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An Exploratory study on Transforming ERP to i-ERP: A case Study of Medium and Large Organizations' Performance in Oman"

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I/We have examined this report titled **An Exploratory study on Transforming ERP to i-ERP: A case Study of Medium and Large Organizations' Performance in Oman"**, submitted by **Bayan Mohammed Idris Hamad**, ID No **PG17F1857** in partial fulfillment of the requirements of MBA(IT) Course during Summer 2019semester.

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Table of Contents

Declaration of Originalityi
Copyright Acknowledgementi
Declaration by Examinersii
Acknowledgementiii
Table of Contentsiv
List of Tables
List of Figuresix
List of Abbreviationsxi
Abstract xii
Chapter 1: Introduction
1.1 Background of the study1
1.2 Statement of the Problem
1.3 Aims and Objective of the Study
1.3.1 Aims3
1.3.2 Research Objectives
1.4 Research Questions
1.5 Scope of the Study4
1.6 Significance of the Study4
1.7 Limitation of the Study
1.8 Structure of the Dissertation
1.9 Summary
Chapter 2: Literature Review
2.1 An Overview of ERP System7
2.1.1 ERP Systems Evolution and Definition
2.1.2 Benefits and Risks of Implementing ERP Systems
2.1.3 Types of ERP Software
2.2 Transformation from ERP to i-ERP10
2.3 Significance of implementing i-ERP11
2.3.1 Process Improvement11
2.3.2 Company Operations11
2.3.4 Flexibility

2.3.5 Cost	13
2.3.6 Innovation	13
2.4 Barriers of implementing i-ERP	13
2.5 Organizational Maturity level to implement i-ERP	14
2.6 Application of machine learning in ERP Systems	15
2.7 ERP and i-ERP in Oman	17
2.8 i-ERP and Internet of Things (IoT)	
2.9 Critical Evaluation of Literature Review	19
Chapter 3: Research Methodology	21
3.1 Introduction	21
3.2 Research Design	22
3.3 Population of the Study	23
3.4 Sampling Technique and Sampling Size	24
3.5 Research Instrument	25
3.5.1 Interview Instrument	25
3.5.2 Questionnaire Instrument	26
3.6 Validity and Reliability Testing	26
3.7 Data Collection Technique	27
3.8 Data Analysis Technique	27
3.9 Legal, Ethical and Social Consideration	28
3.10 Summary	28
Chapter 4: Project management	
4.1 Introduction	
4.2 Project Phases	
4.3 Project Constraints	32
4.4 Risk Management	32
4.5 Summary	
Chapter 5: Results and Analysis of Data	34
5.1 Introduction	34
5.2 Presentation and Analysis of Qualitative Data	34
5.3 Presentation and Analysis of Quantitative Research	
5.4 Summary	78

Chapter 6: Conclusion	79
6.1 Research Contribution to Sustainable Development	81
6.2 Student Reflection	82
6.3 Future Research	83
6.4 Recommendations	84
References	85
Appendices	91
Appendix 1: The Questionnaires	91
Appendix 2: Official Correspondence to Distribute the Questionnaire	99
Appendix 3: Interviews Approvals	
Appendix 4: Research Proposal	
Appendix 5: Research Ethics Form	112
Appendix 6: MBA (IT) Midterm	120
Appendix 7: ERP Certificates	
Appendix 8: Draft of Journal Article	
Appendix 9: Student Dissertation Diary	136

List of Tables

Table 2: Data Analysis Technique 27
•
Table 3: Current Job Position 37
Table 4: Work Experience 38
Table 5: Company Residence 39
Table 6: Company Size 40
Table 7: Working Industry41
Table 8: Type of ERP Software 42
Table 9: System Provider
Table 10: Q8: Intelligent ERP refers to intelligent technologies such as; machine learning integrated with
an ERP systems resulting into i-ERP
Table 11: Q10: In your opinion, higher maturity level of an organization generates higher need for i-ERP
implementation
Table 12: Q11: Do you think that the current IT infrastructure helps to move towards (i-ERP)
implementation?
Table 13: Q12: Do you think that your company is ready to optimize its processes, master data and re-
standardization?
Table 14: Q13: Do you think that your company is ready for innovation (run simple business process,
analytics, big data IoT etc.)
Table 15: Q14: Do you believe that the combination of machine learning and ERP will result into best
product?
Table 16: Q15: Does machine learning support decision automation of ERP processes?
Table 17: Q16: Do you think that the integration of machine learning and ERP will enhance internal
workflow and customer service51
Table 18: Q17: In your opinion, ERP that support machine learning is able to define its business
processes according to certain behavior52
Table 19: Q18: Do you think that i-ERP will be hooked to internet of things?
Table 20: Q19: Does the current system enhance business processes performance at your organization?
Table 21: Q20: Does the current system enhance financial performance at your organization?
Table 22: Q21: Does the current system improve employees' productivity at your organization?
Table 23: Q22: Does the current system support real-time access information?
Table 24: Q23: Does the current system support quick innovation at your organization?
Table 25: Q24: Does the current system support predictive analytics at your organization?
Table 26: Impact Dgree of Mean 60
Table 27: Skewness Level of Symmetry60
Table 28: Principle Components Analysis of ERP Survey Group Questions
Table 29: Reliability Test of ERP Component 5: From Q (8 – 10), from Q (14 -19) and from Q (21-24)61
Table 30: Reliability Test of FRP Component 1: O (from 9 – 12) and from O (14 – 24)

62
62
62
63
63
64
65
76
76
77
77

List of Figures

Figure 1: The Main Architecture of i-ERP System	2
Figure 2: Research Structure	5
Figure 3: ERP Modules	8
Figure 4: SAP Journey and History of User Interface	10
Figure 5: Research Design and Framework	22
Figure 6: Research Phases	30
Figure 7: Research Phases and WBS	30
Figure 8: Project Constraints	32
Figure 9: Current Job Position	37
Figure 10: Work Experience	38
Figure 11: Company Residence	39
Figure 12: Company Size	40
Figure 13: Working Industry	41
Figure 14: Type of ERP Software	42
Figure 15: System Provider	43
Figure 16: Q8: Intelligent ERP refers to intelligent technologies such as; machine learning integrated v	with
an ERP systems resulting into i-ERP	44
Figure 17: Q9 Barriers to Implementing i-ERP	45
Figure 18: Significance to Implementing i-ERP	45
Figure 19: Q10: In your opinion, higher maturity level of an organization generates higher need for i-	ERP
implementation	46
Figure 20: Q 11: What is/are the Requirements to adopt i-ERP??	47
Figure 21: Q11: Do you think that the current IT infrastructure helps to move towards (i-ERP)	
implementation?	47
Figure 22: Q:12 Do you think that your company is ready to optimize its processes, master data and r	e-
standardization?	48
Figure 23: Q13: Do you think that your company is ready for innovation (run simple business process,	,
analytics, big data IoT etc.)	48
Figure 24: Q14: Do you believe that the combination of machine learning and ERP will result into besi	t
product?	49
Figure 25: Q15: Does machine learning support decision automation of ERP processes?	50
Figure 26: Q16: Do you think that the integration of machine learning and ERP will enhance internal	
workflow and customer service	51
Figure 27: Q17: In your opinion, ERP that support machine learning is able to define its business	
processes according to certain behavior	52
Figure 28: Q18: Do you think that i-ERP will be hooked to internet of things?	53
Figure 29: Q19: Does the current system enhance business processes performance at your organization	on?
	54
Figure 30: Q20: Does the current system enhance financial performance at your organization?	55
Figure 31: Q21: Does the current system improve employees' productivity at your organization?	56

