
RESEARCH ARTICLE

Role of Machine Translation in Promoting the Tourism Sector in Support of Saudi Vision 2030

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ABSTRACT

The current demand for translation is growing so rapidly that human translators are insufficient for such demand. Thus, the adoption of machine translation (MT) can be a valuable tool to assist translators in various contexts, particularly in the tourism sector. The purpose of this study is to evaluate the impact of MT in promoting the Saudi tourism sector in support of Saudi Vision 2030. To accomplish this, the study seeks to identify the challenges tourists experience when utilizing MT. The study employs a questionnaire distributed to 267 male and female undergraduates in their third or fourth year of study in the Bachelor of English and Translation program at Qassim University, Saudi Arabia. The findings revealed that students hold a positive perception of MT's capability to address tourists' needs and, specifically, view MT as a valuable tool for enhancing knowledge and information accessibility in tourism. Moreover, the results indicated that students believe that tourists benefit financially from the use of MT. In addition to these advantages, however, the study also showed that linguistic and technical challenges impede the effective use of MT in tourism contexts. The study findings emphasize the importance of considering user demographics when developing MT. Incorporating cultural references into MT and ensuring that its applications are accessible and user-friendly for all age groups will improve tourists' user experiences with MT. The findings demonstrate the need to continue expanding real-time MT capabilities to enhance communications in tourism contexts.

KEYWORDS

Machine translation, MT, machine translation impact and challenges, machine learning, tourism, tourism sector in Saudi Arabia, Saudi vision 2030.

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1. Introduction

1.1 Introduction

With the rise of the Internet as a key medium for modern communication, translation has become a crucial link among speakers of different languages. The continuous flow of interactions among various language groups necessitates translation (Quah, 2006). Translation is among the oldest professions (Sager, 1994). Nida and Taber (1969, p. 12) stressed that the primary aim of translation must be "reproducing the message" rather than translating the words of the original text. Accordingly, translation can be viewed as a communicative process that occurs within a social context (Hatim & Mason, 1990).

Traditional human translation is inadequate for the current demands (Doherty, 2016). To cope with this demand, machine translation (MT) can serve as a cost-effective alternative to human translators in various contexts (Quah, 2006). Hutchins and Somers (1992) described MT as the traditional term for computerized systems that produce translation from one language to another, with or without human intervention. The concept of MT was inspired by earlier successes in cryptography, as Weaver (1947) noted: "When I look at an article in Russian, I say: 'This is really written in English, but it has been coded in some strange symbols. I will now proceed to decode'" (as cited in Raley, 2003, p. 295).

During the Cold War, efforts were made to automate natural language translation due to the urgent need to translate Russian texts into English. This necessity led to significant research investments in translation by the U.S. from the late 1940s to the early 1960s, concentrating on word substitution methods through bilingual dictionaries and syntactical rules. Although such resources were manually constructed and covered only limited language pairs, there was optimism that this approach would eventually extend to broader coverage (e.g., Hutchins, 1997). In fact, MT has undergone significant advancements over its history. Figure 1 shows some highlights of MT's history of development (adopted from Quah, 2006, p 58).

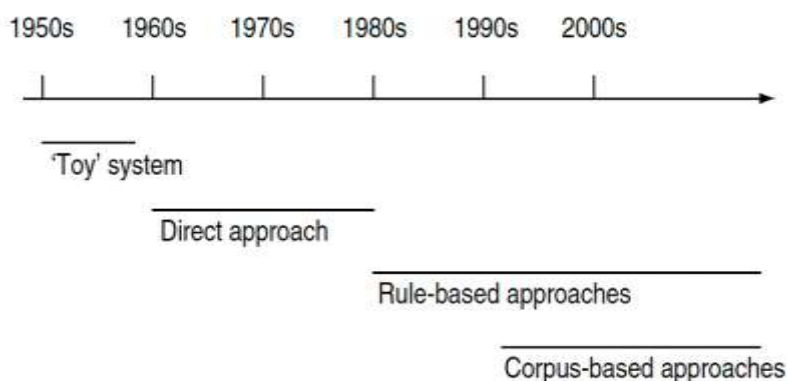


Figure 1 Chronology of machine translation development

Studies have shown that the use of technological tools in translation has been proven to decrease cognitive effort and increase speed (Screen, 2016), efficiency and consistency (Austermühl, 2001). As noted by Vlasta (2012), some professional translators use MT tools to ease tedious tasks and save time. In 2014, global businesses, government agencies and other projects spent approximately \$37.19 billion on translation services (DePalma et al., 2013).

MT systems are commonly optimized using batch learning algorithms such as minimum error rate training, which typically accommodate a limited number of features (Och, 2003). The integration of additional features in MT has significantly enhanced translation quality. Specifically, phrase-based statistical machine translation (PBSMT) (Koehn et al., 2003) emerged as the main approach in the mid-2000s, leading to successful applications in commercial situations (e.g., Fournoy & Duran, 2009; Plitt & Masselot, 2010). PBSMT was introduced by Aqlan et al. (2019) to address two major challenges in MT: (a) the low performance of direct translations from highly inflected and morphologically complex languages to morphologically simpler languages and (b) the issue of data sparsity.

