

**THE IMPACT OF TECHNOLOGICAL,
ORGANIZATIONAL AND ENVIRONMENTAL
FACTORS OF ERP DIFFUSION AMONG SMEs IN
SAUDI ARABIA: PERCEIVED VALUES AS THE
MEDIATOR**

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UNIVERSITI SAINS MALAYSIA

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SAUDI ARABIA: PERCEIVED VALUES AS THE
MEDIATOR**

by

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TABLE OF CONTENTS

ACKNOWLEDGEMENT	ii
TABLE OF CONTENTS	iii
LIST OF TABLES	xii
LIST OF FIGURES	xv
LIST OF ABBREVIATIONS	xvi
LIST OF APPENDICES	xviii
ABSTRAK	xix
ABSTRACT	xxii
CHAPTER 1 INTRODUCTION	1
1.1 Background of the Study	1
1.1.1 ERP evolution	2
1.1.2 Benefits and Risks of ERP Systems.....	2
1.2 Problem Statement	6
1.3 Research Questions	9
1.4 Research Objectives	10
1.5 The Scope of the Study	11
1.6 Definition of the Key Terms	11
1.6.1 Small and Medium Enterprises (SMEs).....	11
1.6.2 Enterprise resource planning (ERP).....	12
1.6.3 Diffusion of ERP	12
1.6.4 ERP Evaluation	12
1.6.5 ERP Adoption	13
1.6.6 ERP routinization.....	13
1.6.7 ICT Infrastructure	14
1.6.8 Technical Know-How	14

1.6.9	Top Management Support.....	14
1.6.10	Organisational Readiness.....	14
1.6.11	Training on ERP	15
1.6.12	Competitive Pressure	15
1.6.13	Vendor Support:.....	15
1.6.14	Government Policies.....	15
1.6.15	Perceived Value	15
1.7	Organization of the Study	16
CHAPTER 2 LITERATURE REVIEW		17
2.1	Introduction.....	17
2.2	Taxonomy of ERP system	17
2.3	Small and Medium Enterprises (SMEs) in Saudi Arabia	18
2.3.1	The ICT and ERP in Saudi Arabia.....	22
2.4	ERP Systems: An overview	25
2.4.1	History of ERP Systems.....	25
2.4.2	ERP System Software	28
2.4.3	Purpose of ERP System	31
2.4.4	Implementation of ERP Systems	33
2.4.5	Benefits of ERP System Adoption.....	35
2.4.6	Risks and Challenges in the Adoption of an ERP system	37
2.5	ERP Diffusion.....	38
2.5.1	ERP Evaluation.....	40
2.5.2	ERP Adoption	40
2.5.3	ERP Routinization	42
2.6	Theoretical Foundations of ERP Adoption Stages	42
2.6.1	Diffusion of Innovations (DOI) Theory.....	46
2.6.1(a)	Applications of DOI in Previous ERP Studies.....	48

2.6.2	Technology-Organization-Environment (TOE).....	50
2.6.2(a)	Applications of TOE in Previous ERP Studies	51
2.6.3	The Underlying Theory of This Research	55
2.7	Technological Context	60
2.7.1	ICT Infrastructure	60
2.7.2	Technological Know-How	61
2.8	Organizational Context	64
2.8.1	Top Management Support.....	65
2.8.2	Organizational Readiness.....	68
2.8.3	Training on ERP	70
2.9	Environmental Context	74
2.9.1	Competitive Pressure	74
2.9.2	Government Policies	77
2.9.3	Vendor Support.....	79
2.10	Perceived Value of ERP.....	82
2.11	Gap of the Literature	87
2.12	Theoretical Framework	89
2.13	Hypotheses Development	94
2.13.1	Relationship between TOE Factors and ERP Diffusion	94
2.13.1(a)	Relationship between ICT Infrastructure and ERP Diffusion	94
2.13.1(b)	Relationship between Technical Know-How and ERP Diffusion	95
2.13.1(c)	Relationship between Top Management Support and ERP Diffusion	96
2.13.1(d)	Relationship between Organizational Readiness and ERP Diffusion	98
2.13.1(e)	Relationship between Training on ERP and ERP Diffusion	99

2.13.1(f)	Relationship between Competitive Pressure and ERP Diffusion	100
2.13.1(g)	Relationship between Government Policies and ERP Diffusion	101
2.13.1(h)	Relationship between Vendor Support and ERP Diffusion	103
2.13.2	Relationship between TOE factors and ERP Perceived Value	104
2.13.2(a)	Relationship between ICT Infrastructure and Perceived Value of ERP	104
2.13.2(b)	Relationship between Technical Know-How and Perceived Value of ERP	105
2.13.2(c)	Relationship between Top Management Support and Perceived Value of ERP	105
2.13.2(d)	Relationship between Organizational Readiness and Perceived Value of ERP	106
2.13.2(e)	Relationship between Training on ERP and Perceived Value of ERP	107
2.13.2(f)	Relationship between Competitive Pressure and Perceived Value of ERP	108
2.13.2(g)	Relationship between Government Policies and Perceived Value of ERP	108
2.13.2(h)	Relationship between Vendor Support and Perceived Value of ERP	109
2.13.3	Relationship between Perceived Value of ERP and ERP Diffusion (Evaluation, Adoption, and Routinization).....	110
2.13.4	The Mediating Role of Perceived Value of ERP	110
2.13.5	The Three stages of ERP diffusion	114
2.14	Summary of the Chapter	116
CHAPTER 3 RESEARCH METHODOLOGY		117
3.1	Introduction	117
3.2	Research Philosophy of the Study	117
3.3	Research Design.....	118
3.4	The Study Population.....	120

3.4.1	The Sample Size of the Study and Power Analysis.....	125
3.4.2	Sampling Technique	126
3.5	Survey Instrument Development	127
3.6	Measurement and Operationalization of the Study's Variables.....	128
3.6.1	Operationalization of ERP Diffusion.....	128
3.6.2	Operationalization of ICT Infrastructures.....	131
3.6.3	Operationalization of Technical Know-How.....	132
3.6.4	Operationalization of Top Management Support	133
3.6.5	Operationalization of Organizational Readiness.....	134
3.6.6	Operationalization of ERP Training	135
3.6.7	Operationalization of Competitive Pressure	136
3.6.8	Operationalization of Vendor Support.....	137
3.6.9	Operationalization of Government Policies.....	138
3.6.10	Operationalization of Perceived Value of ERP Systems	139
3.7	Questionnaire	140
3.7.1	Validity Reliability and Research Instruments	142
3.7.2	Translation Procedure of the Questionnaire.....	144
3.8	Data Collection	145
3.9	Data Preparation.....	147
3.9.1	Missing Data	147
3.9.2	Structural Equation Modeling (SEM).....	148
3.9.3	Assessment of Reflective Measurement Model.....	149
3.9.3(a)	Internal Consistency – Composite Reliability (CR).....	149
3.9.3(b)	Indicator Reliability – Loading and AVE	149
3.9.3(c)	Convergent Validity	149
3.9.3(d)	Discriminant Validity (Fornell and Lacker & HTMT)	150
3.9.3(e)	Goodness of fit	150

3.9.4	Assessment of Structure Model	151
3.9.4(a)	Lateral Collinearity (VIF)	151
3.9.4(b)	Path Coefficient.....	151
3.9.4(c)	Coefficient of Determination (R^2).....	151
3.9.4(d)	Effect Size (f^2)	152
3.9.4(e)	Cross Validated Redundancy (Q^2)	152
3.9.4(f)	The Effect Size q^2	152
3.9.5	Assessment of Mediating Effect in SEM-PLS.....	153
3.9.6	Data Analysis Tools	154
3.9.6(a)	Statistics Package for Social Science (SPSS)	154
3.9.6(b)	SmartPLS 3.0	154
3.10	Summary of the Chapter	154
CHAPTER 4 RESULTS		156
4.1	Introduction.....	156
4.2	Pilot Study.....	156
4.2.1	ERP Domains	156
4.2.2	Perceived value	158
4.2.3	Technological factors	159
4.2.4	Organizational Factors Domains.....	161
4.2.5	Environmental Factors	163
4.3	Study outcomes	166
4.3.1	Response rate	166
4.3.2	Demographic characteristics	167
4.3.2(a)	Position.....	167
4.3.2(b)	Gender	168
4.3.2(c)	Age groups	168
4.3.2(d)	Education.....	169