Figure 32: Q22: Does the current system support real-time access information?	57
Figure 33: Q23: Does the current system support quick innovation at your organization?	58
Figure 34: Q24: Does the current system support predictive analytics at your organization?	59
Figure 35: Scree Plot for the Principle Components	61
Figure 36: Frequencies and Histogram of Maturity Level of ERP Users	67
Figure 37: Frequencies and Histogram of Maturity Level of i-ERP Users	67
Figure 38: ERP Users: Frequency and Histogram of of ML and decicison automation in ERP System	69
Figure 39: i-ERP Users: Histogram and Frequency of of ML and decicison automation in ERP System	70
Figure 40: Summary of ERP and i-ERP Systems Effectiveness	71
Figure 41: Frequency and Histogram of Current ERP System Enhances processes Performance Histogr	ram
	72
Figure 42: Frequency and Histogram of Current i-ERP System Enhances processes Performance	
Histogram	72
Figure 43: Frequency and Histogram of Current ERP System Enhances Financial Performance Histogram	am
	73
Figure 44: Frequency and Histogram of Current i-ERP System Enhances Financial Performance	
Histogram	73
Figure 45: Frequency and Histogram of Current ERP System Supports Real-Time Access	74
Figure 46: Frequency and Histogram of Current i-ERP System Supports Real-Time Access Information	
Histogram	74
Figure 47: Frequency and Histogram of Current ERP System Supports Predictive Analytics Histogram.	75
Figure 48: Frequency and Histogram of Current i-ERP System Supports Predictive Histogram	75
Figure 49: Scatterplot of Real-Time Access Information vs. Innovation	76
Figure 50: Scatterplot of Process Performance vs. Financial Performance	77

List of Abbreviations

- i-ERP: Intelligent Enterprise Resource Planning
- ML: Machine Learning
- ITA: Information Technology Authority
- CRM: Customer Relationship Management
- SCM: Supply Chain Management
- MRP: Material Requirement Planning
- ROI: Return on Investment
- OOE: Overall Equipment Effectiveness
- KPI: Keep Performance Indicator
- UX: User Experience
- PO: Purchase Order

Abstract

Implementation of advanced technologies becomes a key concern nowadays in order to keep the businesses running. Businesses are rapidly growing, and their processes are getting complicated more than ever. Thus, there is high need for advanced technologies like intelligent (i-ERP) to support and boost organizations' performance. This exploratory research aimed to evaluate the effectiveness of i-ERP system in medium and large organizations in Oman. Furthermore, it aimed to identify barriers and significance to implement such system in order to investigate the maturity level of i-ERP adoption. Finally, this research primarily contributed to investigate how machine learning could support ERP processes to enhance its functionality performance. This research was conducted through reviewing of related literatures. Also qualitative and quantitative methods were utilized including interview and questionnaire. Interviews were conducted with 4 employees working in different sectors, and the questionnaire was distributed to 51 public and private organizations in Oman. Among which 41 of the companies are implementing ERP systems and 10 implementing i-ERP systems in order to compare the effectiveness of both systems on the organizations' operations. The main finding of this exploratory research revealed that i-ERP system enhances the performance of organizations compared with traditional ERP systems. Thus it is necessary to conduct feasibility study for i-ERP implementation within medium and large organizations. In addition to that, interviews results indicated that i-ERP system could benefits medium organization based on their mission and vision. The research recommendations aim to contribute to the understanding of i-ERP features and its effectiveness on organizational performance for possibility of adoption i-ERP system by business owners.

Key Words: i-ERP, Enterprise Resource Planning, ERP, Machine learning, Organizations'

Performance, Maturity Level, ERP implementation

Chapter 1: Introduction

1.1 Background of the study

This is the era where organizations are no more asking whether to peruse to digital transformation rather than how to move forward before it is too late. The modernization of IT is one of the main pillars to enhance organizations' processes and run innovation (Bender & Willmott, 2017). His Majesty Sultan Qaboos bin Said that, "Information technology and communications have now become the main elements that move forward the development process in this third millennium; therefore, we have accorded our attention to finding a national strategy to develop the skills and abilities of citizens in this domain with the aim of further developing e-government services". (ITA, 2018). According to (Al-Ruzaiqi, 2018) Information Technology Authority (ITA) believes that the development of Digital Oman Society and e-Government could be achieved successfully only by the contribution of both governmental and private sectors.

Organizations are now using advanced technologies such as; Enterprise Resource Planning (ERP) to enhance internal and external processes. ERP systems have been a powerful tool to improving organizational performance and integrating processes in the last decades. However, legacy systems are being replaced with advanced systems that are capable to fulfill the renewable requirements (Chakraborty, 2018). Intelligent-ERP (i-ERP) is the new generation of ERP system that leverages machine learning to enhance processes, improve employees' productivity, enable innovation and contribute to digital transformation. (Morris et al., 2017) It basically gathers data from various resources and here the concept of IoT and mobile technologies take a place as it will be connected to the ERP system. Then, big data will aggregate data in one database to assist machine learning and analytics to classify and prioritize the data in order to produce the outcomes.





Figure 1: The Main Architecture of i-ERP System

Source: Developed by the researcher based on (OptiProERP, 2017)

According to (Koelsch, 2019) this new generation of ERP will be hooked to the internet of things due to its tendency to support innovation, real-time processes and predictions.

The above discussion obviously emphasizes that i-ERP could largely contribute to shifting to e-Oman. It also matches with Oman 2040 vision that aims to enhance the performance of different sectors such as; health, education, manufacturing, oil and gas and others by adapting high quality systems. Hence, such advanced system could build innovative based economy that depends on creativity, integrity, scalability and mobility which are all characteristics of digital economy which will add value to governmental and private sectors in Oman.

According to Shaikh Saif Bin Hashil Al Maskery, Founder and Chairman of Inter-tech, government and private sectors are moving towards adopting technologies such as ERP, CRM. Although, the rate of adoption in Oman is relatively lower than the other developed nations (Observer, 2015), other organizations like Raysut Oman has already shifted to the new generation of ERP systems which is essential for digital transformation (Observer, 2019).

Medium and large organizations play a vital role in any country. They are characterized by high amount of data, complex processes and large numbers of employees which definitely require intelligent system that helps the organization to survive and achieve sustainable competitive edge. Very limited literatures have discussed ERP system in Oman and declared that ERP systems are more expensive for small companies (Mahrami & Hakro, 2018). Accordingly, this study will be applied on medium and large organizations. It is the first research that will study intelligent ERP in Oman.

1.2 Statement of the Problem

In this digital era, the organizations are seeking advanced technologies in order to digitalize their businesses and remain competitive, as businesses faces huge growth and managing business processes and the incredible amount of data becomes a challenge. Manual entries are another challenge which leads to human errors and late responses. However, organizations cannot only restrict with past and present data, future prediction pattern becomes essential to add business value, satisfy customers and save costs. Hence, in order to overcome these challenges in Oman, it is worth to adopt intelligent technologies such as; i-ERP to fulfill business requirements and enhance efficiency.

1.3 Aims and Objective of the Study

1.3.1 Aims

This study aims to determine the effectiveness of i-ERP system and figures out the barriers of adopting such system. Furthermore, providing comprehensive information on how machine learning supports i-ERP systems processes. Finally, evaluate effectiveness of i-ERP system by comparing both, the effects of the traditional ERP system and intelligent ERP systems on performance of the medium and large organizations.

