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FACTORS AFFECTING THE ADOPTION OF GOOGLE TRANSLATION IN HIGHER EDUCATION THROUGH AN EXTENDED TECHNOLOGY ACCEPTANCE MODEL (TAM): JORDAN AS A CASE STUDY

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Abstract. *The main aim of this paper is to shed light on the role of Google Translate (hereafter GT) in translation profession and studies, Jordan as a case study. GT is turning out to be immensely useful and dramatically impactful. A very good number of scholars, teachers, and students around the globe depend on its translation. Despite that, the factors that may lead to the people's intention to use GT have not been extensively studied in the academic literature, and as a result, the effects of using GT remain open to research. The user's attitude regarding the GT use might differ depending on what language is being used. The unidirectional language change is directed from the Source Language (hereafter SL) towards the Target Language (hereafter TL) or from TL to SL. The proposed systematic structure is developed based on an extended Total Acceptance Model (hereafter TAM) model. The Structural Equation Modeling – Partial Least Square (hereafter SEM-PLS) was employed to analyze the survey outcomes collected from 1182 respondents to practically validate the hypothesized model. As the studies suggested, the behavioral intention to use GT is dependent on the perceived ease of use, perceived usefulness, and motivation. In addition, perceived usefulness and motivation have a considerable impact on the perceived ease of use. The translation researchers, educators, and Machine Translate (hereafter MT) system developers can benefit from the theoretical and practical implications offered by this study's outcomes.*

Keywords: Translation, Jordan, Google translation, Source language, Target language, TAM model, Structural equation, Modeling

1. **Introduction.** The use of machine translation, GT in particular, is becoming a topic that is received with mixed emotions of practicality and reservations. On the one hand, there are those, skeptics, who do not have faith in the role of machines translating human texts. On the other hand, there are others, digital fanatics, who think that the new world order of technology will change the face of life in all its aspects. To them, it is a matter of time when computers will rule our lives; therefore, translators must adapt to and adopt technology. Since the turn of the 2020, the Coronavirus pandemic (COVID-19) has changed the lives of people, maybe for good. The academic field is not different

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in this regard. Probably more than any other fields, the impact of the pandemic had affected the way of teaching at school and university levels. Adapting to the unprecedented circumstances, the higher education decision makers had to adapt. They have endorsed new policies to suit the new system of online teaching, and on campus teaching was strictly not allowed. Consequently, being a skeptic or a fanatic, the world is being digitalized. The 30 tons, or so, computer with its countless features of lamps, resistors and switches that was introduced around 1945 has brought the world into one's palm and is now dominating the scene. It transformed the world into a small village. The need to communicate successfully and quickly in a world of different tongues, gave rise to the idea of using computers in the field translation. Nevertheless, the complex nature of languages, the emotive expressions, the idiomatic and semantic connotations use of words, the ambiguity of terms, and specificity of the cultural bound terms made many language professionals confused about how to overcome such obstacles. Translators, as did translation itself took considerable time to establish a separate track of science away from literature and linguistics. The introduction of new technologies as part of societies way of life in the mid-nineties of the 20th century and the mushrooming of cell phones and the vast and ongoing development computer programs, made it all possible for translation and translators to benefit from it. And since the process of translation links the academic work to the market, the strategies and methods of translation had to meet the requirements of the new market.

To cope with this new context, translation professionals had to address both world: the world of academia, translation as a science, and industry world, translation as a product because technology, computers and machine translation are inevitable. Despite of the controversy it created, its slow beginning and not being accepted by the educational community in the beginning, GT is becoming part of the everyday life of educators and students alike due to many reasons. Firstly, because GT tends to give immediate results which are provided in a twinkle of an eye. Secondly, it is handy and convenient especially with the huge advancement of the mobile technologies and the open access to Google. Thirdly, and probably the most important of all, for many people with small or no budget, it is free compared to other translation programs and applications. Research suggests that the source languages and the target languages, comprising different languages like Urdu, French, Arabic, and English, significantly affect users' actual intention of use [1]. The clearness of the translated text may differ because of variation in the grammatical and semantic structures in the SL and TL which also affects the users' intention to use the technology and the perceived usefulness associated with its use. Therefore, the perceptions towards GT are that the countries such as Pakistan, USA and Oman, for example, portray themselves as three different countries having three entirely distinct SL and TL. The main reason behind the disparity in these perceptions includes disparity in SL and the TL as well as the disparity in cultural values. People's choice or rejection of the use of GT can be realized better through the comprehension of the cultural variations between the said three countries. The usage of technology by people can be explained through cultural factors as they may hold diverse views of it and use it under various cultural conditions [2-4]. Hence, it is necessary to undertake an inter-cultural analysis of the GT acceptance.