4.3.2(e)	Years of work experience.....	169
4.3.2(f)	Geographic region.....	170
4.3.2(g)	Age of institute.....	170
4.3.2(h)	Business institute.....	171
4.3.2(i)	Number of employees.....	171
4.3.2(j)	Time of implemented ERP system.....	172
4.3.2(k)	Resource plan system.....	172
4.3.2(l)	Current ERP status of implementation.....	173
4.3.2(m)	Experience of ERP system.....	173
4.3.3	Responses of study participants.....	174
4.4	Normality, missing values, and outliers.....	180
4.4.1	Normality.....	180
4.4.2	Missing values.....	181
4.4.3	Outliers.....	181
4.5	Measurement Model Assessment.....	183
4.5.1	Internal consistency reliability.....	183
4.5.2	Indicator Reliability.....	184
4.5.3	Convergent Validity.....	186
4.5.4	Discriminant Validity.....	186
4.5.5	Goodness of fit.....	190
4.6	Structural Model.....	190
4.6.1	Coefficient of determination (R^2).....	191
4.6.2	Lateral collinearity (VIF).....	191
4.6.3	Path coefficient.....	192
4.6.4	Effect size (f^2).....	193
4.6.5	Cross validated redundancy (Q^2).....	194
4.7	Hypothesis Testing.....	195

4.8	Mediation relationship	198
4.9	Hypotheses and decisions	204
4.10	Summary	206
CHAPTER 5 DISCUSSION AND CONCLUSION		207
5.1	Introduction.....	207
5.2	Summary of the study findings	207
5.3	Discussion of study findings with direct effect.....	210
5.3.1	The relationship between the ICT infrastructure and ERP diffusion	210
5.3.2	The relationship between the Technical Know-How and ERP diffusion	211
5.3.3	The relationship between the Top Management Support and ERP diffusion.....	212
5.3.4	The relationship between the Organizational readiness and ERP diffusion.....	213
5.3.5	The relationship between the Training on ERP and ERP diffusion	214
5.3.6	The relationship between the Competitive Pressure and ERP diffusion	215
5.3.7	The relationship between the Government Policies and ERP diffusion	216
5.3.8	The relationship between the Vendor support and ERP diffusion	216
5.4	Discussion of study findings with perceived value.....	217
5.4.1	The relationship between the Organizational Readiness and Perceived Value	218
5.4.2	The relationship between the Vendor support and Perceived Value	218
5.5	Discussion of the relationship between the perceived value with ERP diffusion stages	219
5.5.1	Perceived value and ERP evaluation	220
5.5.2	Perceived value and ERP routinization.....	221

5.5.3	Relationship among the stages of ERP diffusion system.....	221
5.6	Discussion of mediating effect of perceived value between TOE factors and ERP diffusion stages	223
5.6.1	Technical Know-How and ERP evaluation	223
5.6.2	Technical Know-How and ERP Routinization	224
5.6.3	Top Management Support and ERP Evaluation	225
5.6.4	Top Management Support and ERP Routinization.....	226
5.6.5	Organizational Readiness and ERP Evaluation	227
5.6.6	Organizational Readiness and ERP Routinization.....	228
5.6.7	Training on ERP and ERP Evaluation	229
5.6.8	Training on ERP and ERP Routinization.....	230
5.6.9	Government Policies and ERP Evaluation	231
5.6.10	Government Policies and ERP Routinization	232
5.6.11	Vendor support and ERP Evaluation	233
5.6.12	Vendor support and ERP Routinization.....	234
5.6.13	Perceived value mediating effect between the ERP system and other TOE factors.....	235
5.7	Implications of the research	235
5.7.1	Theoretical implications.....	236
5.7.2	Practical implications	240
5.8	Limitations of the study	241
5.9	Future works	242
5.10	Conclusion	244
	REFERENCES.....	246
	APPENDICES	
	LIST OF PUBLICATIONS	

LIST OF TABLES

		Page
Table 2.1	Literature studies of commonly used theories of ERP system	59
Table 2.2	Literature studies Technological Context and ERP system.....	64
Table 2.3	Literature studies about the organizational context and ERP system.....	73
Table 2.4	Literature studies about the Environmental Context and ERP system.....	82
Table 2.5	Literature studies about the perceived value and ERP system.....	86
Table 2.6	Summary of Study Hypotheses	115
Table 3.1	Summary of the Study's Philosophy of Research and Research Design	119
Table 3.2	Sampling Frame by Region and Sector (Total Small and Medium Enterprises)	124
Table 3.3	Disproportionate Cluster Sampling of Respondents	127
Table 3.4	Survey Items Related to ERP Adoption Stages (Junior et al., 2019).....	130
Table 3.5	Survey Items Related to ICT Infrastructures (Albar et al., 2017).....	131
Table 3.6	Survey Items Related to Technical Know-How (Awa et al., 2017).....	133
Table 3.7	Survey Items Related to Top Management Support (Junior et al., 2019).....	134
Table 3.8	Survey Items Related to Organizational Readiness (Ram et al., 2015)	135
Table 3.9	Survey Items Related to ERP Training (Rajan et al., 2015).....	136
Table 3.10	Survey Items Related to Competitive Pressure (Junior et al., 2019).....	137

Table 3.11	Survey Items Related to Vendors Support (Saleh et al., 2013).....	138
Table 3.12	Survey Items Related to Government Policies (Ilin et al., 2017).....	139
Table 3.13	Survey Items Related to PV Scale (Yuan et al., 2020).....	140
Table 4.1	Correlation matrix among the items of ERP domains.....	157
Table 4.2	Validity and reliability of ERP domains.....	158
Table 4.3	Correlation matrix among the items of perceived value.....	159
Table 4.4	Correlation matrix among the items of Technological factors	160
Table 4.5	Validity and reliability of Technological factors.....	161
Table 4.6	Correlation matrix among the items of Organizational Factors	162
Table 4.7	Validity and reliability of Organizational Factors Domains.....	163
Table 4.8	Correlation matrix among the items of Environmental Factors	164
Table 4.9	Validity and reliability of Environmental Factors.....	165
Table 4.10	Survey Response Rates according to the geography of Saudi Arabia	167
Table 4.11	Geographic regions of study participants	170
Table 4.12	Age of institute for study participants	170
Table 4.13	Distribution of business instituted for participants of the study.....	171
Table 4.14	Participants' institute employment capacity.....	172
Table 4.15	Groups of Time implemented systems	172
Table 4.16	Percentage of Resource plan system	173
Table 4.17	Current status of ERP implementation	173
Table 4.18	Experience of ERP system	174
Table 4.19	Participants responses of ERP diffusion domains.....	175
Table 4.20	Participants responses of perceived value	176

Table 4.21	Participants responses to Technological Factors.....	177
Table 4.22	Participants responses of Organizational Factors.....	178
Table 4.23	Participants responses to Environmental Factors	179
Table 4.24	Normal distribution of study constructs	181
Table 4.25	Detection of the outliers of study constructs	182
Table 4.26	Construct Reliability and Validity.....	184
Table 4.27	Indicator reliability for items of constructs	185
Table 4.28	Fornell and Larcker’s criterion of constructs	187
Table 4.29	Cross loadings of discriminant validity.....	188
Table 4.30	Hypotheses with results, coefficient, T statistics and p values.....	197
Table 4.31	Use the perceived value as mediator with other variables.....	201
Table 4.32	Study hypotheses and decisions	204

LIST OF FIGURES

	Page
Figure 2.1	Taxonomy of ERP system (Mareai, & Patil, 2012)..... 18
Figure 2.2	Research Framework 93
Figure 4.1	Percentage of study participants positions..... 167
Figure 4.2	Gender percentages of study..... 168
Figure 4.3	Age groups of study participants 168
Figure 4.4	Education groups of study participants 169
Figure 4.5	Percentage of work experience groups..... 169
Figure 4.6	Constructs of the structural model..... 193
Figure 4.7	<i>f</i> square of constructs of the structural model..... 194
Figure 4.8	Cross validated redundancy of structure model 195