1.3.2 Research Objectives

- 1- To identify barriers and significance to implementing i-ERP.
- 2- To investigate the maturity level of i-ERP adoption.
- 3- To investigate how Machine Learning (ML) supports ERP processes.
- 4- To evaluate the effectiveness of i-ERP in medium and large organization's performance.

1.4 Research Questions

- 1- What are the barriers and significance to implementing i-ERP?
- 2- What is the maturity level of i-ERP adoption?
- 3- How Machine Learning (ML) supports ERP processes?
- 4- How i-ERP affects the performance of medium and large organizations in Oman?

1.5 Scope of the Study

The general aim of this research is to enhance understanding of intelligent ERP Systems, specifically its contribution to the successes of medium and large organizations in Oman. The research covers the area of information technology and management strategies via investigating the effectiveness of i-ERP system on organization's processes. The ultimate objective is to compare the efficiency of traditional ERP and intelligent ERP on the performance of medium and large organizations.

A survey was distributed to medium and large organizations in the Sultanate that are using traditional ERP and intelligent ERP systems. The sample size of this study was conducted on 51 participants. 41 of the participants are implementing ERP systems, and 10 are implementing i-ERP system. The targeted population of this research is IT staff who are directly interacting and able to masseur the performance of this system. The findings were derived from the analysis of interview and survey questions.

Furthermore, a literature review was derived from approximately 100 references from various electronic libraries including; Masader and Coventry.

This research was completed in five months (April- August 2019) in Muscat, Sultanate of Oman.

1.6 Significance of the Study

Prior literatures obviously demonstrated limited studies that discussed the concept of recent i-ERP system. In addition to that, very limited companies in Oman had implemented this system. Accordingly, this study contributes to the knowledge, awareness and understanding the concept and value of i-ERP systems particularly in Oman. Qualitative and quantitative methodologies have been employed to achieve objectives and to help in improving performance of the organizations in private and government sectors, moving towards e-Oman and digital transformation. The result may also help other countries worldwide as well and assists decision makers to shift towards such intelligent systems.

1.7 Limitation of the Study

Although the outcomes of this research revealed significant information, it is also compiled with some limitations. First of all, intelligent ERP System is considered to be one of the latest generations of ERP Systems, hence the sample of organizations that have implemented this system are limited in Oman. Secondly, there is lack of related literature review, as this topic is modern. In addition, there is no available statistics or studies that cover i-ERP in the Sultanate. Further critical limitation is data collection. It is difficult to reach the entire medium and large organizations in Oman that are implementing ERP and i-ERP systems due to the large number of organizations and confidentiality. In addition to that, some questions were not clearly answered due to confidentiality.

1.8 Structure of the Dissertation

The structure of the research is briefly outlined in the following Figure (2)





Chapter 1 provided an overview of the stated research, the objectives, questions, scope, significance and limitation of the study.

Chapter 2 will discuss previous studies in order to explore conceptual framework behind the problem statement. The literature review will provide some theoretical concepts about i-ERP systems and its role in enhancing organizations' performance. Furthermore, prior case studies

that discuss this topic will be included with some statistics. Finally, the chapter will be concluded by writing conclusion and critical evaluation.

Chapter 3 provides comprehensive framework of the methodologies being employed to attain stated objectives, the tools used to collect data, research design, population of the study, sampling technique and validity and reliability of the questionnaire

Chapter 4 presents the collected data and provides systematic analysis for both the questionnaire and the interview to sort out the critical findings.

Finally, conclusion chapter summarize the entire research based on findings to build the possible recommendations and individual reflection.

1.9 Summary

Globally, organizations tend to adopt advanced technologies to maintain their business in competitive edge. Intelligent ERP (i-ERP) system has recently released by different ERP providers to track business growth. From this point, the idea of this research rises and aims to provide sufficient information about this sophisticated system and its contribution to Oman industry improvement. Moreover, it aims to help organizations to identify the strengths of this intelligent system and investigating the challenges in order to build outstanding solutions and recommendations that overcome these challenges. This chapter gives an overview of the different aspects of the research; the objectives, questions, scope, significance and limitation of the study.

Chapter 2: Literature Review

This Chapter summarized prior studies on i-ERP Systems, first by covering the evolution of ERP System and then expanding to i-ERP system. It attempts to provide comprehensive overview of the research objectives including; i-ERP concepts, barriers and significance. Furthermore, it discusses a theory of maturity level linked with i-ERP implementation case. Finally, it involves the application of i-ERP and case study from the Sultanate.

2.1 An Overview of ERP System

2.1.1 ERP Systems Evolution and Definition

The unprecedented growth of business processes and communication in global economy has prompt organizations to adopt new technologies (Bahrini & Qaffas, 2019). The evolution of ERP Systems was generated through continuous development in computer hardware and software. In the early 1960s, organizations started realizing process automation through programming languages. Then, in the early 1970s material requirement planning systems (MRP) were introduced which involved planning material and production processes. After that 1980s material and manufacturing processes were synchronized through manufacturing resource planning systems (MRP II). MRP II was expanded and involved other processes such as; project management, finance, distribution management and human resource. Then the need for integration of all the processes arises and Enterprise Resource Planning (ERP) was innovated to integrate several business processes (Rashid et al., 2002).

ERP term is acronym for enterprise resource planning, but this name doesn't reflect the actual concept and capability of the system as it is more than planning system. ERP system integrates and automates business processes regardless of the size or type of the organization (Vasiljeva & Berezkina, 2018). According to (Jirava & Toseafa, 2017) ERP could be defined as a system that controls, organizes and centralizes information flow within regional or Multinational Corporation.

Other researchers (Mjomba & Kavale, 2015) defined ERP as a technological concept that combines different modules such as; production, manufacturing, finance, marketing, human resource and others to plan the goods and services of the entire business as shown in Figure (3)



Figure 3: ERP Modules

Source: developed by Core Agile Lifecycle Management (CoreALM, 2018)

2.1.2 Benefits and Risks of Implementing ERP Systems

ERP as any computer-based system; it has its strengths and drawbacks. According to (Kuo, 2014) introducing of ERP system has tangible and intangible benefits. Tangible benefits could be in terms of financial structure, operation capability, short term solvency and profitability as the improvement was clearly noticed after the implementation of ERP. On the other hand, many intangible benefits were identified. First of all ERP system provides unified systems which avoid expenditure of purchasing separate systems for business functions. Secondly, ERP system provides reporting tools and integrates all financial transaction which facilitates the compression processes by financial directors. Third, such unified system reduces time for reentering data manually and facilitate access information. Finally, ERP modules provide access based on level of the organization. According to (Constantinos et al., 2014) ERP modules satisfy customer needs through different modules such as SCM and CRM. ERP System can streamline organizations' processes that no longer possible to be done via phones or emails. A study of 30 companies shows that ERP enhanced storage and facilitated other processes specially regarding to staff data, payroll processes, appraisal system, time management processes and others. Also based on survey conducted by CapGemini, return of investment has been improved [12-14]. This survey studied CRM System's users and indicated that 61% of the companies have paid their investment back with less than 24 months and 17% of companies with less than 12 months (Ociepa-Kubicka, 2017).

According to (Aslanyan, 2016) risks of implementing ERP can be identified as organizational, business and technological risks. Poor management by the organization in terms of identifying its objectives, capabilities and budget could be a reason for failure during implementation or post-

ERP implementation. In addition to that ERP System is considered to be complex architecture due to its functionality that deals with all organizations' processes which requires non-standard approach and data migration processes that could result in budget and schedule overages. Another risk is security concerns, as mentioned above during ERP implementation project team deals with massive amount of information which could be sensitive and shouldn't be exposed to outsiders. According to (Tobie & Etoundi, 2016) ERP software is considered to be an expensive system due to its complexity as it includes direct and indirect costs such as; software licenses, hardware, team training, administrative cost, consulting fees and system upgrades. However such expenses vary based on several variables for example; organizations' size and needs.