Few previous researches explored the feasibility of implementing MT, usually such as [5] which suggested an expanded TAM model to assess the adoption of MT by users. The study used TAM to assess the extended model related to behavioral use of MT. This research bridges the void in literature by integrating knowledge and motivation in the initial TAM to establish an expanded quasi-circular model. In addition, [6] performs a related analysis where the emphasis is on the neural machine translation. The key findings show that a large number of students use NMT to facilitate the language studies for a number of reasons. Typically, the findings revealed differences between learners in relation to their reliance on and perceived importance of certain resources. A further analysis is done by

[7]. The research reveals how goals and expectations have been expressed. Therefore, the source could be executed in the translation technology lab and classroom. The SMT curriculum was planned for a group of postgraduate student translators to communicate the information collected through the methodology of mixed-method. Findings indicated that there is a substantial improvement in students' knowledge and certainty in the use of overall machine translation, and specifically SMT, at the end of academic sessions in SMT. The final analysis is performed by [8], a research that illustrates facets of machine translation in a systematic review. In this systematic review, a quantitative and qualitative overview of machine research has been given.

Although these researches have concentrated on MT, neither of them emphasizes on the disparity in the use of MT in various countries. With reference to MT, the emphasis on various countries is important. This seems to be related to the reason that MT handles multiple languages such as ST and TL. While differences in SL and TL frameworks are extremely successful in assessing the intent or behavior of users towards the use of GT, the cultural variations might influence the acceptance of the technology by the user. Ostensibly, it is hard to find any study that has been done to explore the factors of GT acceptance in various countries. As described before, almost all of the researches have investigated the adoption of machine translation (MT) in one region. The goal of this analysis is to identify the factors that induce the acceptance of the GT in Jordan. This study design will provide successful findings that illustrate the real causes of the motivating aspects that promote people's intention to use GT and their efforts to improve their technology in multiple regions in order to keep pace with the potential technological developments. This study suggests describing the main acceptance elements and perspectives for specialists through profound knowledge of this technology as well as its acceptance throughout Jordanian universities, hence, allowing them to enhance their technology and its consequent application in the translation process. The selection of various universities allows evaluation and comparison of the users' behavioral intentions in multiple regions. The mother tongue of all Jordanians is Arabic and it is the official language, and English is the second language though. Obviously, the translation is usually done from either English to Arabic or from Arabic to English. The aforementioned facts are the reason for selecting the Jordanian with its different regions in this study.

There are four major sub-components in this paper. The MT and TAM literature is the most significant. The next aspect involves the conceptual context, the study structure and the methodology. The third aspect pertains to research and outcomes. Results and their implications are examined in the final section.

2. **Literature Review.**

2.1. **Machine translation.**

Machine translation is a valuable method for polyglot communities since it enables every participant to speak (write) and listen (read) in one's native language. Machine translation aims to resolve language issues faced by participants. Despite the context of machine translation in separate conversations, both the speaker and the recipient should use the different mentioning phrases as this translation from the Source Language (SL) to the Target Language (TL) would not generate the original phrase. In this kind of case, the recipient must not repeat the phrase of the sender as a means of acknowledging it, demonstrating that it applies to a similar point [1]. Translation technology also aims to combine substantial, analytical and corporate applications and draw along cultural and technological viewpoints on rapidly-developing human-computer interactions. They are simply expected to include a broader spectrum of proficient framework [2]. For instance, as GT is concerned, the usefulness of GT will be apparent once publishers resort to its extensive use; subsequently, the cost of translations is expected to lower leading to greater volume of translations available in the marketplace,