LIST OF ABBREVIATIONS

AVE	Average Variance Extracted
BDA	Big Data Analysis
BIS	Business Intelligence Systems
CB-SEM	Co-variance-Based Approach
CITC	Communications and Information Technology Commission
CMB	Common Method Bias
CR	Composite Reliability
CRM	Customer Relationship Management
CSFs	Critical Success Factors
EFA	Exploratory Factor Analysis
EDI	Electronic Data Interchange
EM	Expectation-Maximization
ERP	Enterprise Resource Planning
f^2	Effect Size
DOI	Diffusion of Innovation
GAS	General Authority of Statistics
GCC	Gulf Cooperation Council
GDP	Gross Domestic Product
GIA	General Investment Authority
GOF	Goodness of Fit
GOSI	General Organization for Social Insurance
HIS	Hospital Information System
HTMT	Heterotrait-Monotrait Ratio
ICT	Information and Communications Technology
IS	Information System

IT	Information Technology
KSA	Kingdom of Saudi Arabia
LEs	Large Enterprises
MHRS	Mobile Reservation Systems
PCA	Principal Component Analysis
PLS-SEM	Partial Least Squares Structural Equation Modeling
Q_2	Cross Validated Redundancy Measure
R^2	Coefficient of Determination
RFID	Radio Frequency Identification
SAGIA	Saudi Arabia General Investment Authority
SAMA	Saudi Arabian Monetary Agency
SCM	Supply Chain Management
SEM	Structural Equation Modelling
SMEGA	Small and Medium Enterprises General Authority
SMEs	Small and Medium Enterprises (SMEs)
SOM	School of Management
SPSS	Statistical Package for the Social Sciences
TAM	Technology Acceptance Model
TOE	Technology, Organization, and Environment Framework
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action
UK	United Kingdom
USA	United States of America
USM	Universiti Sains Malaysia
UTAUT	Unified Theory of Acceptance, Use of Technology

LIST OF APPENDICES

- | | |
|------------|---|
| Appendix A | Meta-Analysis of Studies |
| Appendix B | Survey Questionnaires (English Version) |
| Appendix C | Survey Questionnaires (Arabic Version) |
| Appendix D | Letter of Embassy of Saudi Arabia In Kuala Lumpur |

**KESAN FAKTOR TEKNOLOGI, ORGANISASI DAN PERSEKITARAN
TERHADAP PENYEBARAN ERP DALAM KALANGAN PKS DI ARAB
SAUDI: TANGGAPAN NILAI SEBAGAI PENGANTARA**

ABSTRAK

ERP perancangan sumber perusahaan merujuk kepada sistem pusat bersepadu yang digunakan oleh perniagaan untuk menyimpan dan memproses maklumat, memudahkan pertukarannya antara jabatan yang berlainan, dan membantu dalam menguruskan prosedur dengan berkesan. Teori penyelidikan masa lalu menunjukkan bahawa sistem ERP membawa pelbagai faedah teknikal, operasi, dan strategik, seperti berkongsi maklumat, mengurangkan kos, menyelaraskan proses perniagaan, produktiviti, kecekapan, perkhidmatan pelanggan, dan komunikasi rangkaian bekalan. Telah ditunjukkan bahawa sistem ERP telah memberikan manfaat yang serupa dengan perusahaan kecil dan sederhana (UKM) kerana mereka memiliki perusahaan yang terlalu besar (LES). Walau bagaimanapun, sumbangan PKS ' untuk ekonomi dan pasaran modal negara terhad kerana kurangnya penggunaan ERP dan pemahaman mengenai faedah ERP. Walaupun tidak ada kesepakatan mengenai jumlah dan tatanama tahap penyebaran sistem ERP, majoriti penyelidik mengenal pasti tiga: penilaian, penggunaan, dan rutinisasi. Mempelajari tahap-tahap ini sangat penting bagi pihak berkepentingan untuk mengambil keputusan yang tepat, tetapi ada sedikit kajian mengenai tahap-tahap ini. Pendekatan ini gagal menunjukkan bagaimana teknologi disatukan sepenuhnya ke dalam organisasi. Itulah sebabnya terdapat keperluan untuk pandangan holistik mengenai penggunaan ERP yang dapat membantu memahami proses penyebaran di peringkat firma. Oleh itu, kajian ini mempertimbangkan semua peringkat penggunaan kerana satu faktor penggunaan mungkin merupakan anteseden

penggunaan ERP dalam satu tahap tetapi tidak semestinya untuk semua peringkat atau bahkan dengan kesan tanda yang berbeza. Ia juga mengenal pasti beberapa pemboleh ubah TOE utama yang mempengaruhi penggunaan sistem ERP. Pemboleh ubah ini adalah infrastruktur ICT, pengetahuan teknikal, sokongan pengurusan atasan, kesediaan organisasi, latihan ERP, tekanan kompetitif, dasar pemerintah, dan sokongan vendor. Kajian ini menyelidiki sejauh mana pemboleh ubah TOE yang dikenal pasti mempengaruhi tiga tahap dan nilai ERP yang dirasakan di kalangan PKS di KSA dan sejauh mana mereka mempengaruhi tiga tahap tersebut. Ia juga menyelidiki bagaimana nilai yang dirasakan memediasi pengaruh pemboleh ubah TOE yang dikenal pasti pada tahap. Hubungan ini ditulis sebagai hipotesis dan diuji satu persatu. Secara keseluruhan, 58 hipotesis diuji dalam kajian ini. Kajian rintis dilakukan untuk menentukan kesahan dan kebolehpercayaan konstruk kajian dan mengukur beberapa parameter, seperti kesesuaian item dan konsistensi. Dua program perisian digunakan dalam analisis data: SPSS dan SmartPLS. SPSS digunakan untuk menentukan kajian rintis, normalitas dan outliers sampel kajian, dan respons peserta kajian deskriptif. SmartPLS digunakan untuk melakukan pemodelan struktur persamaan (SEM). Beberapa percubaan dilakukan untuk meningkatkan kadar tindak balas, yang menjadi 57,99%. Peratusan ini dianggap sempurna, lebih tinggi daripada kadar 30% yang boleh diterima yang dilaporkan oleh kajian literatur dan dalam kadar 50% hingga 80% yang ditekankan oleh penyelidik tertentu di lapangan. Mengenai pengaruh pemboleh ubah TOE pada setiap tahap penyebaran ERP (Penilaian, Adopsi, Routinisation), infrastruktur ICT didapati hanya mempengaruhi tahap rutinisasi. Pengetahuan teknikal didapati hanya mempengaruhi tahap penggunaan. Sokongan pengurusan atasan didapati mempengaruhi ketiga-tiga peringkat kecuali tahap rutinisasi. Latihan mengenai ERP dan tekanan persaingan didapati hanya

mempengaruhi tahap penggunaan. Kesiapan Organisasi, Dasar Kerajaan, dan Sokongan Penjual didapati tidak mempengaruhi tahap apa pun. Mengenai pengaruh pemboleh ubah TOE pada nilai yang dirasakan, hanya kesiapan organisasi yang didapati mempengaruhi nilai yang dirasakan. Mengenai pengaruh nilai yang dirasakan pada tahap penyebaran ERP, didapati bahawa nilai yang dirasakan mempengaruhi tahap penilaian dan rutinisasi, tetapi bukan tahap adopsi. Adapun mediasi nilai yang dirasakan pada pengaruh pemboleh ubah TOE pada tahap penyebaran ERP, didapati bahawa nilai yang dirasakan tidak mempunyai pengaruh mediasi terhadap kesan infrastruktur ICT dan tekanan persaingan. Sebaliknya, didapati bahawa nilai yang dirasakan mempunyai kesan mediasi pada semua peringkat penyebaran ERP dalam kesiapan organisasi dan sokongan vendor. Selain itu, didapati bahawa nilai yang dirasakan memiliki pengaruh mediasi hanya pada tahap penilaian dan rutinisasi dalam pengetahuan teknikal, dukungan manajemen teratas, pelatihan mengenai ERP, dan kebijakan pemerintah. Akhirnya, mengenai pengaruh tahap satu sama lain, didapati bahawa tahap penilaian mempengaruhi tahap adopsi, dan tahap adopsi mempengaruhi tahap rutinisasi. Kajian ini mencapai objektif kajian dan mengenal pasti hubungan antara tahap penyebaran ERP, faktor TOE, dan nilai yang dirasakan. Kajian ini mengesyorkan lebih banyak peningkatan dalam model dan pengembangan dalam persekitaran persekitaran untuk mencapai kejayaan dalam kehidupan kerja masa depan dan pertumbuhan organisasi.