Currently, two very different approaches have prevailed: phrase-based machine translation (PBMT) (Koehn et al., 2003) and neural machine translation (NMT) based on deep neural networks (DNNs) (Bahdanau et al., 2014; Cho et al., 2014; Sutskever et al., 2014). NMT aims to replicate human translation processes through neural networks, which leverage large parallel corpora to learn from both the corpora and previously translated texts (United Language Group, 2019). However, the Automatic Language Processing Advisory Committee's report predicted in the 1960s that MT would never fully replicate human behavior (Melby, 1995). Wu et al. (2016) notes that Google Translate transitioned from statistical-based machine translation (SBMT) to a NMT to bridge the gap between human translators and MT and to tackle MT's issues. In conclusion, it is essential to exercise caution when utilizing suggestions from NMT. Although these suggestions may be read fluently, they sometimes include omissions, additions or mistranslations (Castilho et al., 2017, 2018).

This caution becomes even more significant when translating specific terms relevant to the context of tourism. Tourism plays a significant role in ensuring long-term success for both established and growing nations worldwide. Approximately 334 million jobs, accounting for 10.6% of global employment, are linked to the tourism sector, which is valued USD 9.2 trillion, representing 10.4% of global GDP (WTTC, 2019). In the last two decades, the tourism industry has experienced expansion, becoming globally one of the fastest-growing industries (Liu & Chou, 2016; Gorbuntsova et al., 2019).

As a tourism destination, Saudi Arabia has recently initiated several government projects aimed at enhancing its tourism sector, including the expansion of main religious sites and infrastructure developments (Aina et al., 2019; Mahmood & Alkahtani, 2018). Tourism has become Saudi Arabia's third-largest industry after energy and manufacturing and is ranked as the second most important sector in relation to foreign exchange earnings and creating job. World Travel & Tourism Council (2017) expected that tourism revenue would exceed SR86 billion (US\$22.93 billions) by 2020.

In 2016, the Saudi Arabian government introduced Saudi Vision 2030, a document detailing the economic framework and objectives that the country aims to accomplish by 2030 (Saudi Vision 2030, 2016). Under Crown Prince Mohammed bin Salman's leadership, various reforms have been implemented to lessen the country's reliance on oil (Bsheer, 2018). Vision 2030's main aim is to diminish this overreliance by diversifying the economy and enhancing different sectors (Moshashai et al., 2020).

In Saudi Vision 2030, the diversification of the economy and investment in tourism is aimed at positively repositioning Saudi Arabia on a global scale (Volcic & Andrejevic, 2011). A key aspect of Vision 2030 is to correct negative external perceptions of Saudi Arabia and position it as an inviting destination for visitors. The country's strong focus on cultural, religious and conservative traditions has attracted international tourism (Alzhrani, 2020). Indeed, Saudi values, such as hospitality and integrity, play a significant role in attracting tourists from across the globe (Khan & Khan, 2020).

1.2 Statement of the Problem

A significant part of Saudi Vision 2030 involves the expansion of Saudi Arabia's tourism industry, with the goal of attracting 100 million visitors annually by 2030 (Saudi Vision 2030, 2016).

One barrier to achieving this goal is the language disparity between international tourists and the local Arabic-speaking community. As noted by Abuarqoub (2019), effective human communication, involving the sharing of ideas, information, opinions, facts, feelings and experiences between communicators, is essential for social interaction. Although language serves as a fundamental tool for communication, it can also act as a significant barrier. Such language barriers are common across international business, aviation and social interactions, influencing daily activities and posing challenges in an increasingly globalized and communicative world.

This language barrier highlights the importance of translation in maintaining effective communication. According to Doherty (2016), human translators are insufficient to address the rapidly increasing translation demands of globalization. To cope with translation demand, MT tools can serve as an alternative to human translators in various contexts. In this context, translation technologies have notably enhanced productivity and consistency, expanded global language coverage and facilitated international communication (Doherty, 2016). As Alhamdan (2018) has noted, technological advancements have reduced the language barrier via applications and devices that enable the translation of thoughts and words. Advances in digitalization, globalization, computational linguistics and the development of MT have expanded the capacity to translate a broad of text types in multiple languages. Hence, MT has been used in the translation of various tourism-related materials, including brochures, food menus, websites and tourist guides (Fuentes-Luque & Urbietta, 2020). Moreover, MT is increasingly utilized in the tourism industry for analyzing customer reviews and conducting sentiment analysis (Athanasidou & Maragoudakis, 2016).

To sum up, the role of MT in promoting the tourism sector in support of Saudi Vision 2030 has not been comprehensively investigated. There is a lack of research regarding the impact of MT within the tourism sector, its effects on tourists' experiences and the obstacles encountered in its use.

1.3 Research Questions

1. To what level does machine translation impact the tourism sector in regard to Saudi Vision 2030 from the perspective of translation students at Qassim University?
2. What level of obstacles do tourists confront when utilising machine translation from the perspective of translation students at Qassim University?

1.4 Objectives of the Study

This study aims to:

1. Investigate the level of machine translation's impact in promoting the Saudi tourism sector in support of Saudi Vision 2030 from the viewpoint of translation students at Qassim University.
2. Gain insights into the obstacles encountered by tourists when utilizing machine translation from the point of view of translation students at Qassim University.

1.5 Scope and Delimitations of the Study

This study focused exclusively on undergraduate translation students at the main campus of Qassim University in Saudi Arabia, including both male and female sections in their third or fourth year of study. It excluded undergraduate translation students from other years of study, campuses, or institutions, whether within or outside of Qassim.

2. Literature Review

This section reviews the literature relevant to the study focus, including machine translation (MT), Saudi Vision 2030 and the tourism sector. It aims to furnish researchers and readers with an in-depth understanding of the background that informs the study approach and objectives.