and viewers will have advantage of extensive article diversity. Moreover, translators would be capable of performing further translations simultaneously [3]. Three main methods to machine translation were established. The first method is the rule-based approach. In this approach, the translation process is executed through the software that uses a series of grammar rules. The second method is a statistical machine translation. In this approach, the device uses predictive algorithms to train machines how to translate text from one language to the other. The statistical model could then be used to translate the text to the best likely outcome inevitably. The third method is the hybrid machine translation which incorporates the features of the first two methods. The best significant solution is Neural Machine Translation (hereafter, NMT), which has emerged as the latest type of MT, based on neural networks present in human brain [4]. Even though these diverse methods in MT prevent each and every pitfall in the translated texts, few scholars are also concerned about the weak aspects of MT. For example, [5] does not consider it effective, and hence, does not support the use of MT in classrooms. Similarly, [6] shows that student translators are largely preferring online MT among several available online resources.

2.2. **Technology Acceptance Model (TAM).** A very good number of researches have analyzed the successful use of technology as well as its primary causes. Multiple models have been put forward to explore the effective role of technology acceptance among several users. Among these models, the most extensively used is Technology Acceptance Model (TAM) where behavioral intention is influenced by a person's attitude, which is subsequently regulated by two concepts. One of these is perceived usefulness, which is, the degree to which an individual believes that making use of a specific device can increase their work productivity. The other concept is the perceived ease of use, which is, the degree to which an individual assumes that a particular device would be user-friendly [7]. TAM model helps evaluate the acceptance of users [8]. TAM & TRA serve as theoretical foundation for identifying the connection between the 2 beliefs of perceived usefulness and perceived ease of use, and user's attitudes, intentions and real behavior of computer adoption [7].

3. **Research Model and Hypotheses.** The web-based technology of Google Translation (GT) is open to a wide range of people around the globe. Such a research concentrates on the acceptance of the use of GT by instructors, students, academics and scientists in three separate countries. GT is a tool offered by MT. It allows quick generation of text through cutting and pasting of the source text. It is also believed that this technology is strongly linked to Perceived Ease of Use (PE) and Perceived Usefulness (PU). So, it is rational to say that intention of using Motivation (MOV) is heavily dependent on perceived ease of use [9].

Motivation (MOV) is a factor having a strong alliance with the acceptance of technology. As for [9], motivation is strongly linked with the perceived ease of use. Due to that, they conclude that the greater the degree of perceived ease of use is, the greater the motivation will be. Greater motivation for studying translation will result in rather greater understanding in using Motivation (MOV). However, this research does not emphasize on the motivation of students to learn translation; instead, it is concerned with the motivation of users to extensively use the tool of GT translation. That is to say, when the translated texts are explicitly translated and the expected interpretation is clearly provided, the greater the motivation would be for using GT instead of other Motivation (MOV) tools. On this foundation, the given hypotheses are formed.

H1. Perceived Ease of Use (PE) has a positive relationship on Motivation (MOV).

H2. Perceived Ease of Use (PE) has a positive relationship on Perceived Usefulness (PU).

H3. Perceived Ease of Use (PE) has a positive relationship on Behavioral Intention to use GT (BIN).

H4. Perceived Usefulness (PU) has a positive relationship on Behavioral Intention to use GT (BIN).

It is important to indicate that attitudes have not been considered in this study, as it has been indicated by several scholars that improved outcomes for behavioral intention can be obtained by creating a clear relationship among the perceived ease of use and perceived usefulness [10,11].