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SAUDI ARABIA: PERCEIVED VALUES AS THE MEDIATOR**

ABSTRACT

Enterprise resource planning ERP refers to the integrated central systems that businesses use to store and process information, facilitate its exchange between different departments, and assist in effectively administering procedures. The past research theories show that ERP systems bring a variety of technical, operational, and strategic benefits, such as sharing information, reducing costs, streamlining business processes, productivity, efficiency, customer service, and supply chain communication. It was shown that ERP systems had provided similar benefits to small and medium-sized enterprises (SMEs) as they had too large enterprises (LEs). However, SMEs' contributions to the country's economy and capital market are limited due to a lack of ERP deployment and an understanding of ERP's benefits. Although there is no agreement on the number and nomenclature of ERP system diffusion stages, the majority of researchers identified three: evaluation, adoption, and routinization. Studying these stages is of utter importance for stakeholders to take appropriate decisions, but there is little research on these stages. This approach fails to demonstrate how technology is fully integrated into an organisation. That is why there is a perceived need for a holistic view of ERP adoption that can help understand the diffusion process at the firm level. Therefore, this study considers all adoption stages because one adoption factor may be an antecedent of ERP adoption in one stage but not necessarily for all stages or even with different sign effects. It also identifies a few main TOE variables which influence the adoption of ERP systems. These variables are

ICT infrastructure, technical know-how, top management support, organisational readiness, ERP training, competitive pressure, government policies, and vendor support. The study investigates the extent to which the identified TOE variables influence the three stages and perceived value of ERP among SMEs in KSA and to which extent they influence the three stages. It also investigates how the perceived value mediates the influence of the identified TOE variables on the stages. These relationships were written as hypotheses and tested one by one. In total, 58 hypotheses were tested in this study. A pilot study was conducted to determine the validity and reliability of the study's constructs and measure several parameters, like the coherence of items and consistency. Two software programmes were used in the data analysis: SPSS and SmartPLS. SPSS was used to determine the pilot study, normality and outliers of study samples, and descriptive study participants' responses. SmartPLS was used for conducting equational structure modelling (SEM). Several trials were done to increase the response rate, which came out to be 57.99%. This percentage is considered perfect, higher than the 30% acceptable rate reported by the literature study and within the 50% to %80 rates emphasised by certain researchers in the field. As for the influence of TOE variables on each of the ERP diffusion stages (Evaluation, Adoption, Routinisation), ICT infrastructure was found to impact only the routinisation stage. Technical know-how was found to impact only the adoption stage. Top management support was found to influence all three stages except the routinization stage. Training on ERP and competitive pressure were found to influence only the adoption stage. Organisational Readiness, Government Policies, and Vendor Support were found not to influence any of the stages. As for the influence of the TOE variables on the perceived value, only organisational readiness was found to influence the perceived value. As for the influence of the perceived value on the ERP diffusion stages, it was

found that the perceived value influences both the evaluation and routinisation stages, but not the adoption stage. As for the mediation of the perceived value on the influence of the TOE variables on the ERP diffusion stages, it was found that the perceived value has no mediation effect on the impact of ICT infrastructure and competitive pressure. On the other hand, it was found that perceived value has a mediation effect on all stages of the ERP diffusion in organisational readiness and vendor support. Additionally, it was found that the perceived value has a mediation effect on only the evaluation and routinization stages in the technical know-how, top management support, training on ERP, and government policies. Finally, as for the influence of the stages on each other, it was found that the evaluation stage influences the adoption stage, and the adoption stage influences the routinization stage. The present study achieved the study's objectives and identified the relationships among the ERP diffusion stages, the TOE factors, and the perceived value. The study recommends more enhancements in the model and development in the environmental settings to achieve success in future work life and the growth of organisations.

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

To survive and gain competitive advantages in today's changing business climate, many SMEs and major enterprises (LEs) are being forced to modify their old business models, which focus on accomplishing specific function objectives (Almahamid & Awsi, 2015; Heredia-Calzado & Duréndez, 2019; Ruvio et al., 2015). Enterprise Resource Planning (ERP) systems provide an option in this regard. The ERP systems allow businesses to adjust how they handle and manage their employees' talents and integrate solutions for the company's information processing in all aspects of business in an integrated real-time environment (Awa & Ojiabo, 2016a; Asmussen & Møller, 2020; Heredia-Calzado & Duréndez, 2019). In this sense, ERP systems are tools meant to simplify company processes by combining operational solutions for corporate activities such as manufacturing, finance, and human resources, marketing, and supply chain management into a single, integrated system (Awa & Ojiabo, 2016a; Heredia-Calzado, & Duréndez, 2019; Konthong et al., 2016). Organisations invest in ERP systems to facilitate the flow of information between the various departments of the company, from firm to suppliers/customers - into an integrated system with shared data and visibility (Almajali, et al., 2016; Heredia-Calzado, & Duréndez, 2019; Mahmud et al., 2017). Therefore, research about the role and value of ERP is critical to ERP diffusion and ongoing competitive advantage.

1.1.1 ERP evolution

The computers were first used in 1960s when the organizations developed applications to track the inventory, assisting the materials, and produce finished goods (Thakur, 2016). The firms adopted the computerized applications as inventory control for their products. In 1970s, the material running planning (MRP) applications were used by firms for purchasing, forecasting, and scheduling the production (Goldston, 2020a). The MRP applications were developed to MRPII which involve more applications like enhanced shop floor reporting and forward scheduling. In late 1980s, the ERP vendors were developed like SAP, IBM, Baan, Oracle, and others. Later, the decision makings were adopted in organizations because they showed more visibility of the inventory and production (Razzhivina, Yakimovich, & Korshunov, 2015). In 1990s, the competition in the market was raised among the companies, especially these relate to the accounting areas of the firms (Goldston, 2020a). In 2000, new applications installed within the ERP system like Y2P industry within the industry marketing that motivated the growth of business within measurable time. In end of 2000s, the ERP landscape was changed where the PeopleSoft was acquired Oracle and Infor Global Solutions acquired Baan (Goldston, 2020b). To recent time of ERP maturity levels, the ERP applications was progressed with gradual use of the cloud computing. In 2016, the ERP Report was performed by the Panorama Consulting, which showed increase in the use of cloud computing application. The future of the ERP system aims towards the sustainable Enterprise Resource Planning (SERP) (Goldston, 2020a).

1.1.2 Benefits and Risks of ERP Systems

Implementing ERP systems is helpful in today's organisations and is expected to benefit companies of all sizes (Rouhani & Mehri, 2018; Valdebenito & Quelopana,

2019). A review of past research theories includes a variety of technical, operational, and strategic benefits in a collaborative manner, such as sharing information, reducing costs, streamlining business processes, productivity, efficiency, customer service, and supply chain communication (Ali & Miller, 2017; Almahamid & Awsi, 2015; Awa et al., 2015; Elgohary, 2019; Konthong et al., 2016; Venkatraman & Fahd, 2017). Due to strategic benefits, ERP systems faster, more top information exchange across business functions, improve processes, bring significant returns to enterprises, increase organisational value, and obtain a competitive advantage in the competitive market (Venkatraman & Fahd 2017; Valdebenito & Quelopana, 2019). In addition, ERP systems, which give a more practical approach to execute management operations, continue to integrate activities in real-time and provide updated data access to preserve competitiveness (Reitsma, 2018; Ruvio et al., 2015; Sinulingga et al., 2017).