2.1 Machine Translation

Carvalho et al. (2023) conducted a study of 2,535 individuals, including 907 language tourists, with the aim of comparing different perspectives on the significance of MT to tourist profiles, language attitudes and travel behavior. Utilizing both statistical exploratory and inferential analytical methods, the study indicated that individuals who view MT positively are younger, less educated and have lower language proficiency. In contrast, language tourists who view MT as less important are more likely to have formal language skills, engage in cultural activities and maintain closer interactions with locals during their language trips.

In a different study, Lee and Lee (2024) identified and analyzed travellers' views on the use of MT through the consumption value theory. The study employed Q methodology with 32 South Korean travellers. The study identified three major views on the function of MT: as linguistic shortcut, a tool for comprehensibility and a resource for linguistic abundance. The findings offered theoretical and practical implications for improving the use of MT and its importance in tourism-related contexts.

Giampieri and Harper (2023) examined the reliability and acceptability of Google's MT for tourism texts from Italian to English. Their study found that while MT performed well with informative and descriptive tourism texts, they struggled with lexical choices, collocations and English writing conventions. The authors argued that these translations did not adequately cover the full range of tourism texts and called for advancements in MT, suggesting that context-specific translations should be managed by human translators.

The importance of cognitive and linguistic capabilities in producing high-quality MT was also supported by Hannouna (2004), who evaluated the quality of three English-to-Arabic MT systems. That study used 268 English sentences from twelve specialized texts. The study found significant issues with the grammar and meaning of machine-translated sentences, resulting in average or below-average translations. Although MT performed better in scientific translations, the three systems examined in the study provided satisfactory translations only of commercial and computational texts. Hannouna identified three major issues: cognitive, linguistic and operational. Examples include unclear Arabic MT outcome, poor terminology, incorrect grammatical structures and limitations in translation speed and user dictionary design.

Arishi (2023) also investigated the challenges and limitations faced by MT and suggested solutions for its advancement. This study employed a descriptive approach to review existing literature and emphasize the need for a computerized Arabic dictionary and a comprehensive linguistic database to advance MT. Arishi recommended that human translators should carefully review and edit MT to address potential errors and contextual nuances, which can affect the meaning.

The role of MT specifically in tourism translation within Saudi Arabia was examined by Alhaj (2024), who surveyed 80 experts from Saudi universities, translation agencies and tourism organizations. Alhaj revealed that over half of the respondents (51.42%) believed that MT could ease the difficulties faced by translators in the tourism sector. MT is positively viewed by translators and translation professionals in the Saudi Arabian tourism industry as a tool to enhance translation and address challenges. This study indicated a promising relationship between MT and tourism translation, suggesting that MT can effectively lessen obstacles and improve tourism translation practices.

2.2 Saudi Vision 2030 and the Tourism Sector

As explained by Alam et al. (2023), Saudi Arabia's Vision 2030 aims to shift the economy from oil dependence to growth in non-oil sectors. Analyzing data collected from 225 employees in non-oil industries, the study found a strong correlation among Vision 2030, incentivized investments, economic steadiness and financial accommodation. The study highlighted the importance of economic stability policies for sustaining growth and enhancing financial assets in Saudi Arabia's non-oil industries.

In a different study, Matawi (2018) explored the primary information sources about Saudi Arabia's Vision 2030 among students at King Abdul-Aziz University. Data were gathered through a questionnaire from a sample of 150 students, examining sources including traditional and new media, conferences and academic events. The findings showed that social media, particularly Twitter (now known as X), was the predominant information source, followed by traditional media, such as television. Students generally were positive about Vision 2030 and its social impact and strongly believed that oil would no longer be the main source of the country's income by 2030.

In his study, Abuhjeeleh (2019) provided an extensive analysis of Saudi Arabia's tourism sector in relation to Vision 2030. The review emphasized Saudi Arabia's strategic efforts to develop tourism as a major alternative income source, including the launch of tourism visas by late 2019 and the ease of strict regulations by the Crown Prince Mohammad bin Salman to attract tourists. In its proposed transition away from dependency on oil, Vision 2030 positions tourism as a key element. The study noted that this transformation could have significant regional impacts.

Almalki (2022) investigated the influence of tourism marketing on international tourists' perceptions of Saudi Arabia, using a case study and qualitative methods to gather stakeholder insights. The study found that tourism marketing is essential for Saudi Arabia's economic development and its global attractiveness. It plays a vital role in promoting tourism and supporting the country's 2030 tourism investment by increasing the number of visitors and length of stays.

The Saudi National Transformation Program of Vision 2030 seeks to enhance the tourism sector by enabling access to Saudi culture through translation. Translators are essential in cultural mediation within tourism translation, an area that has not been extensively studied. Thus, Alangari (2022) examined the translation strategies used in Arabic and English articles available on the official Saudi tourism website, Visit Saudi. The study found that translators employ techniques such as exoticization and explanation strategies to enhance cultural accessibility, particularly Saudi traditions and cuisine. This research filled a gap in translation studies by investigating the role of cultural mediation in the translation of tourism texts about Saudi Arabia.

In a different study, Metwally and Asiri (2023) examined translation strategies used for tourism and promotional culture-specific expressions in Aseer province, Saudi Arabia. They highlighted the importance of these translations in promoting Saudi's vision of the tourism and tourism sector. The study identified and analyzed translation strategies for tourist sites, commercial activities, cuisine, and folklore. Additionally, it addressed challenges in translating tourism and promotional culture-specific expressions, including linguistic nuances and cultural differences. The study emphasized the role of translators in creating exciting content to attract visitors.

