app for smartphone that can translate both voice, text, and photos
o   A basic function of your smartphone that translates voice, text, and photos on request without needing to install additional apps
o   A device created specifically for voice translation only

19) Do you think these AI-generated devices could replace the need to learn another language?
o   Yes
o   No

20) Do you consider a potential privacy risk that a AI-based machine translator can listen your conversations in order to translate them?
o   Not concerned at all, I find it useful and acceptable
o   Slightly concerned, but I think the benefits outweigh the risks
o   Moderately concerned, as I believe there are risks, but they could be managed with adequate data security guarantees
o   Very concerned, as I think it represents a threat to my privacy
o   Extremely concerned, and I would never use such a service

21) Have you ever used an AI-based automatic translator (for example Google Translate, DeepL, ChatGPT, etc.) during a trip?
o   Yes
o   No

22) Did AI-based machine translation allow you to access information that would otherwise have been inaccessible?
o   Yes
o   No

23) What was the main purpose for using the AI-based machine translation during your trips?
o   Translate street signs or billboards
o   Communicate with locals
o   Read menus or other tourist information
o   Other: _____

24) Which AI-based machine translation do you use most often?
o   Google Translate
o   DeepL
o   ChatGPT
o   Other: _____

25) How useful do you think AI-based machine translations are during your trips?
o   Very useful
o   Quite useful
o   Not very useful
o   Not useful at all

26) In which of these situations do you think a AI-based machine translation is particularly useful?
o   Resolving language misunderstanding
o   Enhancing the cultural experience
o   Having more independence while traveling
o   Other: _____

27) How accurate do you think translations provided by machine translations are?
o   Always accurate
o   Often accurate
o   Sometimes accurate
o   Rarely accurate
o   Never accurate

28) Do you think AI-based machine translations provide neutral and objective translations?
o   Yes, always
o   Yes, in most cases
o   No, it depends on the language or context
o   No, rarely

29) Do you think the use of AI-based machine translations has improved your experience?
o   Very much improve
o   Quite improved
o   Slightly improved
o   Not improved at all

30) Have you ever had negative experiences due to errors or misunderstandings from an AI-based machine translation?
o   Yes, often
o   Yes, occasionally
o   No, never

31) What would you like to improve in AI-based machine translations to make them more useful during trips?
o   Greater translation accuracy
o   Ability to capture cultural nuances
o   More advanced offline functionality
o   Other: _____

32) Do you think AI-based machine translations can replace human tour guides?
o   Yes, completely
o   Yes, but partially
o   No, never

33) What are AI-based machine translations strenghts?

34) What are AI-based machine translations weaknesses?

35) What are AI-based machine translations opportunities?

36) What are AI-based machine translations threats?