ERP systems provide a model that integrates IT tools with an organisation's business goals, allowing firms to re-engineer themselves through a unified information system (IS) to respond to market challenges (AL-Shboul, 2018; Leyh, 2016; Venkatraman & Fahd, 2017). Furthermore, as a result of integrating an organisation's internal business operations into external networks, ERP systems provide businesses with a set of integrated business components that encompass most company activities (AL-Shboul, 2018; Alhirz & Sajeev, 2015). All of these advantages can lead to greater efficiency and provide a competitive edge in the global market.

ERP systems have provided similar benefits to SMEs as they have to LEs, such as less time consuming and improved customer service (AL-Shboul, 2018; Sharma et al., 2012). ERP system improves opportunities for SMEs to compete more effectively with their rivals and be responsive to changes than LEs (Valdebenito & Quelopana, 2019; Awa & Ojiabo, 2016a). ERP systems may also enhance customer or supplier

response times and the visibility and quality of information exchanged (Li, 2011). ERP systems enable SMEs to share information across the supply chain, reduce customised costs, and engage in vendor-controlled inventory procedures, among other things (Coelho & Laporte, 2015). However, SMEs' contributions to the country's economy and capital market are limited due to a lack of ERP deployment and understanding of ERP's benefits (Awa & Ojiabo, 2016b). Due to the importance of ERP and the contribution of SMEs, it is critical to investigate the key factors that may influence ERP adoption in SMEs.

Although ERP advantages are achieved in companies, there is contradictory evidence in the ERP literature concerning the predicted values from these ERP systems, and it did not materialise in most firms (Mohamad, 2020; Sternad & Bobek, 2012). The incomplete spread of the ERP system, and thus the incomplete transfer of all data to this system, are the main reasons for the failure to realise the benefits of enabling ERP for growth and learning (Panorama, 2017; Rouhani & Mehri, 2018). Many businesses failed to persuade the system since 70% of ERP system implementations failed to deliver the promised results (Soliman et al., 2017). More than 60% of implemented ERP initiatives fail (Rajan & Baral, 2015; Scholtz et al., 2016). According to Mahmud et al. (2017), the effective adoption rate of ERP is less than 49% worldwide due to its complexity. On the one hand, around 66-70% of ERP installation projects failed to meet the system's business objectives in some way (Ali et al., 2017).

From 2020 to 2025, the global ERP software market is expected to grow at an 8.66% CAGR, from \$39.56 billion in 2019 to \$65.20 billion in 2025. (Globe Newswire, 2020). In 2020, IT spending on enterprise programs was expected to reach approximately \$ 426 billion worldwide, a decrease of 6.9% from the previous

year. However, given the significant number of SMEs switching to hosted ERP systems to run their operations in China, India, and Singapore, the Asia region is anticipated to develop fastest throughout the ERP software market's forecast period (Allied Market Research, 2019). However, due to the negative economic impact caused by the Coronavirus (COVID-19), global IT spending will decrease in 2020 (Statista, 2020). Furthermore, the deployment of an ERP system is both expensive and time-consuming. In 2015, for example, the average ERP implementation cost was \$3.5 million, with a median implementation period of about 21 months (Kimberling, 2015). Only about 25% of the ERP system's cost was considered squandered, and only about 75% of the ERP system's effectiveness was used (Shatat, 2015). ERP system usage is rising, with deployment success rates ranging from 20% to 40%. (Sun et al., 2015). However, the failure of the ERP system or will cause a vast losing productivity and competitive advantage may even lead to bankruptcy, inefficiencies, and employees' dissatisfaction (Hossain & Quaddus, 2011; Li, 2011; Rouhani & Mehri, 2018). This reason prevents many companies, e.g., SMEs, from implementing ERP systems and limits the system's market share.

The main problem associated to the adoption of ERP among SMEs is critical because is more associated to the cost requirements, limited resources, risky endeavour, and high investment that mostly led to the failure of the system (Subanidja, & Broto Legowo. 2019). Also, lack for the experience of implementing the ERP system on linking the phases and proper transition from phase to another phase of ERP diffusion, is considered as a significant challenge for successful ERP system (Alaskari, Pinedo-Cuenca, & Ahmad, 2021). Other reasons associated to avoiding the owners and officials to the ERP first is limited ERP awareness for the capabilities of performing the functions of ERP system that reduce the ERP vendor to trust. Second,

is the misconception about the use of ERP among the big companies due to high cost of possession and implementation. Third, is the lack of resources especially about the small number of IT professionals who implement and adopt the ERP system. Fourth, financial worries where most of SMEs have budget restrictions so these companies avoid the implementation of ERP system. Finally, the employee resistance which be faced due to the adoption of ERP system. Therefore, a training is required offered to the employees to proceed with ERP implementation (ExactlyERP, 2017).

1.2 Problem Statement

The role of the ERP system in providing various potential advantages, their diffusion among SMEs in the developing countries is still limited (AL-Shboul, 2018; Alam & Uddin, 2019; Awa et al., 2016b; Uddin et al., 2020). Due to many factors, including a lack of knowledge and resources to properly deploy ERP systems, SMEs are still hesitant to accept new technologies such as ERP projects (Costa et al., 2020; Valdebenito & Quelopana, 2019). Nevertheless, evidence shows that SMEs have lately been encouraged to implement ERP in certain economies to improve their market position and take advantage of government support programmes (Awa et al., 2016c). However, in reality, the use of ERP systems in SMEs has not progressed sufficiently (Heredia-Calzado & Duréndez, 2019), and current models for ERP adoption are inapplicable as many important factors for successful adoption were overlooked (Aldossari & Mukhtar, 2018).

Similarly, despite the Saudi government imposing ERP adoption among organisations, including SMEs (Aldossari & Mukhtar, 2018; Al-Hajjaj, 2018), the ERP use resistance is still prevalent (Alhirz & Sajeev, 2015; Aldossari & Mukhtar, 2018; Badewi et al., 2018). Al-Hajjaj, (2018) and Bazhar and Sandu (2015) reported

that managers feel that ERP systems need changes in firm structures and proper change management. Although it is a typical regulatory reaction to oppose change, many Saudi SMEs are still low in the adoption of technology, in general, and ERP, in particular, remains a very critical problem (Bazhair & Sandhu, 2015; Al-Hajjaj, 2018). The SMEs in Saudi Arabia is defined as “Any enterprise with an independent commercial registration that has less than 249 employees and less than SAR 200 million as revenue” (Tripathi, 2019). As a result, it is critical to concentrate on the influence of diffusion systems on SMEs in Saudi Arabia. According to AlMuhayfith and Shaiti (2020), studies on SMEs are uncommon in Saudi Arabia, and the majority of research studies focus on the impact of ERP systems on the performance of big businesses. The ERP diffusion systems are topics that have not gotten much attention in the Saudi literature. Moreover, several challenges could face the adoption of ERP in the Kingdom of Saudi Arabia are the cost, laboring and labor system, recruitment, competition, Saudization (Saudi employment), issues on renewing licenses, bureaucracy, and government supports (Elhassan, 2019).

Because of the significant financial investment and the risks of implementing an ERP system, SME managers need a comprehensive view of the perceived value of the ERP model. More specifically, SMEs seek concrete evidence about aspects that determine the perceived value of ERP (Ruivo et al., 2016). Furthermore, this research discovered several flaws in the ERP literature in terms of perceived value. First, research into the perceived value of ERP in SMEs is still in its infancy (Awa et al., 2016 a; Ruivo et al., 2016) as well as its factors remains inadequate (Al-Jabri & Roztock, 2015; Almhamid & Awsi, 2015; Mohamad, 2020; Ruivo et al., 2016; 2020). Furthermore, research on ERP perceived value and ERP dissemination is still inconclusive. For example, the perceived value of ERP has been studied in-depth in

the literature as has significantly influenced the adoption of ERP systems (Awa et al., 2016 b; Valdebenito & Quelopana, 2019), while ignoring several other crucial adoption procedures that might help ERP spread successfully, such as evaluation and routinisations. Following Xu et al. (2015), who argued that higher ERP advantages would lead to higher ERP diffusion and use levels. However, few studies in SMEs look at the impact of perceived value on ERP diffusion phases, including adoption and routinisation. Finally, the theoretical framework for a complete view of the antecedents is provided, and the implications of the perceived value of the ERP model in the context of SMEs are still to be recognised.