2.1.3 Types of ERP Software

According to (Saa et al., 2017) there are two main types of ERP software; on-premises and cloud based. ERP that implemented on-premise requires stable IT infrastructure; hardware, software and network connection). It is characterized by more complexity and high operating cost. However, nowadays most businesses are moving towards cloud ERP which is more fixable with lowest cost and short period of implementation that takes 4-8 months only. Cloud ERP contains three models; private cloud, public cloud and hybrid cloud. Private cloud is available for certain organization or limited group. While public cloud could be accessed through any internet connection (Ziani & Al-Muwayshir, 2017). On the other hand, hybrid cloud is a combination of on-premise, private cloud and public cloud. This combination reduces size of data saved to the depository hence improving provide flexibility, agility and accessibility (Trautman, 2018). Prior study in UK indicated that 51% of the companies prefer private cloud and 2% favored public cloud. 35% of the companies prefer on-premise ERP, while 10% prefers hybrid cloud ERP (Accenture, 2018).

2.2 Transformation from ERP to i-ERP

When traditional ERP was released in the previous years the companies that implemented the system could gain advantage over competitors in integrating and streaming business processes. However, this traditional ERP is considered to be back-end system and complex to implement and run and doesn't directly contribute to innovation. On the other hand, intelligent ERP system brings improvement in flexibility, agility and simplicity that meets the current digital era. Arvara, CIO at BW Group, claimed that in the next 2 years about 85 % of the companies will be doing its tasks without human interaction. Hence, this generation of ERP will take part of this experience (Chakraborty, 2018).

This is an approach where ERP is being enhanced by intelligent technologies such as machine learning and analytics (Ellingsen & Mukherjee, 2018). The following Figure (4) illustrates the transformation from ERP to i-ERP.



Figure 4: SAP Journey and History of User Interface

Source: Developed by SAP IGNITE (Borda, 2017)

Intelligent-ERP (i-ERP) is the new generation of ERP Systems. I-ERP can be defined as a smart system embedded with advanced technologies (Jenab et al., 2019). According to (Chakraborty, 2018) i-ERP system refers to the ERP system that uses machine learning and predictive analytics to generate high level of innovation which makes the system "proactive rather than reactive". Intelligent ERP system is the modern trend of ERP that incorporate machine learning in order to support digital transformation of organizational core processes (Morris et al., 2016).

2.3 Significance of implementing i-ERP

A company can analyze the value of a system based on four quality criteria; quality of business processes, speed of operation, flexibility, cost and innovation (Jenab et al., 2019).

2.3.1 Process Improvement

Intelligent-ERP plays a vital role in business processes by determining the new wave of processes and enhances the current ones. The rapid changes of business processes become challenging, and the customers are expecting to be served with high quality products promptly. ERP that embedded with machine learning is capable to automatically adapt and optimize internal processes to meet business needs. A study was conducted at 25 German companies in 2017, expected that by 2020, 60% of the companies will desire independent and intelligent process (Paschek et al., 2017). I-ERP improves and automates existing processes in different modules for example; in finance module, the cash application software learns from previous data cleaning to automatically predict the accuracy of incoming invoice (Ellingsen & Mukherjee, 2018).

Moreover, the intelligent architecture of the ERP supports real-time or close real-time processes rather than the traditional operations. This intelligence is clearly noticed in the supply chain as the company could start manufacturing once it receives the order without holding surplus inventory and it avoids accepting orders that is above capacity (Ellingsen & Mukherjee, 2018). It also enhances quality by integrating the different processes with KPI metrics. For example; integrating "overall equipment effectiveness (OOE), production volume, and inventory turns" with KPI to enhance real-time and automotive decision making. In addition to that machine learning also can predict the shortage and send notification to the supplier to replenish the raw material needed for present manufacturing. Such feature will be also beneficial for E-commerce where the system will be able to make a response for an order at a real-time which will lead to customer satisfaction (Chakraborty, 2018).

2.3.2 Company Operations

Organizations always are looking for innovative ways to manage its resources. Intelligent ERP tends to attain this goal by optimizing human, business processes, technology and assets. The machine learning embedded with ERP systems learns from massive amount of data which leads to innovative products and enhance employees' productivity. An Intelligent-ERP system helps

the organization to shift from records management to smart system that learns from previous experience and business rules to predict better outcomes and suggest recommendations. It is expected that by 2019 around 60% of the companies will be able to measure out the performance of intelligent ERP on resources, processes and people optimization.

According to (Koelsch, 2019) i-ERP system helps to reduce lag of information flow by letting the machine learning or sensors to do certain tasks instead of wasting more time for arranging the information manually. For example; i-ERP enhances automotive decision making at machine level in manufacturing industry in order by determining capacity, quality and cost (Koelsch, 2019). This kind of intelligent decision making will drive the organization towards agility and digital edge. Moreover, intelligent ERP enables learning, analyzing and controlling massive amount of data on real-time basis by using in memory computing (IMC), (IDC, 2018).

2.3.4 Flexibility

Intelligent ERP is supporting more fixable services. The cloud now is providing more than cutting cost of hardware components and integrating several plants belong to the enterprise. It enables vendors to take advantage of computational economic, integrating business services outside the organization and using machine learning to analyze and predict (Koelsch, 2019).

In traditional ERP, the workers were able to access data via central data repository while in the new generation of ERP workers can access information about processes via mobile devices. Hence, the information will be processed and displayed promptly which leads to more fixable business environment. (Koelsch, 2019). Furthermore, i-ERP provides features that support user experience (UX) by providing friendly user-interface with automated set of tasks that didn't exist in the legacy system. In addition to that the learning environment provided by machine learning supports guidance for the expected step to be completed in different tasks; suppliers, customers, hiring procedures, payment and collection methods. Such features help employees to be more effective and productive. In addition to that, intelligent ERP systems are installed easily and help in cutting operating cost and saving time by converting the manual processes into automated and real-time processes. The cloud model of ERP supports friendly use, flexibility, mobility and agility (Chakraborty, 2018).

2.3.5 Cost

According to (Chakraborty, 2018) i-ERP is easy to be managed, installed and reduces the overall operational cost by automating the manual processes which results in saving time. In addition to that, the company can chose the implementation model to be in cloud which saves cost. A prior study claimed that by 2020, 40% of the large organization will shift 60% of their function to the public cloud (IDC, 2018). This adds advantage over the traditional ERP systems which are complex to implement and manage which results in adding unpredicted cost for implementation, maintenance and training. Moreover, machine learning capabilities inside the ERP system minimizes many organizational functions by automating processes which will result in reducing labor costs. For example in procurement and sourcing processes, i-ERP learns and analyzes prior purchases orders (PO) to automatically generate upcoming PO which reducing redundancy and eliminating manual steps. I-ERP also automates cash management process by enabling the system to use auditing techniques. (IDC, 2018).

2.3.6 Innovation

Intelligent ERP helps in executing new ideas which are unprecedented by predicting contract and goods expiration and consumption. Accordingly, build effective negotiation with suppliers. The customer can also predict his transaction according to personal data and retrain. (Ellingsen & Mukherjee, 2018). Moreover, Intelligent ERP also provide detailed and secured performance indicator in real-time manner. Hence, problems can be identified early. According to Chakraborty, the emergence of i-ERP is an essential part of transformation strategy from pre-digital age to post-digital age (Chakraborty, 2018).