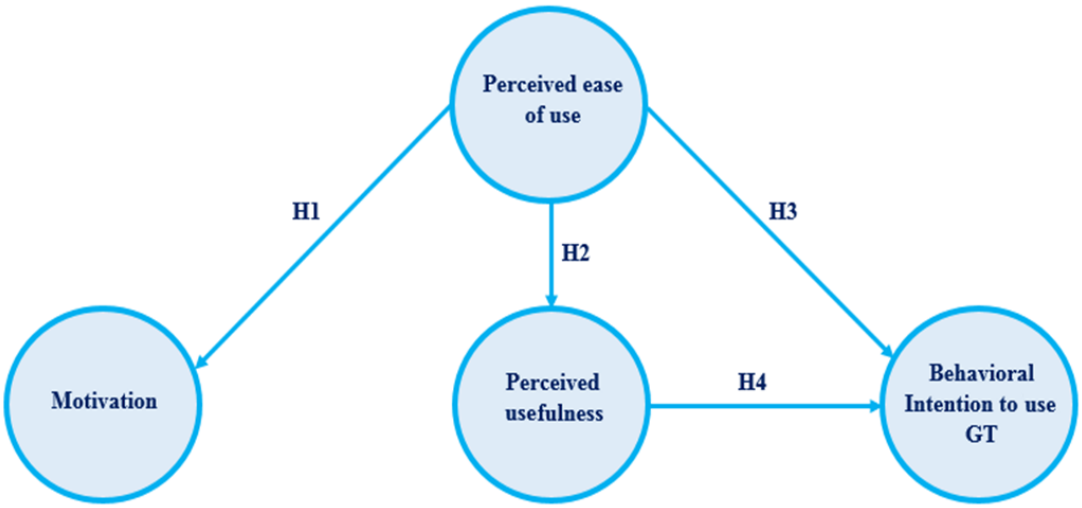

FIGURE 1. The conceptual framework

4. **Methodology.** The researchers circulated the online surveys among undergraduate, Diploma and postgraduate students enrolled in Jordanian universities (JOR) ($N = 1500$). In this study, nine well-known universities in Jordan are included, namely, University of Jordan, Yarmouk University, Al al-Bayt University, The Jordan University of Science and Technology, University of Petra, Amman Arab University, Zarqa Private University, Jadara University, and Princess Sumaya University for Technology.

4.1. **Sample and data collection.** The data for the study was collected from the students enrolled in fall semester 2020/2021 between 15-Oct 2020 and 04-Dec 2020. The data-collection tool employed in the study was randomly-distributed online survey. Total response rate of 79% was achieved as 1182 respondents out of 1500 submitted the filled questionnaire. Out of these filled questionnaires, 318 were rejected because they had missing information, thus making total 1182 questionnaire to be effective as they were filled properly. According to [12], the number of effective questionnaires (1182) to be used in the study for evaluation of collected data is adequate as the suggested sampling size is 306 respondents in a population of 1500. In this case, structural equation modeling is acceptable because sample size of 1180 is much higher than the minimum requirements of 306 [13]. Therefore, this sample size was used for hypothesis testing. Although the hypotheses used were found on current theories, they also proved to be efficient in Google Translation context. In order to evaluate measurement model, Structural Equation Modeling (SEM) was used while final path model was applied subsequently.

4.2. **Survey structure.** As mentioned in the research, a survey instrument was developed for testing the hypothesis. Four constructs were measured in the questionnaire through 11 items in the survey form. Construct sources that were used in the survey are shown in Table 1. The applicability of the study was enhanced by making adjustments in the prior studies questions.

TABLE 1. Constructs and their sources

Constructs	Number of items	Source
Behavioral intention	2	[9,14]
Motivation	3	[9,14]
Perceived ease of use	3	[7,14]
Perceived usefulness	3	[7,14]

A questionnaire survey was prepared and distributed among students [15]. The following three sections make up the survey.

- The first section of the survey collects the participant's personal data.
- The second section of the survey focuses on the 2 elements that describe the general question about Google Translation.
- The third and last section of the survey comprises 9 elements that signify "Motivation, Perceived ease of use, and Perceived usefulness".

Out of all items, 11 have been measured using a five-point Likert scale in the following order, i.e., strongly agree (5), agree (4), neutral (3), disagree (2), and strongly disagree (1).

4.3. **Students' personal information/demographic data.** The ratio of male to female students' participation in the study was 47 : 53. Out of all respondents, 59% were between age group of 18 and 29 whereas the rest of the respondents, i.e., 41% belonged to age group of above 29. Most of the respondents held a university degree. Respondents holding bachelor's degree, master's degree and Ph.D. degree, were 62%, 23% and 11% respectively, whereas the rest of the respondents were associated with diploma education (4%). When the respondents were easily available and willing to participate in the study voluntarily, [15] suggested using the "purposive sampling approach". This is relatively a simple approach as it involved students having different ages, enrolled in different programs of different colleges at different levels. The demographic data for the study was measured using IBM SPSS Statistics ver.