Literature studies emphasized about the roles of perceived value for the future of business. Perceived value determine the successfulness of the transition of firms from adoption to the assimilation of ERP system (Gardiner & Andoh-Baidoo, 2019). Also, it will represent the attitude and decision making for avoiding the possible bias (Kahler, 2018). The main challenge is the poor understanding and underestimation for the benefits of perceived value in the ERP diffusion could be costly, improper decision making, time consuming, low level of usefulness and retarded system (Gardiner & Andoh-Baidoo, 2019). All the limitations, especially influence of the perceived value, increased the resistance of adopting the ERP system. This belief negatively influence the developing of the infrastructure of firms and sustainability of business in the Kingdom of Saudi Arabia (Alsayat, & Alenezi, 2018). The roles of perceived value and existence of efficient model of ERP systems, are gaps of literature and practical experience, lead to the future failure of businesses among SMEs of Saudi Arabia.

1.3 Research Questions

Based on the above, this study undertakes to answer the following questions:

- a) To what extent ICT infrastructure, technical know-how, top management support, organisational readiness, training on ERP, competitive pressure, government policies, and vendor support can influence each of the three ERP diffusion stages: evaluation, adoption, and routinisation among SMEs in KSA?
- b) To what extent ICT infrastructure, technical know-how, top management support, organisational readiness, ERP training, competitive pressure, government policies, and vendor support can influence the perceived value of ERP among SMEs in KSA?
- c) To what extent perceived value of ERP can influence each of the three ERP diffusion stages: evaluation, adoption, and routinisation among SMEs in KSA?
- d) To what extent perceived value of ERP can mediate the relationship between ICT infrastructure, technical know-how, top management support, organisational readiness, ERP training, competitive pressure, government policies, vendor support, and each of the three ERP diffusion stages: evaluation, adoption, and routinisation among SMEs in KSA?

1.4 Research Objectives

The study's primary goal is to understand better the mediating role of the perceived value of ERP on the relationship between TOE factors and ERP diffusion stages (i.e., evaluation, adoption, and routinisation) among SMEs in Saudi Arabia. The objectives of the current research are:

1. To examine the relationship between ICT infrastructure, technical know-how, top management support, organisational readiness, ERP training, competitive pressure, government policies, vendor support and each of the three ERP diffusion stages: evaluation, adoption, and routinisation among SMEs in KSA.
2. To examine the relationship between the ICT infrastructure, technical know-how, top management support, organisational readiness, training on ERP, competitive pressure, government policies, vendor support, and perceived value of ERP among SMEs in KSA.
3. To examine the relationship between the perceived value of ERP and each of the three ERP diffusion stages: evaluation, adoption, and routinisation among SMEs in KSA.
4. To examine the mediating role of the perceived value of ERP on the relationship between ICT infrastructure, technical know-how, top management support, organisational readiness, training on ERP, competitive pressure, government policies, vendor support, and each of the three ERP diffusion stages: evaluation, adoption, and routinisation among SMEs in KSA.

1.5 The Scope of the Study

Taking into consideration that the current study combines the features of three theories (TOE and DOI) and comprises three relevant TOE contexts: (1) technological characteristics (i.e., ICT infrastructure and technical know-how), (2) organisational characteristics (i.e., top management support, organisational readiness, and training on ERP) and (3) environmental context (i.e., competitive pressure, government policies, and vendor support) to the perceived value of ERP and three stages of ERP diffusion. Thus, the eight TOE factors are the independent variables (IVs), the perceived value of ERP is mediating variable, while SMEs' ERP diffusion for the three stages: evaluation, adoption, and routinisation, are the dependent variables (DVs). The determinants of ERP diffusion are selected from the TOE framework theory based on previous research concerning technology adoption (Awa et al., 2016a; Chan & Chong, 2013; Ilin et al., 2017; Junior et al., 2019). In addition, the study looks at the impact of perceived ERP value in mediating TOE variables and the three stages of ERP dissemination in Saudi Arabia.

1.6 Definition of the Key Terms

The descriptions of terminologies used in this study are provided here to avoid any potential confusion in interpreting the ideas utilised in this research.

1.6.1 Small and Medium Enterprises (SMEs)

In Saudi Arabia, small enterprises are firms with 6 to 49 employees, whereas medium-sized enterprises have 50 and 249 employees (Ministry of Commerce and Investment, 2016). The Ministry of Commerce and Investment definition is used in

this study since the organisations being studied utilise ERP regularly or irregularly in Saudi Arabia (Rawashdeh & Al-Namlah, 2017).

1.6.2 Enterprise resource planning (ERP)

It is a system included different software sets use to integrate the business functions of the firms. The ERP system involve several constructs or variables could determine the successfulness or failure of this system among the SMEs in Kingdom of Saudi Arabia. The ERP provide benefits to the SMEs in the Saudi Arabia because the business and managerial needs. Also, because many functions of organizations are demanded of which increase the benefits compared to the cost and time to perform these functions (Hermawan, 2019).

1.6.3 Diffusion of ERP

The spread of ERP systems is dynamic and complicated in this research, and it can vary depending on different variables throughout time. It is divided into three stages: evaluation, adoption, and routinisation (Junior et al., 2019). The evaluation stage occurs when an organisation assesses the ERP's potential, followed by the adoption stage, which involves deciding to use the ERP for value chain activities. The routinisation stage involves ERP being fully installed and integrated throughout the organisation, including external supply chain members.

1.6.4 ERP Evaluation

This stage of ERP is more associated to the evolution, continuous improvement, and enhancement activities. ERP evaluation allow of management intervention, like decision making, to reveal the actual and tangible advantages of ERP

system. The evaluation is a crucial stage of ERP to determine the proper plannings of ERP diffusion towards the integration of the management system of SMEs (Al-Fawaz, 2012). The evolution could measure either the success or failure of ERP system. In present study, the ERP adoption is the first stage of ERP diffusion.

1.6.5 ERP Adoption

Many activities are involved in this stage before the actual normal use of ERP system. These activities depend on the early analysis of evaluation stage. Several factors are determined in this stage like price, training, project team, maintenance, monitoring, and investment SMEs (Al-Fawaz, 2012). The adoption stage of ERP is mostly measured based on the services, facilities, and funding provided by the Saudi government to the SMEs. Therefore, this ERP stage is dependent to the infrastructure and supports provided to make the success of using the ERP adoption.

1.6.6 ERP routinization.

The routinization stage is more important than other two stages, because it refers to the normal usual use of applications to solve the problems and achieve the objectives. This stage will give the management control to transform the organization ERP system. Another organizational benefit is the successful alignment of the plans with benefits of ERP system (Jing-hua, Kang, & Xiao-wei, 2010). In present study, the ERP routinization is an essential to sustain the adoption of ERP system among the SMEs in the Kingdom of Saudi Arabia. It is the final stage of ERP system adopted in present study.

1.6.7 ICT Infrastructure

The ICT infrastructure is viewed as a platform that precisely meets the demands of IT to support the operating system and participate as a service and coordinated emphasis throughout the company (Nguyen et al., 2019). Hardware, software, networks, and data are all part of the ICT infrastructure (Awa et al., 2016a; Nguyen et al., 2019).

1.6.8 Technical Know-How

It refers to the availability of installation and maintenance services and skilled ICT experts and consultants that might utilise their knowledge and experience to help SMEs adopt and operate ERP systems (Awa et al., 2017).

1.6.9 Top Management Support

Top management support refers to senior management's or the organisation's head's efforts to develop ideas for ERP communication, analyse technology diffusion threats, and strategies for ERP usage, implementation, and deployment (Junior et al., 2019; Nguyen et al., 2019).

1.6.10 Organisational Readiness

Organisational preparedness measures an organisation's financial, economic, cultural, and technological resources that may be used to implement an ERP system (Ram et al., 2015; Rawashdeh & Al-namlah, 2017; Valdebenito & Quelopana, 2019).

1.6.11 Training on ERP

ERP training is described as teaching, and learning activities carried out by SMEs for workers based on their ERP relationships, which enabled them better understand and apply ERP functionalities while also increasing their trust with it (Rajan & Baral, 2015; Sternad et al., 2012).

