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## INVESTIGATING THE E-SERVICE ADOPTION OF SMEs IN OMAN USING THE TECHNOLOGY READINESS MODEL 2.0 WITH A FOCUS ON BUSINESS SIZE

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### ABSTRACT

The study examines the technology readiness of SMEs for the adoption of e-services based on company size. This reveals opportunities to better exploit the potential of e-services adoption for SMEs in Oman. The problem this study focused is that despite the increasing availability and benefits of e-services, many small and medium enterprises (SMEs) in Oman have been slow to adopt them. This lack of adoption can limit their ability to compete and grow in an increasingly digital market. Studies show that business size plays an important role in the adoption of e-services, and this is one of the main reasons for conducting this study. A quantitative survey method was used to select the sample among SMEs in Oman. SmartPLS 4.0 was used to conduct a multigroup analysis (MGA) to determine the moderating effect of firm size of SMEs in Oman. The main findings show that motivators (optimism and innovativeness) are important predictors of SMEs' willingness to adopt e-services. The study also found that among demographic factors, firm size significantly explains differences between SMEs' readiness to adopt e-services, while it is predicted by motivators and inhibitors. This study has added to the literature by investigating the moderating effect of firm size on SMEs'

readiness to adopt e-services in Oman. It could also provide additional benefits to many SMEs that could lead to the adoption of e-services.

**Keywords:** Technology Readiness, Technology Adoption, E-services, SME, Business Size.

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## INTRODUCTION

There is a growing body of literature that addresses many of the distinctions between large enterprises and small and medium enterprises (SMEs). According to the Omani Ministry of Commerce and Industry, a small enterprise is an enterprise with (5-9) employees and an annual turnover between 25,000 and 250,000 OMR, while a medium enterprise is an enterprise with (10-99) employees and an annual turnover between 250,000 and 1.5 million OMR (Al-Junaibi et al., 2022). Researchers have studied small and large firms in terms of their flexibility and innovation capabilities, resource constraints, and smallness liability (Salavou et al., 2004). The research findings to date provide important insights into the differences that characterise small and medium-sized enterprises (SMEs). While the effort to distinguish between small and large firms is informative and useful, a drawback of studying SMEs as a class of firms is that they can be viewed as a population of firms with relatively homogeneous characteristics.

Firm size, measured by the number of employees, is an important dimension for SME researchers (Beck, Demirgüç-Kunt, & Maksimovic, 2015). Although not an ideal metric, the number of employees is considered relatively unobjectionable by SME managers and owners. According to Lai (2016), the ever-evolving technology landscape poses a threat to established business models and offers numerous opportunities for the implementation of new services. The adoption and use of new technologies is influenced by many factors, including technology availability, consumer demand, convenience, security, and other benefits. With the increase in labour costs and technological innovation, the growth of Internet and e-services is very high. In the broadest sense, e-services can be defined as a concept that includes an online application using information and communication technology (ICT) in various fields.

It is expected that the technology of e-services will continue to grow, especially in the interaction between SMEs and their consumers. As of January 2023, there were approximately 4.44 million Internet users in Oman with an Internet penetration rate of 96.4% (Kemp, 2023). In this study, a model is developed to predict and explain SMEs' intentions in adopting e-services based on the Technology Readiness 2.0 (TR 2.0) model (Parasuraman & Colby, 2014). This study assumes that the adoption of e-services by SMEs in Oman is dependent on firm size. This study focuses on the relationship between technology readiness and e-services adoption with a special focus on firm size in Oman.

Hamed (2017) describes technology acceptance as a function associated with user participation in system development. This indicates that consumer confidence in the use of technology is essential for the development of new technologies. The closure of government offices, businesses, and schools during the height of the pandemic COVID -19 highlights the importance of understanding the fundamental role of SMEs in the adoption of e-services in Oman (Al-Junaibi et al., 2022). SMEs as a group may certainly be invariant in certain dimensions. However, they may also differ greatly within the group in other dimensions. Perhaps the differences between small and medium enterprises are greater than between medium and larger enterprises. These are empirical questions that remain to be explored in the research literature.

The research question underlying this study is: Are there significant differences between small and medium enterprises in terms of technological readiness to adopt e-services in Oman?