5. Analysis & Results.

5.1. **The construct measurement.** A software named SmartPLS V.3.2.7 and its Partial Least Squares – Structural Equation Modeling (PLS-SEM) was used to commence the data analysis of this study. The assessment model based on two models of structural and measurement model was employed to analyze the collected data [16]. Various reasons lead to the employment of PLS-SEM for this study. First, PLS-SEM is undertaken to be the ideal option when it comes to development of an existing theory. Second, when complex models need to be analyzed in the study, PLS-SEM works effectively. Third, PLS-SEM does not involve fragmentation of model; rather it involves analysis of complete model. Lastly, PLS-SEM provides more precise estimations by conducting simultaneous analysis for both structural model and measurement model [17].

5.2. **Assessment of the measurement model (outer model).** According to [16], the validity including discriminant and convergent validity and the construct reliability including composite and Cronbach's alpha reliability should be estimated in order to assess the measurement model. Table 2 demonstrates the results of Cronbach's alpha that can help evaluate construct reliability. According to results, Cronbach's alpha values are between 0.733 and 0.832, hence exceeding 0.7 threshold value [18]. Similarly, Table 2 shows Composite Reliability (CR) values between 0.707 and 0.867, hence exceeding 0.7

threshold value. In accordance to these results, all the constructs were observed to be sufficiently error-free; thus, confirming construct reliability. In order to measure convergent validity, it is recommended to test the average variance extracted and the factor loading [16]. According to the results of factors loadings given in Table 2, the values exceed the threshold value of 0.7. Moreover, AVE values depicted in Table 2 were between 0.640 and 0.803, hence exceeding 0.5 threshold value. In accordance to these results, it is concluded that the convergent validities for all constructs are satisfied. Two parameters, i.e., the Fornell-Larker criterion, and the Heterotrait-Monotrait ratio (HTMT) were recommended to be measured in order to measure the discriminant validity [16]. Table 3 shows the AVE findings in such a way that the square root of these values is larger in correlation with other structures, confirming the Fornell-Larker criteria requirement [19]. The results in Table 4 reveal that HTMT ratio value of each construct is below the threshold of 0.85 [20]. As a result, the HTMT ratio is confirmed. The discriminant validity is determined using all of these results. These outcomes reveal that the reliability and validity of the measurement model were effectively assessed; thus, structural model can be assessed on the basis of the collected data.

Table 2. Convergent validity results

Constructs	Items	Factor loading	Cronbach's alpha	CR	AVE
Behavioral intention	BIN1	0.747	0.745	0.812	0.640
	BIN2	0.788			
Motivation	MOV1	0.883	0.832	0.772	0.662
	MOV2	0.890			
	MOV3	0.966			
Perceived ease of use	PE1	0.785	0.741	0.707	0.775
	PE2	0.757			
	PE3	0.789			
Perceived usefulness	PU1	0.856	0.733	0.867	0.803
	PU2	0.890			
	PU3	0.748			

Table 2 shows the convergent validity results which assures acceptable values (Factor loading, Cronbach's Alpha, composite reliability ≥ 0.70 & AVE > 0.5).

Table 3. Fornell-Larcker scale

	BIN	MOV	PE	PU
BIN	**0.772**			
MOT	0.345	**0.826**		
PE	0.692	0.449	**0.768**	
PU	0.559	0.639	0.338	**0.779**

Table 4. Heterotrait-Monotrait ratio (HTMT)

	BIN	MOV	PE	PU
BIN				
MOV	0.582			
PE	0.549	0.269		
PU	0.590	0.367	0.368	

5.2.1. *Structural model analysis.* Once the measurement model is confirmed, then come the structural model [21,22]. In order to carry out its study, 5000 resamples are required to go through a procedure known as bootstrapping to estimate the path coefficients and the coefficients of determination (R^2) [16]. Path analysis results, i.e., path coefficients p-values, and t-values for each hypothesis are demonstrated in Table 5. In correspondence with the results all hypotheses are supported. The results reveled that Perceived Ease of Use (PE) significantly influenced Motivation (MOV) ($\beta = 0.597$, $P < 0.001$), Perceived Usefulness (PU) ($\beta = 0.236$, $P < 0.05$), and Behavioral Intention to use GT (BIN) ($\beta = 0.534$, $P < 0.01$), supporting hypotheses H1, H2, and H3 respectively. The relationships between Perceived Usefulness (PU) and Behavioral Intention to use GT (BIN) ($\beta = 0.428$, $P < 0.001$) was found to be statistically significant, and thus, the hypothesis H4 is generally supported.