1.6.12 Competitive Pressure

The amount of pressure a company experiences from rivals or industry groups to implement and use ERP systems to gain a competitive advantage (Awa et al., 2017; Junior et al., 2019).

1.6.13 Vendor Support:

It refers to the technical support, training, and update information that an ERP provider makes available to a business/firm during and after the deployment of an ERP system. (Saleh et al., 2013; Salum & Abd Rozan, 2017).

1.6.14 Government Policies

It is described as government resource and regulatory support for implementing IT systems, such as ERP, in consultancy, instructional aid, and legislation support (Ilin et al., 2017).

1.6.15 Perceived Value

The perceived value of ERP is the derivative benefits that SMEs enjoy from implementing ERP as opposed to the price paid for the system (Almahamid & Awsi, 2015; Hinterhuber & Liozu, 2013).

1.7 Organization of the Study

The following is the study's structure: The background of the study, the research problem, the research questions, the research objectives, the study's relevance, the scope of the investigation, and the definitions of the research variables are all covered in Chapter 1. Chapter 2 is devoted to literature reviews on ERP adoption; the DOI and TOE are the underlying theories, ERP diffusion, TOE factors that influence ERP diffusion, research gaps, the research model formulation, and hypothesis development based on previous literature reviews are discussed. Chapter 3 will provide a thorough overview of the research strategy and methods. The data analysis will be shown in Chapter 4, and the significant conclusions of this study will be presented. In Chapter 5, the work will be discussed, the implications for theory and practice, and a new route for future study.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The purpose of this chapter is to show the relevant literature reviewed from scholarly publications and journals and about ERP diffusion determinants and situate literature concerning existing information regarding ERP adoption theories and the mediating influence of ERP PV. The study begins with a brief overview of the SMEs, ICT, and ERP in Saudi Arabia. The second part moves on to describe an overview of ERP software. The third part describes the ERP diffusion, adoption theories (TOE & DOI), technological factors, organisational factors, environmental factors, and the PV of ERP adoption. The gap in the literature is discussed in the latter portion of this chapter, research model development of the study, and hypotheses development.

2.2 Taxonomy of ERP system

The ERP system is believed as cost and risky investment due to use of resources. Companies are using the ERP systems to get guarantees for the expected outcomes. However, many companies are failing with the ERP system for achieving their objectives (Svensson, & Thoss, 2021). Taxonomy of ERP system involves two main parts are the critical success factors and the evaluation of ERP system. The critical success factors contain fifteen variables. The evaluation of ERP involves the success of ERP implementation and impact of ERP (Mareai, & Patil, 2012). Figure 2.1 depicts the taxonomy of ERP system, where the critical success factors and evaluation of ERP variables are the main influencing factors of the business (Mareai, & Patil, 2012).

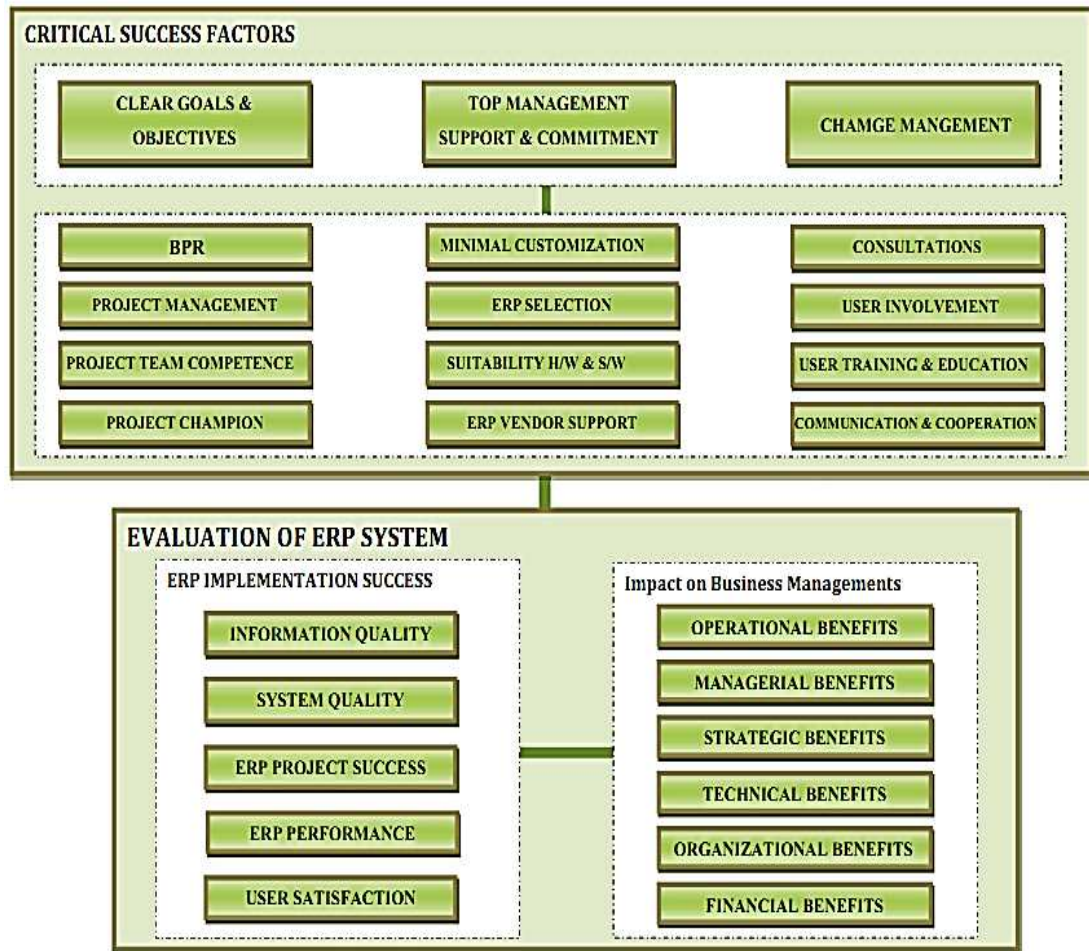


Figure 2.1 Taxonomy of ERP system (Mareai, & Patil, 2012).

2.3 Small and Medium Enterprises (SMEs) in Saudi Arabia

Saudi Arabia is an Arabic country in the Middle East, with Al Riyadh as its capital. It is a resource-rich nation with around one-fifth of the world's known oil reserves. It is a regional economic powerhouse, holding 25% of the world's proven oil reserves and employing many people, mostly in energy and oil extraction (Almoawi & Mahmood, 2011). Saudi Arabia is also one of the world's twenty largest economies and the largest in the Middle East, accounting for approximately a quarter of all Arab GDP (Saudi Arabian General Investment Authority) (AlBar & Hoque, 2017a; SAGIA, 2014). The Saudi government decided to examine the growth of local firms such as SMEs in light of this success and desire to become international oil markets.

There is no worldwide or regional agreement on what constitutes a small or medium-sized enterprise. Agwu and Murray (2015) opine that SMEs are considered those enterprises' economic coinage, defined in various shapes and forms. According to the authors, some criteria are considered to determine SMEs, such as the total amount of turnovers, the total amount of assets, and the total amount of some employees from a quantitative perspective. In contrast, it has been viewed from a qualitative perspective based on how the company is organised. Some definitions, however, have emerged from a variety of sources, including government bodies and nations.

While several criteria are used to define SMEs in Gulf nations, Saudi Arabia's definition of SMEs is generally based on employees. Due to the paucity of financial data in the Gulf, most public and private entities define SMEs exclusively by the number of workers, according to Hertog (2010). Berisha-Namani (2009), for example, claims that the commonly accepted definition in Saudi Arabia A for “*small-sized enterprises is between 1 to 49 employees, while the medium-sized enterprises are firms between 50 to 100 employees.*” It should be mentioned that there is no formal definition of SMEs in the KSA. Based on the number of employees, the majority of Saudi Arabia's organisations are tiny. As a result, several quantitative criteria are used to define SMEs in KSA.