## LITERATURE REVIEW

### Technology Readiness

People's willingness to adopt and use new technologies to achieve their daily goals is referred to as technological readiness (Liljander et al., 2006). Parasuraman and Colby (2015) categorise technology readiness into two main components: Motivators (optimism and innovativeness) and Inhibitors (discomfort and insecurity). Optimism and innovativeness, according to Parasuraman and Colby (2015), are positive drivers for TR, because they inspire consumers to adopt technological services and have a good attitude towards technology. In contrast, discomfort and insecurity are barriers that increase consumer reluctance to adopt new technologies (Parasuraman & Colby, 2015). In this sense, the technology readiness model defines users according to two groups distinguished by personality traits that include motivators and barriers to using new technologies (Parasuraman & Colby, 2015; Parasuraman, 2000; Parasuraman & Colby, 2001). The importance of ICTs has led researchers (Kim, Kim, Moon, & Chang, 2014) to look at relevant technological issues in emerging economies over the past decades. Their findings, as well as those of Parasuraman and Colby (2015), suggest that TR has the potential to determine people's technological readiness.

### Motivators

*Optimism* According to Scheier and Carver (1985), optimistic people expect "good things to happen rather than terrible things" Optimists' attitudes towards the world are influenced by their perception of risk and their acceptance of technology. In addition, Parasuraman (2000) describes optimism in the context of a "positive attitude towards technology and confidence that it will provide people with greater efficiency, flexibility and control", assuming that optimism has a positive impact on technology readiness. According to Al-Junaibi et al. (2022); Alharbi and Sohaib (2021); Parasuraman and Colby (2015), the adoption of e-services is positively influenced by optimism. *Innovativeness* is commonly used to assess the novelty of innovations, with more innovative products being labelled with a higher degree of novelty (Buyle, et al., 2018). Consequently, creative and innovative users adopt new ideas faster and more efficiently than others (Rogers, 2003). Parasuraman and Colby (2015) argue that creativity lies in the propensity to "be a thought leader and an innovation pioneer", which is often synonymous with a bold, innovative user. Furthermore, Parasuraman (2000) introduced the technological dimension and referred to it as the "propensity to be a technology pioneer and influencer", while the work of Al-Junaibi et al, (2022); Alharbi and Sohaib (2021) found a correlation between technology readiness and e-services adoption. Therefore, the following hypothesis is put forward.

*H1. There is a significant relationship between Motivators (optimism and innovativeness) in the adoption of e-services among SMEs in Oman.*

### Inhibitors

*Discomfort* is an attribute often associated with "a perceived lack of control over technology and a sense of being overwhelmed by it" (Parasuraman & Colby, 2015; Parasuraman, 2000). Parasuraman (2000) defined the "apparent lack of control over innovation and feeling overwhelmed by it" as a sign of discomfort. Consumers who experience discomfort are predicted to distrust innovative technologies, developments and changes and may develop

technophobia (Parasuraman, 2000). Alharbi and Sohaib (2021); Al-Junaibi et al. (2022), in their study of new technology adoption, find that discomfort does not have a positive impact on technology adoption and leads consumers to develop a generally negative perception when there is an innovation. Insecurity is often equated with "distrust of technology and scepticism about its ability to work properly" (Parasuraman, 2000). Now and then, consumers who feel insecure show their willingness to rely on innovations. However, the combination of safety concerns, negative technological consequences and the need for security leads to consumer scepticism towards the use of technology (Parasuraman, 2000).

Haddad et al. (2019) reported that insecure consumers are associated with both unclear and generally low use of innovation. In terms of measuring innovativeness, the unique effects of uncertainty have been widely researched (Haddad et al., 2019). Godoe and Johansen (2012) and Walczuch et al. (2007), cited in Haddad et al. (2019), affirmed that the identification of uncertainty is not fundamental when, contrary to expectation, "individuals might be expected to realise a basic appraisal for a framework that pays little attention to how things are handled". Gelderman et al. (2011) observed a small effect of *insecurity* and considered the measure inconsistent and weak, confirming the findings of Godoe and Johansen (2012); Walczuch et al. (2007). They concluded that insecurity is a negative factor that should be combined with the much more significant part of discomfort due to its shortcomings (Haddad et al., 2019). Nevertheless, Parasuraman and Colby (2015) found that insecurity is strongly associated with a lack of confidence in innovations and a lower willingness to use them. This identification establishes a negative relationship between insecurity and the overall recognition of progress and prompts the following hypothesis to be formulated:

*H2. There is a significant relationship between Inhibitors (discomfort and insecurity) in the adoption of e-services among SMEs in Oman.*

### **Technology Readiness and Business Size of SME**

To remain competitive in today's digital age, it is essential for businesses to be prepared for technology. The use of technology can help businesses streamline operations, increase efficiency and reduce costs. However, the readiness of businesses to adopt technology depends on the size of the business. In Oman, small and medium-sized enterprises (SMEs) are an integral part of the economy and account for over 90% of the country's businesses (Ashrafi et al., 2014). However, SMEs in Oman face several challenges when it comes to technology adoption. SMEs in Oman lack the necessary resources, such as finance, expertise and infrastructure, to effectively adopt and implement new technologies (Alraja et al. 2021; Bogavac & Cekerevac, 2020; Shatat, 2017). The study also found that the size of the company is an important factor in technology readiness.