2.4 Barriers of implementing i-ERP

Some companies prevent implementing i-ERP systems due to security concerns. However, some ERP providers like Oracle has released intelligent ERP that automatically responds to threats in minutes rather than months (ORACLE, 2018). Changing the business environment or transformation of the legacy system is another barrier that prevents companies from shifting to i-ERP. Such transformation of the legacy system will lead to consuming time for migration, added expenses and training. However, business requirements changes frequently and the companies try to create competitive advantage and meet customers' needs which will be no more possible through the legacy system. (W.Awad et al., 2017). Prior study was conducted by IDC in 2017 on 300 SAP customers in 9 countries, presents several challenges why companies are not sure to

implement i-ERP systems. First of all, around 45% which is the top concern of the companies are preventing implementation of such system due to cost of implementation, while 35% claimed that there is a lack of in-house capabilities. Furthermore, around 40% don't want to migrate from the legacy system and 20% have concerns of training users. In-depth interview results indicated that some companies have other reasons such as; customization limitation and unclear business benefits (Morris et al., 2017).

2.5 Organizational Maturity level to implement i-ERP

According to (Sliż, 2018) Organizational maturity level refers to the organization's ability and readiness to change its processes culture, individual, resources and technology in a stabilized and optimized manner. According to (Chumo, 2016) in order to identify the maturity level to adopt a new system, the company should align the desired system with the following six factors. First of all, communication factor; the organization should conduct communication with project manager, vendors and other stakeholders in order to identify how such system will add value to the organization. Second, the company should measure the value of such project and the expected outcomes to ensure the future success. Third, the authorized party should share the result with management to align it with the business strategy. Fourth, this factor ensures that IS decisions are aligned with the business strategies. Fifth, this factor considers the scope of the project. IT determines organization's readiness to grow and innovate, capability of its infrastructure, financial capacities, and timeframe. Finally, training and human resource are essential in any organization. Upon the mentioned factors, the company can determine its level of maturity based on the desired maturity metrics.

Most organizations try to move towards digital era and adopting advanced technologies. According to (Morris et al., 2017) there are different types of organizations and their needs vary based on their business nature. However, a deep interview with some organizations indicated common maturity criteria to move towards i-ERP System. The company should align the project with its business strategy by investigating whether it is ready to digitalize its business. Several interviews indicated that digitalizing information is the most concern which is basically controlled by ERP systems. Hence, i-ERP helps the organization to capture knowledge, protect it and processes it on real-time basis. The statistic shows that 26.5% of the companies are planning to implement i-ERP to digitalize their business while 21.6% already shifted due to same reason. On the other hand 13.3% of the companies didn't decide yet. Many organizations suggested perusing in the field of integrating machine learning and ERP as the range of tasks automated helps the organization to stay competitive, enhance employees' productivity and performance statistics shows that 26.5% of the companies are planning to implement i-ERP to enhance employees productivity while 28.4% has already implemented the system for this reason. On the other hand, 15.6% are not sure. However, the organization should have stable IT infrastructure and data management plan to be able to transform to i-ERP system. According to statistics data migration was the leading challenge as; 15.6% of the companies that implemented i-ERP have faced. Furthermore, financial capabilities and time frame is another concern. Finally, involve employees in the early stage of the implementing i-ERP project to be familiar with such change.

2.6 Application of machine learning in ERP Systems

Machine learning uses advanced technologies to detect business data, bolsters data mining techniques and enhances predictive analytics to generate conceptual results and recommendations (ORACLE, 2018). ML enables computer to learn from massive amount of information without programming in order to generate intelligent solutions (Dimitrovska & Malinovski, 2017).

Furthermore, ML supports multiple algorithms that can support ERP systems. However, the ERP product could be customized based on the algorithms that supports a certain business processes (Pawełoszek, 2015). Prior study declared how supervised learning can support customer service in ERP systems. Users frequently request help disk to solve their problems that occurred due to incorrect action, system failure or request further information. Intelligent ERP systems support automatic responses in few minutes rather than days which saves time, effort and cost. This is done by enabling ML to use multi-class classification algorithms in order to identify similar data of users' request, analyze ERP modules to collect evidence, map classes, generate possible causes, and evidence from different modules. Accordingly, generate answer that will be checked by an expert (Vlasov et al., 2017).

Moreover, ERP also supports multiple unsupervised ML algorithms. Clustering could enhance various ERP processes. Clustering could improve sales area by facilitating customers purchase and managing user's complaints quickly. Moreover, procurement processes are also enhanced by reducing of the suppliers' price due to competition and track any order delay and identify the

reason behind it. Clustering also enhances other areas such as; marketing, warehouse management, autonyms production process and e-communication among employees (Pawełoszek, 2015).

2.7 ERP and i-ERP in Oman

Organizations in Oman are expanding, and it is no more possible to manage them without at least ERP system. However, there is insufficient literature on ERP systems in Oman. In addition to that, there is no clear statistics about the number of ERP or i-ERP users. One study only attempted to cover the maximum number of ERP users in the country in order to study the effectiveness of ERP system. The study stated that organizations agreed that the cost of ERP implementation and users training are not expensive compared to the value it adds to the business. Most of responses indicated that ERP system is able to reduce operating cost, assist decision making and real-time data.(Mahrami & Hakro, 2018). Another study was conducted that aims to investigate the success factors of applying this system indicated that ERP system is rapidly growing in Oman market especially in different sectors specially manufacturing. More than 30 large companies in Oman are implementing ERP systems including; "Bank Muscat, Khimji Ramdas, Oman LNG, Omantel, OTE Group, Oman Cement Company, Petroleum Development Oman, Ahlibank, Suhail Bahwan group, Sohar Aluminum, Vale Oman, Oman Methanol Company, Powertech Engineering, and many others" (Shatat, 2015). Moreover, a case study was conducted on Omantel to examine the success factor of ERP implementation revealed that implementation of Hybrid ERP could reduce the cost up to 80%. Hybrid ERP helps in saving capacity by storing some information on-premise and the other part in cloud or private. However, there are some challenges in implementing Hybrid ERP; managing master data, coordinating business activities and integrating business processes that are hosted in different places. Furthermore they considered stakeholder involvement from the beginning to be the most important factor for successful implementation (Yahyaee, 2016).

However, some organizations in Oman already shifted to the new generation of ERP. Intelligent ERP plays a vital role in digital transformation, as all the organizations aim to develop their processes and enhance productivity. There are no available studies that covered intelligent ERP in Oman so far. Recently Oman Observer news published that Raysut Cement Company (RCC) has successfully implemented intelligent ERP "SAP S/4 HANA and SAP Success Factor for HR" as they consider it an essential step with regards to digital transformation. According to Al Tamimy, Chief of HR and Administrative Affairs, this intelligent system will digitalize the HR solutions, facilitate and integrate processes and achieve interaction among employees. In addition to that, Fadhel, Head of IT, stated that this i-ERP will provide better services to

customers quickly. Intelligent ERP systems also support the organizations' business strategies and objectives. The implementation of i-ERP took 5 months and the system was officially lunched in the first day of January 2019. (Observer, 2019)

2.8 i-ERP and Internet of Things (IoT)

Internet of things relay on using clouds in order to store data and automate business processes. (Paschek et al., 2017). ERP that support ML will be hooked to Industrial Internet of Things (IIoT) in the very near future. For example the manufacturing industry, the predictive analysis of weather will help food and beverage industry to predict the demand of services. (Koelsch, 2019). Oracle provider supports IoT cloud applications that leverage huge amount internal and external data in order to guide ERP users towards the right actions. In addition to that IoT applications inside ERP combine time sensors, data series and business data in order to automatically select the appropriate build-in ML algorithms to accomplish certain task. (ORACLE, 2018)

2.9 Critical Evaluation of Literature Review

This chapter comprises literature review of concepts related to i-ERP system. A discussion of significance and barriers of implementing i-ERP system was undertaken. Furthermore, a comprehensive framework of maturity level to implement such advanced system was highlighted. Application of machine learning in ERP Systems was investigated. Finally, the study involved cases of ERP and i-ERP in the Sultanate.