Bayaa (2023) examined Saudi Arabian citizens' perceptions of the impact of leisure tourism on their culture and its economic potential. Using a quantitative approach with data from 98 Saudi Arabian citizens and tourism industry professionals, the study found no significant cultural impact from leisure tourism but identified its considerable economic importance. The study highlighted the need for sustainable tourism practices to preserve cultural heritage and the environment, advocating for a balanced strategy that integrates economic advantages with cultural preservation.

Along similar lines, Mufeed and Gulzar (2014) investigated tourism awareness in Saudi Arabia among both Saudi and non-Saudi residents in Riyadh. The study surveyed 130 individuals (62% Saudis and 38% non-Saudis). The findings revealed that non-Saudis had a higher level of awareness regarding local tourist destinations than Saudis, indicating a need for further investigation into this area.

3. Methodology

The main purpose of this study is to analyze the impact of MT in promoting the Saudi tourism sector within the context of Saudi Vision 2030. Furthermore, it seeks to identify the challenges encountered by tourists when utilizing MT. The descriptive approach is used owing to its ability to provide precise explanations of the study topic and a comprehensive overview of all the dimensions/domains studied in this research.

3.1 Participants

The participants of the study were 267 male and female undergraduates in their third or fourth year of study in the Bachelor of English Language and Translation program at Qassim University. Participants were informed that participating in this study was voluntary and that they had the right to withdraw from the study at any time without any consequences. Their responses remained confidential. Ethical approval for this study was obtained from Ethics Committee at Qassim University with approval number [24-05-02].

3.2 Data Collection

According to Saldanha and O'Brien (2014), "questionnaires have been used to some extent in research on translation, most notably to research topics on the translation profession, technologies or to survey translation student opinions about teaching and learning" (p. 151). Therefore, a questionnaire was employed in this study to gather information. The questionnaire was structured around four domains: knowledge, economics, linguistics and technical. Each domain contained items that effectively illustrated the primary objective of that domain. The first two domains were focused on evaluating the impact of MT in promoting the Saudi tourism sector in support of Saudi Vision 2030, while the two latter domains were designed to identify the obstacles encountered by tourists when employing MT. In this questionnaire, a 5-point Likert-type scale (Strongly Agree, Agree, Neutral, Disagree and Strongly Disagree) was employed to collect and assess data.

3.3 Research Procedures

3.3.1 Research Sample

The main sample of the study consisted of 267 undergraduate translation students at the main campus of Qassim University, Saudi Arabia. Table 1 shows the distribution of the sample according to the demographic data of the participants :

Table 1 : Participants' Demographic Data

Characteristic	No.	Percentage
Gender		
Male	104	39.0%
Female	163	61.0%
Year of Study		
Third Year	79	29.6%
Fourth Year	188	70.4%
GPA		
2.00–2.75	12	4.5%
2.75–3.75	58	21.7%
3.75–4.50	105	39.3%
4.50–5.00	92	34.5%

As shown in the table above, 61.0% of the participants were female students (163), while 39.0% were male (104). Thus, female students had greater representation in the sample.

Regarding year of study, a majority (70.4%) of the participants were fourth-year students (188), with just 29.6% being third-year students (79). This distribution suggests that most of the participants were in the final stage of their academic program and could potentially provide more informed insights into the study topic than students who were in their third year.

In terms of academic performance, the largest proportion of students (39.3%) had a GPA between 3.75–4.50 (on a 5-point scale), followed by 34.5% with a GPA between 4.50–5.00. A smaller percentage of participants (21.7%) had a GPA between 2.75–3.75, while only 4.5% had a GPA between 2.00–2.75. This distribution indicates that the majority of the participants demonstrated a consistently high level of academic performance, which reflects the reliability and quality of their responses.

3.4 Validity and Reliability of the Questionnaire

3.4.1 Questionnaire Validity

Pearson's correlation coefficient was used to establish internal consistency validity. This approach allows researchers to verify that each statement consistently reflects its respective domain, whether it is knowledge, economics, linguistics or technical. Higher correlation values between items and their domains indicate strong validity, as each item contributes significantly to the measurement of its construct. Therefore, internal consistency validity supports the robustness of the questionnaire, ensuring that it accurately captures the dimensions it aims to measure.

Table 2: Internal consistency between statements and their domains ($N = 25$)

Dimension 1: Impact of machine translation in promoting the Saudi tourism sector in support of Saudi Vision 2030				Dimension 2 : Obstacles encountered by tourists when employing machine translation			
Knowledge Domain		Economics Domain		Linguistic Domain		Technical Domain	
Statement No.	Correlation	Statement No.	Correlation	Statement No.	Correlation	Statement No.	Correlation
1	0.775**	7	0.614**	13	0.725**	18	0.813**
2	0.737**	8	0.770**	14	0.847**	19	0.876**
3	0.687**	9	0.583**	15	0.673**	20	0.757**
4	0.758**	10	0.857**	16	0.757**	21	0.808**
5	0.703**	11	0.808**	17	0.830**	22	0.662**
6	0.616**	12	0.781**				

The above table shows that the internal consistency of each statement within its respective domain showed strong correlations, all above 0.6. For the knowledge domain, correlations ranged from (0.616) to (0.775), suggesting that these statements are well-aligned and contribute accurately to the domain.

In the economics domain, correlations were notably high, especially for statements number 10 (0.857) and 11 (0.808). These values indicate high internal consistency within this domain.

The linguistic domain also demonstrated considerable correlation, with the highest being statement number 14 (0.847). This result suggests that these statements are consistent and represent the domain’s focus.