More recently, the Ministry of Commercial and Investment (2016) defined SMEs based on the employees' number working in a particular business as small enterprises are firms with 6 to 49 employees, whereas a medium-sized enterprise is a firm with 50 and 249 employees. This study uses this definition since it is more current and encompasses a more significant number of businesses. Individual businesses account for 93.1% of Saudi corporations, limited partnerships for 4.7%, and joint

ventures for 0.6% (Saudi Arabian Monetary Agency (SAMA), 2014). Construction, trade, building, and manufacturing are the three primary areas of concentration for these businesses (Albar & Hoque, 2017a).

SMEs play vital roles within all economies worldwide, and it is becoming increasingly crucial in income creation, workforce absorption, poverty reduction, and GDP contribution (Hunt, 2017). In 2016, SMEs contributed around 21% (USD160,000,000) to the country's GDP and 53% to total employment as part of the industrial sector (JEG, 2016). SMEs account for over 95% of businesses and 60% of jobs, and they account for a substantial percentage of job creation and the highest sales, innovation, and employment growth (Choi & Lim, 2017). Besides, SMEs are among the most vital agents responsible for creating steady growth within an economy. They boost productivity, gain competitive advantages in the global market, and are critical drivers of innovation and transformation (Ruivo et al., 2012).

The SME sector is vital to the Saudi economy, and it has the potential to help the Saudi government lessen its reliance on the oil industry, a lucrative source of revenue that is anticipated to shrink in the coming decades (Sivakumar & Sarkar, 2012). Saudi Arabia, however, is one of the lowest compared to developed countries such as the United States of America (USA), Spain, Germany, and the United Kingdom (UK). According to Ahmad (2012), the contribution of SMEs to Saudi Arabia's national GDP is low due to several constraints. These include difficulty acquiring financial assistance, bureaucracy, a lack of credit, a lack of training, and a hostile business climate, with insufficient government backing being SMEs' major challenge and restriction.

Saudi Arabia considers improving SMEs' contribution to the country's GDP as the primary factor to become a developed country; therefore, it is one of the objectives of Saudi Arabia's Vision 2030 (Hunt, 2017). Saudi Arabia's Vision 2030 is a strategy to reduce reliance on oil and diversify its economy through small and medium-sized businesses. The Saudi Government aimed to be 15th in the world by 2030 with SME's contributions would reach \$2.2 trillion (Zawya, 2017). However, in terms of the potential of SMEs, it has been noticed that, until recently, Saudi Arabian programmes, plans, and government policies have been too focused on SMEs (Rawashdeh & Al-namlah, 2017). IT adoption among SMEs is still relatively low. For example, the ERP adoption issue has gained the attention of government agencies and academicians to investigate.

Saudi Arabian SMEs will benefit significantly from ERP software, as it enhances their productivity and responsiveness to customer satisfaction and improves performance (Awa et al., 2015; Hossain et al., 2011; Valdebenito & Quelopana, 2019). Saudi SMEs are moving fast to follow this trend despite the cultural difference with western organizations where ERP originated. Many SMEs and new enterprises have created business accounts on Facebook, LinkedIn, and other social media platforms (Abed, 2020). It aligns with the Saudi government's 2030 goal to have ISs in the backbone of every initiative concerning the industry and particular service facilities. An outcome of this research will be a framework that would assist Saudi SMEs to identify the importance of technological factors, organizational factors, and environmental factors and the advantages that can be utilized to adapt ERP and thus sustain their performance.

The contribution of SMEs in Saudi Arabia is developed with adoption of ERP systems (Lutfi, et al., 2022). AlMuhayfith and Shaiti reported the successful ERP adoption significantly contributed to the enhancement of performance and development of SMEs business in the Kingdom of Saudi Arabia. They emphasized the importance of use the ERP system among the SMEs in Saudi Arabia (AlMuhayfith, & Shaiti, 2020).

2.3.1 The ICT and ERP in Saudi Arabia

Saudi Arabia has invested much in developing its ICT infrastructure. Saudi Arabia's government offers considerable assistance and has made significant investments in developing ICT infrastructure (Al-Maliki, 2013). ICT investments in Saudi Arabia were 17.83 billion Saudi Riyal in 2015. (SAR). Packaged and in-house created software accounted for 47% of ICT investments, according to the Communications and Information Technology Commission (CITC, 2015), followed by IT equipment at 26% and communications equipment at 27%. Saudi Arabia is one of the fastest-growing IT markets in the Middle East, according to the ICT report (2015), accounting for half of all ICT investments in the Gulf Cooperation Council (Alsayat & Alenezi, 2018). (GCC). According to statistics, computers and their applications are used by roughly 80% of Saudi industrial firms.

According to the CITC study, ICT services spending reached SAR 120 billion in 2015, with an annual growth rate of over 7%. According to Market Research Report (2014), software sales in KSA have risen at an annual pace of around 10% over the last several years. According to the same research, Saudi Arabia is the largest IT market in the Gulf area and will remain so in the future as it invests heavily in upgrading its IT and communications infrastructure. According to a government

official, the ICT industry contributes around 6% of the overall GDP. This explains why nations all over the globe strive to provide an enabling climate for their economic sectors to thrive. Various e-government initiatives, such as electronic tax systems, electronic payment gateways, and online information exchanges, have been implemented in numerous corporate organisations in Saudi Arabia, according to Alshehri et al. (2012). Large corporations are commonly used to describe these enterprises, and they are historically linked with the owner being actively involved in the operation.

The technology, in general, is still considered to be in its infancy (Rawashdeh et al., 2017), and in particular, there is a slow rate of adoption among SME organizations (Al-Jabri & Roztocki, 2015). Despite having the Middle East's fastest-growing ICT markets (Al-Salamin & Al-Hammad, 2014), Saudi Arabia is still lagging behind industrialised nations in ERP system deployment. From 1993, ERP systems became popular in Saudi Arabia (Al-Muharfi, 2010). Although technology has been used in industrialised nations for more than two decades, technological adoption and information and ERP technology in Saudi Arabia have not achieved the required level (Rawashdeh, 2013). According to Aldayel et al. (2011), there were just two ERP installations at Saudi state colleges in 2007, but 12 in 2011.

Saudi Arabia has attracted significant attention from ERP vendors who consider such a country as a significant sales growth location. Saudi Arabian firms are using ERP systems quickly rising, particularly among big and medium-sized businesses and across all industries. Some companies have accepted a software system package (SAP, ORACLE, or PeopleSoft), while others have built local ERP systems (e.g., MADAR). Saudi Arabia has many SMEs, which provides various chances for ERP adoption (AL-Shboul, 2018). However, SMEs' use of ERP systems is a new

phenomenon since ERP installation projects are low and lag behind industrialised nations by several years (Albar & Hoque, 2017b). An ERP system has been built and is being used by a large number of Saudi Arabian businesses. Most of the ERP adopters were from the manufacturing and service industries, and ERP applications like Microsoft Dynamics, Oracle, SAP, MS Dynamics, or any home-grown ERP are the most widely used application globally (Al-Jabri et al., 2015; Ruivo et al., 2015). On the other hand, many SMEs are hesitant to implement an ERP system, which might be related to ERP system breakdowns in many big firms.

Despite economic, socio-political, legal, and cultural disparities, Saudi Arabia is not behind developed countries in ERP use. Although there are no data on the number of Saudi businesses that have used ERP systems since 2004, the Research Institute at King Fahd University of Petroleum and Minerals stated that by the middle of 2004, more than 450 Saudi organisations had deployed ERP systems (Al-Turki, 2011). However, because of the recent degree of economic development and the KSA Government's active investment in IT adoption after the year 2000, the number of businesses in SA presently implementing ERP systems may be projected to be more than twice the number recorded for the year 2004. (Eid & Abbas, 2017). The Saudi Arabian ERP industry is heavily reliant on international suppliers, with SAP and Oracle leading the pack with a combined market share of around 70%. Baan, Great Plains, Orion, and JD (e.g., MADAR) are among the market's other players (Al-Turki, 2011).

Even though ERP systems have a high installation rate, they fail at more than 90%. (Saleh et al., 2013). The ERP adopting organisations in KSA, according to Saleh et al. (2013), are following the practical outcomes of many ERP installation initiatives.