This research started from identifying the evolution of ERP system and expanding to i-ERP system in order to identify the difference and significance of i-ERP system. According to (Ellingsen & Mukherjee, 2018) the rapid change and growth of technology have prompted businesses to evoke advanced technologies that meet digital revolution. Current systems are being replaced by more intelligent systems that capable to build innovation. However, prior studies agreed that the most barriers to implement i-ERP could revel to the cost of such system and transformation from the legacy system (Morris et al., 2017).

Furthermore, a theory of maturity level was attached with a case i-ERP implementation. According to (Chumo, 2016) before i-ERP implementation, the organization should have a clear business strategy that is aligned with the organizations' vision and mission, with consideration status of the IT infrastructure and the financial capability to implement i-ERP system.

Moreover, the functionality of i-ERP System basically depends on the power of machine learning and data analytics (Pawełoszek, 2015). Scientific studies indicated that the algorithms machine learning supports and automates various processes of ERP system. Supervised learning algorithms help the customers to resolve the issues without waiting for the help-disk staff. In addition, by reviewing historical data and prediction, machine learning support auto-decision making in ERP processes authorizations (Vlasov et al., 2017), (Pawełoszek, 2015).

Finally, studies indicated lack of ERP and i-ERP cases in Oman. According to (Observer, 2019) Raysut Cement Company (RCC) is one of the organizations that already shifted to i-ERP by implementing SAP S/4HANA software in order to automate process and decision making to enhance the productivity.

The prior studies have been conducted in different geographical areas applying different methods and sample size. In fact, there is a gap revealed due to lack of studies on effectiveness

of i-ERP system especially in Oman. Accordingly, this exploratory study was undertaken to evaluate the effectiveness of i-ERP system on the performance of medium and large organizations in Oman.

Chapter 3: Research Methodology

3.1 Introduction

The research aims to explore effectiveness of i-ERP system on organizational performance in Oman. Systematic research methodology will be employed in order to achieve the estimated project objectives. The objectives have been investigated through previous studies conducted by other researchers and scholars who tried to cover the different aspects of the topic in chapter 2.

Quantitative and qualitative are the two main methods used in this study. Quantitative methodology deals with numerical and statistical data such as; percentage, frequency means and others. It can be analyzed through survey research, descriptive and correlation which will be used in the current study as shown in figure (5). Survey research relies on the survey responses which are structured in a manner to clarify the problems. Descriptive research clarifies the characteristics of research problem to draw the appropriate conclusion. The correlation research clarifies the relationship among variables (Bhat, 2018).

However, qualitative methodology deals with non-numerical data where data is collected through conversational methods. Several methods can be utilized to collect data such; one-to-one interview, focus group, observation, case study (Bhat, 2018). In this study two main methods are being used; one-to-one interview and telephonic interview in order to address the problem and collect in-depth information.

The following Figure (5) illustrates the research methodology of this study.



Figure 5: Research Design and Framework

Source: Developed by (Kothari, 2004)

Research methodology refers to the systematic plan of a project implementation in order to achieve the expected objectives. It covers the overall project methodologies, project design, population of the study, sampling technique and data collection and analysis.

3.2 Research Design

Research design refers to the overall structure to be followed and getting answers to the questions. In fact, it articulates the required data, methods to collect data (Toshkov, 2016). It considered three steps; preparation, data collection and data analysis. In the preparation step the area of the study is decided upon reviewing in-depth prior studies and the understanding of the current situation. Accordingly, the research objectives and questions are specified. Then, proper data methods are specified to collect the desired information. In the last step data analysis techniques are allocated which will help to draw conclusion and recommendations (Kumar, 2011).

According to (Dudovskiy, 2018) there are several types of research design, for example; exploratory, descriptive, evaluative, predictive and others. A researcher should understand the nature of the research in order to set the appropriate type with justification. However, in this study, exploratory research design is the most appropriate type. It is conducted to explore a

problem or a situation that was not clearly defined. Hence, it attempts to explore research questions without providing clear or constant solution (Dudovskiy, 2018).

According to (Swanson, 2015) exploratory research is conducted for a situation where no prior researches had been initiated within the same field. Hence, it provides basis for further researchers who are intended to complete researches within the same field in the future.

Exploratory research has been designated in this study due to several reasons. First of all, the first and second objectives require practicing exploration as it aims to investigate the maturity level of i-ERP adoption in Oman. Another reason belongs to the fourth objective as it aims to evaluate the effectiveness of i-ERP systems in medium and large organization's performance in Oman which is considered to be new topic and cannot be accomplished with other designs. Overall exploratory research is the most appropriate for this study because no researches have been conducted in the Sultanate of Oman about the same field. However, the conclusion cannot contain rigorous conclusion about the best practice. The developed recommendations provide suggestions in order to improve productivity. These recommendations and solutions don't draw final conclusion rather than it attempts to demonstrate the effectiveness of i-ERP systems on organizations' performance. Finally, the above discussion obviously proves that exploratory research design is the most suitable for this problem.

3.3 Population of the Study

According to general population refers to the entire audience or units of interests who belongs to a certain problem or a situation characterized by common behavior. Target population is the set of individuals by which a sample is chosen. On the other hand, accessible population refers to the actual group that could be measured. It is smaller than targeted as some of targeted members are unwilling or unavailable to participate (Asiamah et al., 2017). In this research, the targeted and accessible population is mainly the large and medium organizations in the Sultanate that are implementing ERP or i-ERP systems in order to compare and evaluate the efficiency of i-ERP systems.
3.4 Sampling Technique and Sampling Size

According to (Alvi, 2016) it is impossible to reach the entire population. A researcher conducts the research and draws a conclusion based on smaller participant group which is called sample of the study. Whereas sampling is the technique that a researcher follow in order to select the appropriate sample based on subjective justification. Most researches study sample instead of entire population due to time, cost, reliability and physical factors (Imdadullah, 2015).

There are two types of sampling techniques; probability and non-probability sampling. In probability sampling all the individuals have equal opportunity to be elected. Wearers, in non-probability, individuals within the population may not have equal opportunity to participate. Non-probability sampling has different types; volunteer, convenient, purposive, Quota, snowball and matched. Non-probability sampling is mostly used in exploratory research (Alvi, 2016).

For the current study, and since there is no clear statistics of ERP or i-ERP users, non-probability sampling type of convenient sampling was utilized. Convenient sampling is the most common type where a researcher can approach the available sample. The advantage of this type is its scalability compared to other survey analysis as it will derive the important perceptions. There are several reasons for selecting such technique. First of all, lack of population statistics. Secondly, convenience sampling can resolve time and cost limitations (Alvi, 2016). Third, it is difficult to reach all companies for different reasons (Gazala, 2018). Accordingly, a sample of 51 participants is sufficient for the current research. 41 of ERP users and 10 of i-ERP users were selected due to the small population of the companies that implemented i-ERP system in the Sultanate.