Finally, the technical domain demonstrated high internal consistency, with statement number 19 achieving the highest correlation (0.876), reflecting the consistent and reliable measurements for the aspects of this domain.

Table 3: Internal consistency among domains, dimensions and the total questionnaire

Dimension	Domain	Correlation with the dimension	Correlation with the total questionnaire
1. Impact of machine translation in promoting the Saudi tourism sector	Knowledge	0.817**	0.538**
	Economics	0.856**	0.736**
	Total		0.767**
2. Obstacles encountered by tourists when employing machine translation	Linguistic	0.862**	0.639**
	Technical	0.841**	0.681**
	Total		0.773**

As indicated in Table 3, each domain showed strong correlations with its dimension, indicating that the domains effectively represent their correlated dimensions. For instance, the knowledge domain was correlated at 0.817** with the dimension of MT’s impact on the tourism sector, while the linguistic domain showed a strong correlation of 0.862** with the obstacles dimension.

Furthermore, each domain also showed moderate to strong correlations with the total questionnaire. For instance, the economics domain (0.736) and the technical domain (0.681) had strong correlations with the overall questionnaire. These results enhance the structural validity of the instrument.

3.4.2 Questionnaire Reliability

To ensure the reliability of the questionnaire, both Cronbach’s alpha and split-half reliability methods were applied. Cronbach’s alpha was calculated for each domain individually and for the overall questionnaire, providing a measure of internal consistency to assess how well items within each domain reflect the same construct.

Additionally, split-half reliability was assessed using the Spearman–Brown and Guttman coefficients, which divide groups of items into two equal halves and measure the correlation between them. High values for both coefficients support the reliability of the questionnaire, demonstrating that it yields consistent results across different halves.

Table 4: Reliability of the questionnaire with Cronbach’s alpha and split-half coefficients

Dimension	Domain	Cronbach’s alpha	Split-half reliability coefficients	
			Spearman–Brown	Guttman
1. Impact of machine translation in promoting the Saudi tourism sector	Knowledge	0.759	0.821	0.813
	Economics	0.832	0.836	0.825
	Total	0.841	0.829	0.827
2. Obstacles of using machine translation in the tourism sector	Linguistic	0.818	0.803	0.796
	Technical	0.839	0.823	0.804
	Total	0.853	0.846	0.842
Total questionnaire		0.844	0.838	0.834

Table 4 shows that the reliability analysis using Cronbach's alpha for each domain ranged from 0.759 for the knowledge domain to 0.893 for the technical domain, which means that all the values indicated high reliability. The overall questionnaire achieved a Cronbach's alpha of 0.844, thus confirming the strong internal consistency of the entire questionnaire.

Both the Spearman–Brown and Guttman coefficients showed high reliability for all domains, highlighting the stability of the questionnaire when split. For example, in the economics domain, the Spearman–Brown coefficient was 0.836 and Guttman was 0.825. The split-half coefficients of the entire questionnaire were also high, with Spearman–Brown at 0.838 and Guttman at 0.834. This result indicates a balanced internal consistency and reliability across the two halves.

4. Results and Discussion

This section presents the findings obtained from the study's instrument and the subsequent statistical analysis. The results are discussed and interpreted within the theoretical framework and previous studies relevant to the topic of the study. By carefully examining the data, the researcher aims to provide insights that address the research questions and highlight the implications of these findings for the study's objectives.

The current study aimed to answer the following questions :

1. To what level does machine translation impact the tourism sector in regard to Saudi Vision 2030 from the perspective of translation students at Qassim University?
2. What level of obstacles do tourists confront when utilising machine translation from the perspective of translation students at Qassim University?

In what follows, the researcher presents the results of each question separately.

4.1 Results of Research Question One

The first question asked: "To what level does machine translation impact the tourism sector in regard to Saudi Vision 2030 from the perspective of translation students at Qassim University?"

To answer this question, frequencies, percentages, arithmetic means, standard deviations and relative weights were calculated for the students' point of view on the first dimension of the questionnaire, which was related to determining the extent of MT's impact on promoting the tourism sector in support of Saudi Vision 2030. The results are shown in Table 5.

Table 5: Overall results of the impact of machine translation on the tourism sector in regard to Saudi Vision 2030 ($N = 267$)

Questionnaire domain	No. of statements	Mean	Standard deviation	Relative mean	Impact	Rank
Knowledge	6	3.33	1.03	66.7%	Moderate	1
Economics	6	3.23	1.06	64.7%	Moderate	2
General mean	12	3.28	1.05	65.6%	Moderate	

The overall arithmetic mean for the first dimension was 3.28, with a relative weight of 65.6%. These values indicate that translation students at Qassim University viewed MT as exerting a moderate impact in promoting the tourism sector in support of Saudi Vision 2030. This finding aligns with Almahasees (2021), who noted that MT could promote the tourism industry in the Arab world.

The results by specific domain reflect a similar picture. The knowledge domain was ranked first, with an arithmetic mean of 3.33 and a relative weight of 66.7%, indicating a moderate impact. The economics domain was ranked second, with an arithmetic mean of 3.23 and a relative weight of 64.7%, indicating a moderate impact. These findings suggest that while both domains contribute to the impact of MT in promoting the tourism sector, students viewed the knowledge domain as slightly more influential.