Larger companies in Oman have more resources and are better equipped to adopt and implement new technologies than smaller companies (Alraja et al. 2021; Bidan et al., 2012). According to Shatat (2017), larger companies in Oman are more likely to have dedicated IT departments responsible for implementing and maintaining technology infrastructure. Alraja et al. (2021); Bogavac and Cekerevac (2020); found that larger companies in Oman have a more positive attitude towards technology adoption than smaller companies. The study found that larger companies in Oman see technology adoption as a way to improve their operations and gain a competitive advantage. However, the study also found that the level of technology adoption among businesses in Oman is relatively low, regardless of the size of the business. The authors

suggest that this could be due to a lack of awareness of the benefits of technology adoption, as well as a lack of government support for technology initiatives. Research studies have found that one of the criteria for successful e-services adoption in SMEs is the size (Salavou et al., 2004; Beck et al., 2015). SMEs are interested in e-services because they can help them improve their business processes, reduce costs and establish a close connection with their customers. As a result, the author has made the following hypothesis.

*H3. The impact of SMEs' technology readiness on the adoption of e-services in Oman varies significantly by firm size.*

## METHODOLOGY

The relationship between technology readiness factors and the adoption of e-services was investigated using a quantitative research technique. Data from 309 participants (SME managers) were collected for the research using a survey design. With a range of 30 to 500 samples, Rosco (1975) suggested a sample size of 10% of the population. An open-ended, 5-point Likert scale was used in the questionnaire's closed items. On a scale of 1 (strongly disagree) to 5 (strongly agree), participants were asked to evaluate their agreement with statements pertaining to the variables of technology readiness and the adoption of e-services. The 16-item TRI 2.0 questionnaire was used to generate the measurement scores (Parasuraman & Colby, 2015). Three different parts make up the form. The first section focuses on the demographics of the respondents, the second on their technological readiness, and the third on their adoption of e-services. An online survey was administered to a random sample of SME managers who fulfilled the study's inclusion requirements. Before taking part in the poll, participants were made aware of the investigation's goal and provided their consent. 309 participants completed the survey, yielding an 80% response rate for the research. For this research, SPSS and SmartPLS 4.0 were employed. Validity and reliability were tested using confirmatory factor analysis, while hypotheses were tested using path analysis, and the impacts of firm size were investigated using multigroup analysis. Partial Least Square, a variance-based approach to structural equation modelling, is used to analyse the data with SmartPLS 4.0 (Roldán & Sánchez-Franco, 2012). This method is used in conjunction with SmartPLS because it allows for more robust and incremental data analysis (Hair, Sarstedt, Ringle, & Gudergan, 2017; Ringle, Wende, & Becker, 2015). The business size was then analysed using multigroup analysis (MGA) to determine the moderating effect on SME technological readiness and e-services adoption.

## ANALYSIS AND RESULTS

Table 1.  
*Demographic Information of Respondents*

		Frequency	Percentage
Gender	Male	153	49.5
	Female	156	50.5
Age Group	20 - 24	17	5.5
	25 - 34	41	13.3
	35 - 44	114	36.9
	45 - 54	92	29.8
	55 and above	45	14.6
Education Level	Primary certificate or below	1	0.3

	High School	47	15.2
	Diploma	171	55.3
	Bachelor's degree and above	90	29.1
Management Position	Owner	123	39.8
	Manager	92	29.8
	Owner & Manager	94	30.4
Business Size	5 – 9 (Small)	140	45.3
	10 – 99 (Medium)	169	54.7
Years of Internet use	No experience	3	1
	Less than 5 Years	47	15.2
	5 - 10 Years	129	41.7
	10 Years and above	130	42.1