3.5 Research Instrument

According to (Gazala, 2018) research instrument refers to the way of gathering collecting data in order to get the research questions answered. For the current research, questionnaire instrument and interview instrument were used.

3.5.1 Interview Instrument

Interview instrument is a qualitative mean of collecting data. Interview instrument support the research with additional information which helps the researcher to enhance understanding through open questions (Buriro et al., 2017). For the current research, the interview questions were designed in a way to support information gained from literature review and to fulfill research objectives under supervision review. Then, a letter of consent was issued by the college to be signed by the interviewee. After that, the researcher conducted interview with four employees from different organizations. The interviews were conducted face to face with the organizations located in Muscat and through telephone with the organization located in Dhofar. Finally, the notes were clearly reviewed and organized to facilitate the analysis in the upcoming stage. Furthermore, the interview instrument supports in the formulation of survey questions.

No	Name	Organization	Position	Data of Interview
I1	Mr. Steven Lewis	SAP	SAP HR Freelancer Consultant	30 April 2019
I 2	Mr. Faisal Said Al Balushi	Oman Data Park (ODP)	Senior Specialist	1 May 2019
13	Mr. Akthar Khan	RaysutCementCompany	Project Manager	12 May 2019
I 4	Mr. Vazim Mahmood	Ultimate Solutions for Technology LLC	ERP Implementation Consultant	15 May 2019

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Iable(1)	mustrates	the	interviewee	information.

Table 1: Interviewee Information

3.5.2 Questionnaire Instrument

Questionnaire survey is one of the common mean adopted to answer research questions. The questionnaire should be organized in a systematic process in order to attain target (Brancato et al., 2006). In this research, related questions were structured and suggested based on research objectives and literature review in Chapter 2. Then, short-listed of the questionnaire was designed and divided as subsets under the main objectives (See objectives in page (3). Accordingly, two surveys were finalized for ERP and i-ERP users with the same question in order to facilitate comparison. The survey consists of 24 closed questions and 1 open question. Moreover, one of the most important factors of writing the questionnaire is designing the questionnaire was distributed through different means; such as; email and LinkedIn. Find the questionnaire in Appendix 1.

3.6 Validity and Reliability Testing

According to (Bolarinwa, 2015) a researcher must consider the term validity and reliability while designing the questionnaire. Validity deals with insuring that the concept is clear, accurate and could be measured in quantitative study. The questionnaire of this research was designed in clear language. However, the validity was inspected through two stages. First of all, the questionnaire was reviewed by the supervisor. Few comments were given regarding to the re-structuring the questions in order to be clear for the reader. Furthermore, the questions were divided in subsets under the four objectives for the purpose to be measured by each objective separately.

On the other hand reliability measures to what extent the questions are consistent. It is also agreed that if the research is repeated within the same instrument at same condition it will produce same result (Livingston, 2018). The most common reliability test is "Chronbach's α " which states that the result of a test lies between .00 and 1.00. A value of 1 indicates highest consistency. Whereas, A value of .00 indicates lack consistency. Most studies agreed that the reliability value should strive for value of 0.7 or above (Bolarinwa, 2015).

3.7 Data Collection Technique

The current study involves two methods of collecting data; primary and secondary. According to (Simister, 2017) secondary data refers to the ready data which is already gathered, generated other researcher. On the other hand, primary data refers to the data collected by a researcher himself through interview, questionnaire and other sources.

For this research, the researcher used both methods in collecting data. The primary data was collected through face-to-face interview, telephonic interview and questionnaire. On the other hand, the secondary data was collected from priors studies such as; books, journal article, conference paper, reports and newspaper.

3.8 Data Analysis Technique

The quantitative data of this research will be analyzed using PSPP software. Descriptive statistics approach will be applied, for example; the demographic data will be analyzed through frequency and cross-tabulation. On the other hand, the responses of the questions from section 2 to 5 which are based on 3-likert scale will be analyzed using mean, standard deviation, frequency and skewness. Besides that, section 5 will be analyzed through correlation coefficient in order to figure out the correlation among processes performance within the organization. Finally, reliability test will be conducted through; Principle factors and Chronbach's α . The following Table illustrates data analysis technique.

Data Analysis	Method	Implementation
Descriptive statistic	mean, standard deviation, frequency, cross-tabulation and Skewness	To assess the data
Correlation statistic	Correlation Coefficient	To find relationship between variables
Inferential Statistics	Principle component analysis Reliability test	Principle factors Chronbach's α

Table 2: Data Analysis Technique

3.9 Legal, Ethical and Social Consideration

Research ethics refers to the set of ethics a researcher should follow in order to protect the dignity of the research as well as all the parties involved. Following protects the right of other parties who are involved in the research through getting their consent. In addition to that, collecting and citing primary and secondary data in ethical manner ensure quality and facilitate the publication without any objection or harm (Akaranga & Makau, 2016).

Ethical and social considerations were followed in this research. First of all, letter of consent was issued by the college in order to collect the information from interview in ethical way. The participants received a brief description of the research, conditions, risks and confidentiality. In addition to that the participants have the right to be informed about the content of the research. The declaration also includes that the participant is involved voluntary and there is no any specific benefits from the participation and no harms. Finally, the letter includes clause that states that the recorded conversation will be removed once the research is completed.

Moreover, the questionnaire also was distributed with attached letter from MEC College stating that the student is enrolled in the college and the purpose from collecting data is to enhance knowledge. In addition to that, the letter indicates that none of the personal information will be collected such as; participant name or organization's name, email or phone number.

Finally, the finding of the research will not cause any harm to individual or society and at the same time experience of the experts in regards to the system implemented will benefit private and public organizations in future plans.

3.10 Summary

Research methodology was discussed in this chapter from different dimensions. This research follows an exploratory research in nature. It used survey and interview in order to percent quantitative and qualitative data. A researcher follows no-probability sampling technique type of convenience. A sample of 51 participants was selected to explore situation. Furthermore, a framework of data analysis was introduced which contains analyzing quantitative data through descriptive and correlation analysis. A researcher followed a triangulation method to draw the conclusion using secondary data, interview data and questionnaire. A researcher also used Chronbach Alfa to insure research reliability. This chapter also discussed legal and ethical

aspects. Finally, this chapter is a preliminary chapter to be utilized in the next chapter in finding presentation and analysis.

Chapter 4: Project management

4.1 Introduction

This chapter highlights the contribution of project management concepts and procedures in completing this research. It illustrates the different phases the researchers follows in order to achieve research objectives, maintain quality and mitigate risks.

Many studies agreed that the strong management of any project is the main reason of its successes. Project management refers to continues activities with common purpose. Usually a project is undertaken in order to solve problems or take advantage of opportunities. Every project follows certain phases in order to insure that each the project activities are completed within the timeframe see figure (6) (Nicos & Athanasios, 2016).

Source: Developed by (Nicos & Athanasios, 2016)



Figure 6: Research Phases

4.2 Project Phases

For the current research, a researcher followed the following phases in order to get this project done. The following Figure (7) shows a framework of the research phases and Figure (8) shows the project WBS.



Figure 7: Research Phases and WBS

1- Initiating phase

In this stage the researcher chose the area of interest by reviewing prior studies. The finding showed that the topic is modern and in the exploratory stage where many organizations are looking for in order to enhance their performance. Then, the suggested topic was presented to the supervisor for approval. Finally, after getting the approval, the research title, objectives, questions, cost and timeframe were initiated. Furthermore, the researcher communicated with the research stakeholders such as interviewee in order to get confirmation for the interview. Finally research proposal was finalized and submitted through MEC Module.