Table 6: Descriptive statistics for the impact of machine translation on supporting the tourism sector within the knowledge domain

No	Statement	Frequencies and ratios	Response alternatives					Mean	Standard deviation	Relative mean	Impact	Rank
			Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree					
1	Machine translation helps enhance the international image of tourism for the Kingdom of Saudi Arabia.	F	31	98	76	50	12	3.32	1.05	66.4%	Moderate	4
		%	11.6	36.7	28.5	18.7	4.5					
2	Machine translation helps Saudi society to learn about other cultures.	F	33	102	76	45	10	3.38	1.02	67.6%	Moderate	3
		%	12.4	38.2	28.5	17.2	3.7					
3	Machine translation helps meet the tourists' needs.	F	40	97	92	28	10	3.48	0.99	69.6%	High	2
		%	15.0	36.3	34.5	10.5	3.7					
4	Machine translation helps get tourism information quickly.	F	44	110	69	40	4	3.56	0.97	71.2%	High	1
		%	16.5	41.2	25.8	15.0	1.5					
5	Machine translation promotes effective communication between tourists and members of Saudi society.	F	31	87	90	40	19	3.27	1.08	65.4%	Moderate	5
		%	11.6	32.6	33.7	15.0	7.1					
6	Machine translation helps build trust between tourists and members of Saudi society.	F	23	60	102	55	27	2.99	1.09	59.8%	Moderate	6
		%	8.6	22.5	38.2	20.6	10.1					
General mean							3.33	1.03	66.6%	Moderate		

As shown in Table 6, the knowledge domain had an arithmetic mean of 3.33 with a relative weight of 66.6%, reflecting that Qassim University translation students viewed MT as exerting a moderate impact on supporting the tourism sector. More generally, this finding suggests that students believe that MT is a valuable tool for enhancing knowledge and information accessibility in tourism.

Focusing on the highest-rated statements, "machine translation helps get tourism information quickly" received the highest level of agreement, with a mean of 3.56 and a relative weight of 71.2%, indicating a high impact. This finding suggests that students recognize MT as an effective tool in providing quick access to essential tourism-related information, which is crucial in enhancing tourists' experiences. Following closely in second was "machine translation helps meet tourists' needs," with a mean of 3.48 and a relative weight of 69.6%, also indicating high impact. This finding reflects a positive perception among participants concerning MT's capability to address tourists' needs. These findings are also in line with Sousa et al. (2024), who reported that respondents who used MT positively evaluated its effectiveness within the tourism sector.

In contrast, the lowest-rated statements showed a more limited impact. "Machine translation promotes effective communication between tourists and members of Saudi society" was ranked fifth, with a mean of 3.27 and a relative weight of 65.4%, indicating a moderate impact. This finding suggests that while MT is considered a useful means of basic communication, it may not fully facilitate effective communications within the tourism sector. This assumption is supported by Cadwell et al. (2018), who reported in their study that 82% of respondents believed that "MT can be ineffective for certain types of text" (p. 311). Finally, "machine translation helps build trust between tourists and members of Saudi society" had the lowest mean score of 2.99 with a relative weight of 59.8%, also reflecting a moderate impact. This result highlights that while MT is considered a valuable tool, it is not adequate to promote trust between tourists and locals, indicating a potential need for human intervention to build such trust.

Table 7: Descriptive statistics for the impact of machine translation on supporting the tourism sector within the economic domain

No	Statement	Frequencies and ratios	Response alternatives					Mean	Standard deviation	Relative mean	Impact	Rank
			Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree					
7	Machine translation helps encourage investors to invest in the tourism sector as part of Saudi Vision 2030.	F	22	101	84	45	15	3.26	1.02	65.2%	Moderate	4
		%	8.2	37.8	31.5	16.9	5.6					
8	Machine translation promotes the country's non-oil imports as part of Saudi Vision 2030.	F	14	71	96	61	25	2.96	1.04	59.2%	Moderate	6
		%	5.2	26.6	36.0	22.8	9.4					
9	Machine translation helps market tourism offers.	F	25	93	101	36	12	3.31	0.97	66.2%	Moderate	3
		%	9.4	34.8	37.8	13.5	4.5					
10	Machine translation helps reduce the financial burdens of tourists within the Kingdom of Saudi Arabia.	F	13	80	107	51	16	3.09	0.96	61.8%	Moderate	5
		%	4.9	30.0	40.1	19.1	6.0					
11	Machine translation helps provide tourism content in multiple languages without financial burdens.	F	33	105	87	32	10	3.45	0.98	69.0%	High	1
		%	12.4	39.3	32.6	12.0	3.7					
12	Machine translation helps improve reservation and planning management for tourists.	F	29	96	92	39	11	3.35	0.99	67.0%	Moderate	2
		%	10.9	36.0	34.5	14.6	4.1					
General mean							3.23	1.06	64.6%	Medium		

As illustrated in Table 7, the economic domain had a general arithmetic mean of 3.23 with a relative weight of 64.6%, reflecting a moderate impact of MT on supporting the economic aspects of the tourism sector. From the perspective of Qassim University's

translation students, these findings suggest that while MT has a beneficial role in supporting the tourism sector, its impact in terms of economic contributions remains moderate.

Turning next to the highest-rated statements, “machine translation helps provide tourism content in multiple languages without financial burdens” was ranked the highest in this domain, with a mean of 3.45 and a relative weight of 69.0%, indicating a high impact. This result suggests that students view MT as a cost-effective solution for providing content in various languages, which aligns with the economic goals of reducing financial burdens in tourism services. The second-highest-rated statement was “machine translation helps improve reservation and planning management for tourists” with a mean of 3.35 and a relative weight of 67.0%, also reflecting a moderate to high impact. This finding suggests that participants believe that MT is effective in facilitating reservation and travel planning, which supports the operating efficiency of the tourism sector.