In total, 309 SMEs took part in the poll, with 156 women (50.5%) and 159 men (49.5%). In terms of age, there were 17 respondents in the 20 to 24-year age range (5.5%); 41 respondents in the 25 to 34-year range (13.3%); 114 respondents in the 35 to 44-year range (36.9%); 92 respondents in the 45 to 54-year range (29.8%); and 45 respondents in the over 55-year range (14.6%). One respondent had only completed primary education (0.3%); 47 had completed high school (15.2%); 171 had a diploma (55.3%); and 90 had a bachelor's degree or higher (29.1%). There were 123 owners (39.8%), 92 managers (29.8%), and 94 owners and managers (30.4%) in managerial roles. 140 (45.3%) of the businesses were classified as small (5-9), and 169 (50.7%) were classified as medium (10-99). Three individuals had no experience (1%), 47 had experience of fewer than five years (15.2%), 129 the experience of five to ten years (41.7%), and 130 had experience of more than ten years (42.1%) when asked how long they had used the internet.

### Assessment of Measurement Model

A confirmatory factor analysis (CFA) was conducted to validate the dimensions and items of the measurement model. The originally specified model and solution are shown in Figure 1.

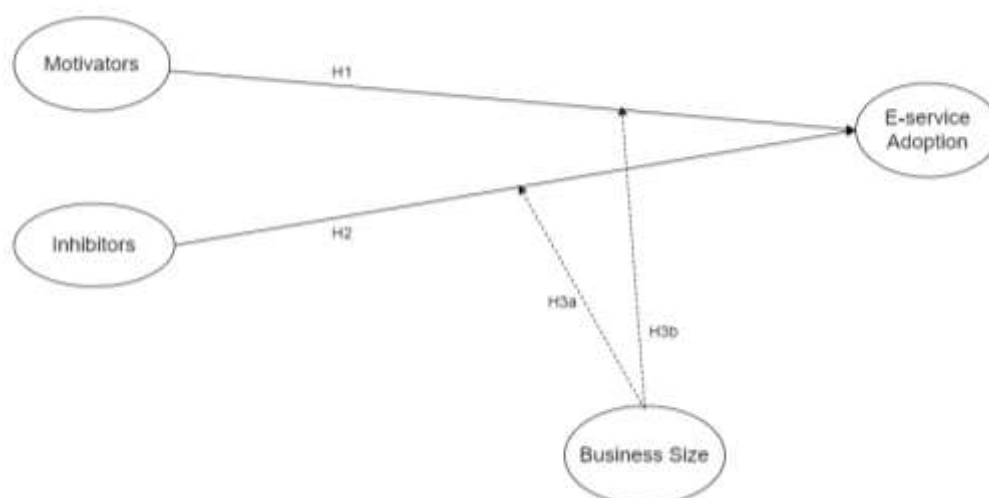


Figure 1. Research Framework



Table 2.  
*Convergent Validity and Reliability*

Constructs	Items	Standardised Factor Loading	Cronbach Alpha	Composite Reliability	Average Extracted (AVE)	Variance
Motivators	INNI1	0.581	0.789	0.843	0.402	
	INNI2	0.658				
	INNI3	0.582				
	INNI4	0.694				
	OPT1	0.626				
	OPT2	0.686				
	OPT3	0.635				
	OPT4	0.600				
Inhibitors	DISC1	0.820	0.747	0.839	0.568	
	DISC2	0.765				
	DISC3	0.759				
	DISC4	0.661				
	INS1, INS2, INS3, INS4	Deleted				
E-service Adoption	ESA1	0.723	0.791	0.865	0.616	
	ESA2	0.773				
	ESA3	0.842				
	ESA4	0.795				

\*INN=Innovativeness, OPT=Optimism, DISC=Discomfort, INS=Insecurity, ESA=E-service Adoption

Since the Cronbach Alpha and Composite Reliability are all above 0.70 for all the variables, the outcome in Table 2 demonstrates that all the variables have good internal consistency. As a result, this suggests high dependability. Regarding the variables' validity, individual factor loadings for each item were analysed, and the results showed that all values, with the exception of the variable, which has a value of 0.402, are above 0.50. When the average extracted variance is less than 0.5 but the composite reliability is greater than 0.6, Fornell and Larcker (1981) claimed that convergent validity is suitable. As a consequence, the test's convergent validity is found to be satisfactory (Hair et al., 2017; Fornell & Larcker, 1981).