TABLE 5. Hypotheses of the study

H	Relationship	Path	t-value	p-value	Direction	Decision
H1	PE → MOV	0.597	20.426	0.000	+	Corroborative **
H2	PE → PU	0.236	8.260	0.032	+	Corroborative *
H3	PE → BIN	0.534	15.847	0.001	+	Corroborative **
H4	PU → BIN	0.428	18.479	0.000	+	Corroborative **

Note: BIN, Behavioral Intention to use GT; MOV, Motivation; PE, perceived Ease of use; PU, perceived usefulness.

** strongly support, * support

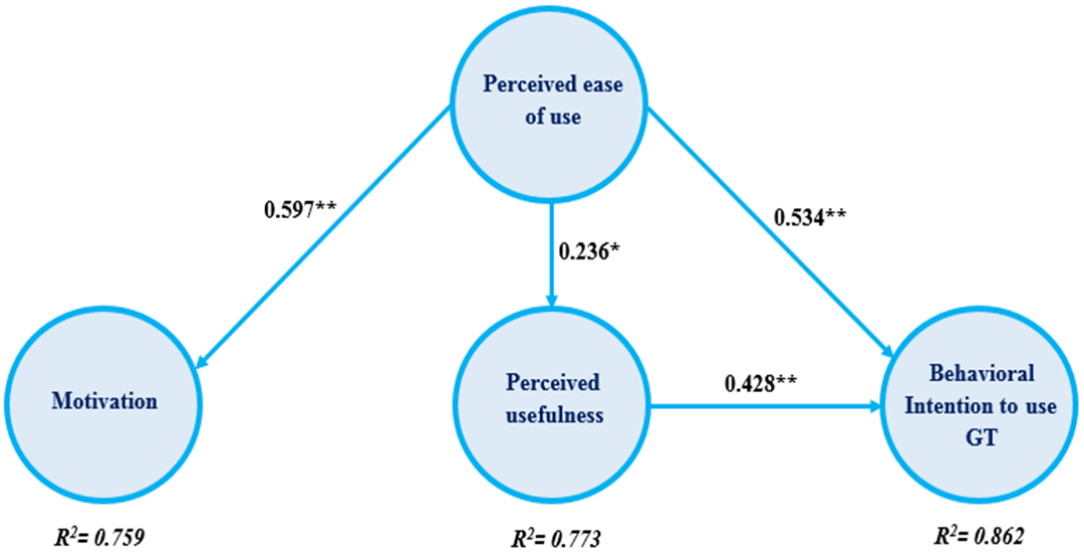

FIGURE 2. Result of the research model

6. **Conclusions.** The role MT in the translation studies and profession is an issue that still engenders a range of doubts and raises questions. The attention is directed towards GT which is an ongoing omnipresence in our lives. In a COVID-19 pandemic era, we perceived transformation from a semi-tech world into a full-tech world that depends heavily on Artificial Intelligence (AI) with the package of the new tools and working methods it brings with it. Students at universities, as one major pillar of the society in Jordan, are leaving behind the Old School way of teaching and are enjoying the New School blended learning or the online learning. The MT is, in most cases, their safe heaven to collect translated information and quick data. To be members of a global community, translation

professionals have to be connected through the new world of free technologies, and convenient and fast information. The new digital world, requires special skills in addition to the insightful knowledge and the talent to meet the market requirements of today. It has been said that the world after the COVID-19 will never be the same as it was before it. The change is enormous and the new world necessities are huge. Thus, being informed about the latest tools and techniques of the new tech methods and models needed for the MT, will take experts who are capable of building bridges between new types of translations and their new requirements. That is said, we still remain doubtful about the quickness of acceptability of the decision makers in the higher education institutions, the students at universities, academics, and how amenable they will be to overtake the human translator. We are hoping that the results of this paper will be implemented in the universities whose students took part in the study or at least to benefit from it for further research and more elaboration.

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