In contrast, the lowest-rated statements highlighted areas where the economic impact of MT was less prominent to Qassim University translation students. “Machine translation helps reduce the financial burdens of tourists within the Kingdom of Saudi Arabia” was ranked fifth, with a mean of 3.09 and a relative weight of 61.8%, suggesting a moderate impact. This result indicates that students believe that tourists benefit financially from the use of MT, although its impact on reducing expenses remains limited. “Machine translation promotes the country’s non-oil imports as part of Saudi Vision 2030” was ranked last, with a mean of 2.96 and a relative weight of 59.2%, indicating a moderate impact. This finding suggests that students do not yet recognize MT as significantly effective in promoting non-oil imports—a key objective of Saudi Vision 2030’s economic diversification goals.

4.2 Results of Research Question Two

The second question asked: “What level of obstacles do tourists confront when utilising machine translation from the perspective of translation students at Qassim University?”

To answer this question, frequencies, percentages, arithmetic means, standard deviations and relative weights were calculated for the students’ point of view on the second dimension of the questionnaire, which concerned the obstacles tourists confront when employing MT. The results are shown in Table 8:

Table 8: Overall results for the level of obstacles facing tourists when using machine translation (N = 267)

Questionnaire Domain	Statement	Mean	Standard deviation	Relative mean	Obstacle	Rank
Linguistic	5	3.97	0.95	79.4%	Large	1
Technical	5	3.84	0.93	76.8%	Large	2
General mean	10	3.91	0.94	78.2%	Large	

The overall arithmetic mean for the obstacles tourists encounter when using MT was 3.91, with a relative weight of 78.2%. These findings indicate a considerable level of obstacles from the perspectives of translation students at Qassim University. However, the results of this dimension do not correspond with Alhaj (2024), who reported that translators and translation experts had highly positive views on the use of MT in the tourism sector.

Looking specifically at the two domains of the second dimension, the linguistic domain was ranked first, with an arithmetic mean of 3.97 and a relative weight of 79.4%, showing a high level of obstacles. The technical domain was ranked second, with an arithmetic mean of 3.84 and a relative weight of 76.8%, also indicating a considerable level of obstacles. These findings suggest that while both domains contribute to the observed challenges of MT in the tourism sector, linguistic obstacles are viewed by the participants as more slightly significant. These findings are consistent with Shouaib (2022), who reported that respondents encountered various challenges when utilizing MT, such as syntactic and semantic issues.

Table 9: Descriptive statistics for identifying linguistic obstacles faced by tourists when using machine translation

No	Statement	Frequencies and ratios	Response alternatives					Mean	Standard deviation	Relative mean	Obstacle	Rank
			Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree					
13	Machine translation struggles to recognize and address cultural references and social norms.	F	100	103	41	22	1	4.04	0.95	80.8%	Large	3
		%	37.5	38.6	15.4	8.2	0.4					
14	Machine translation can be challenging when dealing with vocabulary that has multiple meanings needed by tourists.	F	128	89	38	12	0	4.25	0.86	85.0%	Very large	1
		%	47.9	33.3	14.2	4.5	0.0					
15	Machine translation struggles to translate specialized terms.	F	94	87	55	29	2	3.91	1.03	78.2%	Large	4
		%	35.2	32.6	20.6	10.9	0.7					
16	Machine translation struggles to take into account cultural differences.	F	110	103	38	13	3	4.14	0.91	82.8%	Large	2
		%	41.2	38.6	14.2	4.9	1.1					
17	Machine translation struggles to translate and read tourism site boards.	F	45	95	83	43	1	3.52	0.97	70.4%	Large	5
		%	16.9	35.6	31.1	16.1	0.4					
General Mean							3.97	0.95	79.4%	Large		

As indicated in Table 9, the linguistic domain had a general arithmetic mean of 3.97 with a relative weight of 79.4%, reflecting a high level of obstacles faced by tourists when using MT. From the perspective of translation students at Qassim University, these results suggest that linguistic challenges obstruct the effective use of MT in tourism contexts. This interpretation aligns with Okpor (2014), who noted that certain linguistic features in MT must still be set manually.

Focusing on the highest-rated statements, the statement "machine translation can be challenging when dealing with vocabulary that has multiple meanings needed by tourists" was ranked the highest in this domain, with a mean of 4.25 and a relative weight of 85.0%, indicating a very high level of obstacle. This result suggests that students recognize the difficulty of MT in handling polysemy, which is crucial for tourists seeking accurate information. Such challenges may lead to misunderstandings or mistranslation. This result is supported by Cadwell et al. (2018), who reported that translators have expressed concerns in regard to incorrect, inaccurate or unnatural MT outcomes. This emphasizes the need for more advanced MT systems that consider context-specific implications to avoid producing wrong translations.

The second-highest statement was "machine translation struggles to take into account cultural differences", with a mean of 4.14 and a relative weight of 82.8%, also reflecting a large level of obstacle. This finding indicates that students recognize the importance of cultural nuances in translation, which are crucial for effective communication in the tourism sector. This supposition is supported by Rivera-Trigueros (2022) and Tan et al. (2020), as cited in Naveen and Trojovský (2024), who highlighted that a significant skill gap for MT lies in the translation of idiomatic expressions and cultural nuances, which are often lost due to the MT's incapability to understand context. The acknowledgment of this challenge emphasizes the necessity for MT tools to incorporate cultural nuances to improve tourists' experiences when utilizing MT.