Table 3  
*Discriminant Validity*

	1	2	3
E-service Adoption	<b>0.785</b>		
Inhibitors	0.245	<b>0.753</b>	
Motivators	0.583	0.373	<b>0.634</b>

As shown in Table 3, discriminant validity was determined using the standards established by Fornell and Larcker (1981). The square root of AVE is represented by the values in the bold diagonal, while the correlation between the variables is represented by the other values. It is necessary for the values in the bolded diagonal to be higher than the other values in the corresponding rows and columns. Conclusion: The variables exhibit strong discriminant validity. The structural model was analyzed to evaluate the hypotheses after determining a suitable measurement model.

### Assessment of Structural Model

According to Hair et al. (2017), once the measurement modal has been analysed, the next step is to evaluate the structural model for hypothesis testing. The criteria used to evaluate the structural model include multicollinearity assessment, t-statistics, path coefficients, coefficient of determination (R<sup>2</sup>), effect size (f<sup>2</sup>), and predictive relevance of the model (Q<sup>2</sup>). The VIF or variance inflation factor was used to assess multicollinearity, as shown in Table 4.

Table 4.  
*Multicollinearity Assessment Output*

Constructs	VIF Values
Inhibitors	1.162
Motivators	1.162

Table 4 shows that all the values are below the threshold of 5, which means that there is no problem with multicollinearity in our data. The threshold of the VIF is 5 and is based on the guidelines of Hair et al. (2017) and Ringle et al. (2015).

Table 5.

#### *Structural Model (Hypothesis Testing)*

H.n o	Path	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics ( O/STDEV )	R <sup>2</sup>	f <sup>2</sup>	Q <sup>2</sup>	P value s
H1	Motivators -> ESA	0.570	.576	.053	10.693	.342	.425	.3	0.000
H2	Inhibitors -> ESA	0.035	.042	.051	0.686		.001	.18	0.493

\*ESA= E-service Adoption

Table 5 shows that the motivators (optimism and innovativeness) for e-services adoption ( $\beta=.570$ ,  $P < .05$ ) have a positive and significant impact on e-services adoption by SME managers. However, the results for inhibitors (discomfort) ( $\beta=.035$ ,  $P > .05$ ) show a positive but insignificant result. Based on these results, we accepted H1 but rejected H2. Hair et al. (2017) proposes other criteria for assessing the relationship besides the beta coefficient, namely the coefficient of determination R-squared (R<sup>2</sup>), the effect size F-squared (F<sup>2</sup>) and the predictive relevance Q-squared (Q<sup>2</sup>). R<sup>2</sup> is the explained variation of the dependent variable due to the independent variables. The R<sup>2</sup> value in this study indicates that the independent variable explains 34.2% of the variation in the dependent variable of e-services adoption in SMEs, which is satisfactory. The value of f<sup>2</sup> indicates the predictive power of the independent variable.

An f<sup>2</sup> value of 0.02 is considered a small effect, 0.15 a medium effect and 0.35 a large effect (Cohen, 1988; Roldán & Sánchez-Franco, 2012). The f-squared value for the motivators is above 0.35, which can be considered a large effect, while the f-squared value for the inhibitors shows that their effect is weak. Q<sup>2</sup> is also an important criterion and an indication of the predictive relevance of the model based on the construct of each sample (Hair et al., 2017). Finally, as the Q<sup>2</sup> value for the endogenous construct is above 0, the predictive relevance of the model is given. The Q<sup>2</sup> value was determined using the PLS Predict procedure SmartPLS 4.0. The Q<sup>2</sup> value above 0 shows that our model has good predictive relevance.



### Multigroup Analysis (MGA)

The multigroup analysis of company size, which is employed as a moderator variable (H3) in the model, is the subject of the study's final hypothesis. The MICOM approach with 5000 permutations was used to carry out the test for measurement invariance in accordance with the standards set forth by Henseler et al. (2016). Table 6 illustrates the three stages of the MICOM process for detecting measurement invariance.

Table 6.

#### *MICOM Analysis Result*

<b>Step 2 - Composite Measure Invariance</b>						
	<b>Original correlation</b>	<b>Correlation mean</b>	<b>permutation 5.00%</b>	<b>Permutation p-value</b>		
ESA	0.998	0.997	0.993	0.438		
Inhibitors	0.929	0.974	0.927	0.054		
Motivators	0.995	0.992	0.981	0.661		

<b>Step 3a: MICOM Mean - Part 1</b>						
	<b>Original difference (Small-Medium)</b>	<b>Permutation difference (Medium)</b>	<b>mean (Small- 2.50%</b>	<b>97.50 %</b>	<b>Permutation p-value</b>	
ESA	-0.08	-0.001	-0.216	0.23	0.482	
Inhibitors	-0.168	-0.003	-0.219	0.217	0.118	
Motivators	-0.096	-0.003	-0.23	0.224	0.404	