In contrast, the statement “machine translation struggles to translate and read tourism site boards” was ranked fifth, with a mean of 3.52 and a relative weight of 70.4%, indicating a large but relatively lower obstacle level. This finding suggests that, while translation students at Qassim University recognize the challenges of MT’s capability to accurately translate tourism site boards, they consider this issue as less critical than other linguistic obstacles. This result may indicate an understanding that, although translating tourism site boards is essential, other language-related issues, such as handling cultural references and vocabulary with multiple meanings, are seen as more critical barriers to effective tourist communication.

Table 10: Descriptive statistics for identifying technical obstacles

No	Statement	Frequencies and ratios	Response alternatives					Mean	Standard deviation	Relative mean	Obstacle	Rank
			Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree					
18	Elderly people struggle to use technology and deal with smart devices.	F	108	104	44	9	2	4.15	0.87	83.0%	large	1
		%	40.4	39.0	16.5	3.4	0.7					
19	The difficulty of internet availability in all tourist places on which machine translation depends mainly.	F	71	119	55	19	3	3.88	0.92	77.6%	large	3
		%	26.6	44.6	20.6	7.1	1.1					
20	The difficulty of using machine translation during real-time conversation, such as phone calls.	F	94	105	41	23	4	3.98	0.99	79.6%	large	2
		%	35.2	39.3	15.4	8.6	1.5					
21	Machine translation faces a challenge in translating all languages of the world into Arabic language.	F	34	108	64	60	1	3.43	0.98	68.6%	large	5
		%	12.7	40.4	24.0	22.5	0.4					
22	Machine translation faces challenges in translating archaeological manuscripts through technical tools.	F	52	120	82	10	3	3.78	0.84	75.6%	Large	4
		%	19.5	44.9	30.7	3.7	1.1					
General mean							3.84	0.93	76.8%	Large		

As indicated in Table 10, the technical domain had a general arithmetic mean of 3.84 with a relative weight of 76.8%, reflecting a large observed level of obstacles that tourists face when using MT. From the perspective of translation students at Qassim University, these results suggest that technical challenges obstruct the effective use of MT in the tourism sector.

Focusing on the highest-rated statements, the statement “elderly people struggle to use technology and deal with smart devices” was ranked first in this domain, with a mean of 4.15 and a relative weight of 83.0%, indicating a large level of obstacle. This result highlights that students recognize the challenges faced by elderly tourists in using technology, which may limit their ability to effectively utilize MT. Hence, this finding stresses the importance of considering user demographics when developing MT and ensuring that its applications are accessible and user-friendly for all age groups.

The second-highest-ranked statement involved “the difficulty of using machine translation during real-time conversation, such as phone calls”, which has a mean of 3.98 and a relative weight of 79.6%, also reflecting a large level of obstacle. This finding highlights a significant barrier in real-time communication, where MT is inadequate, making it difficult for tourists to hold real-time conversations. This result is inconsistent with Doherty (2016), who stated that translation technologies significantly enhance international communication. This result necessitates the improvements of real-time MT capabilities to enhance communications in tourism contexts.

In contrast, the statement “machine translation faces a challenge in translating all languages of the world into Arabic” was ranked fifth, with a mean of 3.43 and a relative weight of 68.6%, indicating a large but relatively lower level of obstacle. This finding suggests that while students recognize the limitations of MT’s capability to handle all languages, they identify this issue as less critical than obstacles related to user accessibility and real-time communication. These findings reflect that participants understand that while complete language coverage is required, addressing practical usability issues takes priority for enhancing tourist experiences.

5. Conclusion

The purpose of this study was to explore the impact of machine translation in promoting the Saudi tourism sector in support of Saudi Vision 2030. Further, it sought to identify the obstacles that tourists face when utilizing MT. A questionnaire was distributed to 267 male and female undergraduates in their third or fourth year of study in the Bachelor of English Language and Translation program at Qassim University. Participant demographic data indicated that the majority of the participants maintained a high level of academic performance, which reflects the reliability and the quality of their responses. In general, the results of this study reveal a moderate impact of MT in supporting the tourism sector in Saudi Arabia. On the one hand, participants indicated positive perceptions regarding MT’s capabilities in addressing tourists’ needs. They believe that tourists benefit financially from using MT, which they see as a cost-effective solution for offering tourism content in different languages. They also consider MT as a valuable tool for enhancing knowledge and information accessibility in the tourism sector. Moreover, participants see MT as effective in facilitating reservations and travel planning. On the other hand, the findings reveal that while MT is considered a valuable means for basic communication, it may not fully deliver effective communication within the tourism sector. Acknowledging the importance of effective communication in tourism highlights the need to incorporate cultural references into MT to enhance tourists’ experiences. The findings reflect that participants do not consider MT significantly effective in promoting non-oil imports. Furthermore, participants believe that linguistic and technical challenges obstruct the effective use of MT in tourism contexts. The findings also indicate that participants acknowledge the difficulty of MT in dealing with polysemy, which may result in misunderstandings or mistranslation. Participants are aware of the challenges elderly tourists face when using technology, which may limit their ability to effectively utilize MT. Finally, MT poses a significant barrier in real-time communication within the tourism context.

A limitation of this study is its focus on students, rather than on tourism agencies within the tourism sector. Consequently, future research should incorporate insights from tourism agencies to better evaluate the impact of MT on the sector. This would provide a more comprehensive understanding of MT’s influence on the tourism industry. Furthermore, additional research is needed to explore how cultural references can be effectively integrated into MT systems. Finally, future studies should also address the linguistic and technical challenges that currently impede the effective application of MT in tourism contexts.

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