<b>Step 3b: MICOM Variance - Part 2</b>						
	<b>Original difference (Small-Medium)</b>	<b>Permutation difference (Medium)</b>	<b>mean (Small- 2.50%</b>	<b>97.50 %</b>	<b>Permutation p-value</b>	
ESA	-0.062	0.006	-0.338	0.359	0.735	
Inhibitors	-0.008	-0.001	-0.256	0.276	0.957	
Motivators	-0.157	-0.001	-0.316	0.314	0.348	

\* ESA = E-service Adoption

The MICOM process, which uses an automatic calculation for configural invariance or the first step, is shown in Table 7. (Garson, 2016). The composite invariance was checked in the second phase, and as required, it is not significant for any correlation values. Examining the equality of the means and variance across groups was the next stage. The step test operates under the null hypothesis that the variance of the composite is equal to the sum of the differences between the measures. According to the MICOM total table's outcome, all values for step 3a are within the acceptable range. Similar to step 3a's outcome, step 3b's result demonstrates that all values pertaining to the variance of the initial differences are within a 95% confidence interval or negligible. These findings allow us to conclude that the selected measure exhibits comprehensive measurement invariance. As a result, the data are consistent with the multigroup premise, which allows for the next stage.

Table 7.  
*Multigroup Analysis, Business size*

H no.	Path	Path difference (Medium Small Enterprise - Enterprise)	Coefficients- Enterprise - Small Enterprise)	p-value original 1-tailed (Medium Enterprise vs Small Enterprise)	p-value (Medium Enterprise vs Small Enterprise)	NEW Enterprise
H3a	Inhibitors -> ESA		-0.248	0.992	0.008	
H3b	Motivators -> ESA		0.196	0.026	0.026	

\*ESA = E-service Adoption

Table 7 shows the MGA result indicating that there is a statistically significant difference in the path coefficients for inhibitors and motivators to e-services adoption in SMEs. In line with the result, H3a and H3b are accepted.

### DISCUSSION AND CONCLUSION

This study's goal was to examine the Technology Readiness Model 2.0 in the context of SMEs in Oman adopting e-services. The key conclusions demonstrate that factors that influence motivation—such as optimism and inventiveness—are significant determinants of SMEs' readiness to adopt e-services. The study also discovered that, among demographic indicators, firm size strongly explains variations in SMEs' readiness to adopt e-services, even though motivators and inhibitors are predictive of this readiness. In other words, the likelihood that a SME will adopt e-services may grow with business size. These findings concur with those of earlier investigations (Alraja et al. 2021; Bogavac & Cekerevac, 2020; Shatat, 2017; Bidan et al., 2012). In light of this, the findings are supported by the Technology Readiness Model 2.0 (Parasuraman & Colby, 2015) and the previously examined literature.

Based on the Technology Readiness Model 2.0, this study examines the moderating impact of SME business size on the adoption of e-services in Oman. According to the study, e-services adoption is relentlessly rising, and all SMEs—regardless of size—should follow this trend in the expectation that they may take advantage of this technology's potential. Additionally, it has been shown that readiness to adopt e-services and company size are related. The findings of this study offer SME managers and researchers a unique viewpoint. The study also looked at the connection between business size. Those in top management and the management team who comprehend the value of information technology and acquire the skills necessary to properly adopt it may succeed financially. According to the study's expectations, the size of the SMEs varied significantly from one another statistically. The findings of this study indicate one of the major factors influencing the adoption of e-services by SMEs in Oman. In times of intense competition, like the Covid-19 pandemic, an innovative business will surely have a higher chance of surviving and standing out, enabling SMEs to adapt to their customers' changing demands.

### Future Research

The topic of the methodological framework, such as the qualitative technique, may be the subject of future study. Although SME managers were the main target group, the sample size prevents generalization of the findings. Future studies should therefore consider this and strive to obtain better outcomes by increasing the sample size. Third, the effect of firm size needs to be investigated in future studies in order to clearly differentiate between SME size and technological readiness and adoption of e-services in Oman. Fourth, all SMEs were considered in this study; SMEs that were industry-specific were not. The model may be put to the test for

a particular industry or through comparative study among SMEs in order to determine the degree of technological readiness and e-services adoption based on the type of industry. Oman is a member of the Gulf Cooperation Council (GCC), so statistics from the GCC will be used to compare SMEs' technological readiness and adoption of e-services across different countries.

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