2- Planning phase

In this phase, the secondary data from different studies which assists the researcher with the right path of collecting data and in the exciting stage. In this stage the scope of the research was completed. The methodology and the resources of the research were specified. Finally, the plan was presented in a poster session in order to take experts feedback. The poster included project introduction, summary of literature review, expected deliverable and plan of the phases.

3- Execution phase

After getting the feedback from experts, a researcher proceeds with the execution phase. First of all, interviews were conducted with experts from different organizations in order to share their experience. The shared experience highly contributes in the development of the research and knowledge enhancement. After that, the questionnaire was designed based on prior studies and was approved by the supervisor and distributed among organization that are using ERP and i-ERP systems. After the processes of collecting data, a researcher used PSPP software in order to analyze data, draw recommendation and conclusion. Finally, a researcher finalizes the research and viva under the supervisor directions.

4- Closing phase

In this phase the research will be submitted through MEC Moodle for review and marking.

4.3 Project Constraints

According to (Chatfield & Johnson, 2016) the most common way to visualize and track a project is to use the triangle of project constraints which are; cost, scope and time see Figure (9). Project constraints can be defined as limited factors which affects the project quality. For the current research, a researcher considers completing the research within 6 months in order to insure quality and prevents any late submission. This factor successfully achieved by breaking down the activities to be completed within a specific period of time. Moreover, a researcher distributed the survey to the organizations via online form which saves cost and utilizes technology means to get the project deliverables. Furthermore, the scope of the research was continually tracked by the researcher and supervisor to insure that the activities are completed within the expected time, cost, resources and quality standards to meet research objectives.



Figure 8: Project Constraints

Source: Developed by (Chatfield & Johnson, 2016)

4.4 Risk Management

Risk management refers to the plan taken to prevent unfavorable events that might occur during the project (Borghesi & Gaudenzi, 2013). Accordingly, the researcher prepared a risk plan in order to mitigate unfavorable risks. First of all, the researcher communicated with stakeholder that will affect the research including; experts from organizations, MEC college to get authority to processed with research. Secondly, the researcher started collecting data at early stage to prevent any delay. Furthermore, a research diaries were signed by the supervisor weekly to prevent gold plating; adding activities which are not related to the objectives.

4.5 Summary

In conclusion, this research followed a project life cycle to insure the consistency stability of the research. A researcher planned the research with regards to project constraints; cost, time and scope to meet the desired objective with standard quality. In addition to that, risk management was conducted at early to mitigate undesired events. Finally this research was conducted by utilizing project management concepts, procedures which highly impacts the outcome of the research.

Chapter 5: Results and Analysis of Data

5.1 Introduction

This chapter aims to present and analyze data collected from the questionnaire and interview. The first section presents and analysis the interview data. Whereas, the second section present the data collected through the questionnaire. Then, the analysis part was conducted through PSPP software by applying several statistical tests including; reliability and sampling sizes calculations. Finally the findings were interpreted, analyzed and provided proper recommendation.

5.2 Presentation and Analysis of Qualitative Data

As shown in Table (1) in Page (25), the interviews were conducted with four interviewees (4I). However, the aim of theses interviews is to get answers for the research questions. First of all, all interviewees agreed that the top barrier not to implement i-ERP could be the cost of the system. In addition to that (I1) stated that education could be major barriers. People are not enough educated as they are not aware of the benefits of such systems. Furthermore, management and employees are resistant to change, also I4 agreed on this barrier. (I4) stated that, changing the mentality of employees and management is essential concern. Furthermore, (I1) stated that, organizations might believe that the current system meets requirements. Whereas, (I3 and I4) stated that poor IT infrastructure and resources, lack of strong business case, security and time to migrate are other possible barriers.

Moreover, regarding to organizations' maturity level to implement such system, all interviewee agree that the organization should be having good communication with stakeholders in order to study the system requirement match it with originations' business strategy, vision and mission. Furthermore, the company should identify i-ERP system would be beneficial for the organization by evaluating ROI, profit margin. Then the company should consider the company resources such as; hardware and networking. According to (I4) the organization should insure that the server is stable and can handle the desired amount of data and the networking should be proper to access data very fast. After that, according to (I1, I3, I4), the company should plan list of new requirements, Change Management, prior decisions on design change, resources with relevant knowledge, where the solution is introduced first time.

Furthermore, regarding to the impact of machine on ERP processes, (I1) stated that machine learning support ERP processes from an HR perspective. He stated that, machine learning would be able to determine employee's behavior and future decisions by deeply reviewing his activities through ERP system, success factors, employees' productivity and KPI. Accordingly, machine learning can predict his performance for the upcoming years and the expected retirement. In addition to the (I3) stated that, the major improvement of i-ERP system is the improvement of processes approval. They were suffering from manual Management approvals in the form of paper bundles on the desk of each Manager. It was time taking and leading to slow down each business decisions and processes. Now mangers are able to take decisions in time and share the approvals by their cell phones. Furthermore, the processes are automated with predesigned autocontrol & decisions making. On the other hand, (I4) as an ERP implementation consultant, stated that, customers were requesting process prediction specially manufacturing and supermarkets. Such industries are highly depending on raw material; as if there is no raw material the business will stop. Accordingly, they were requesting for automated prediction processes to determine the required material and the proper supplier. Accordingly, an automated PO should be send automatically to suppliers. However, such feature is already embedded with i-ERP system such as SAP S/4HANA, SAP Business One and other software.

Finally, the last question was asked regarding to the effectiveness of i-ERP system and whether it would be suitable for medium enterprises. However, all interviewee agreed that i-ERP system could be beneficial for both medium and large organizations. According to (I1, I2 and I3) i-ERP system can fit any organization size. For example; SAP has introduced Business by design. The software is designed according to the nature of business by default with minimized customization due to the advanced technologies embedded with i-ERP system. Furthermore, (I3) stated that, huge businesses today used to be a medium organization in the past or its initial stage. Hence, i-ERP system may lead the business to move form medium organization to the tycoon. On the other hand, (I4) stated that, i-ERP system is much advanced and more suitable for large organization. Medium organization are always looking for simple software, but at the sometime if the organization is having proper vision and mission, then they have to go for such system. As they have clear picture of what should be done in the coming years.

5.3 Presentation and Analysis of Quantitative Research

The questionnaire has examined the responses of 51 companies. 41 companies are ERP users and 10 companies are i-ERP users. This section includes presentation of demographic and questions data. Then, the next section will contain analysis of the questionnaire with respect to research questions.

Demographic Data

The first section of the questionnaire collected personal information of the participants and general information about the organization. Descriptive analysis was conducted to analyze these data including mean, frequency, and percentage tests. The demographic data includes participant job level, participant experience, company residence, company size, industry, ERP deployment option, ERP provider.

D1: Participant Job Level

A total of 41 ERP users and 10 i-ERP users responded to the question on current their job level in the organization. ERP users indicated that 3 (7.3%) participants are project manager, 6 (14.29%) are project coordinator and 2 (4.76%) indicated project analyst. Whereas, i-ERP users indicated that 1 (9.09%) is Digital manager; 4 (36.36%) are IT manager; 1 (9.09%) is IT practitioner. Table (3) and Figure (9) summarize the outcomes.

D2: Participant Experience

ERP	Users
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D1: Current Job Position						
		Frequency	Percent	Valid Percent	Cum Percent	
valid	IT Manager	9	21.95	21.95	21.95	
	IT Practitioner	12	29.27	29.27	51.22	
	Others	5	12.20	12.20	63.41	
	Project Analyst	2	4.88	4.88	68.29	
	Project Coordinator	6	14.63	14.63	82.93	
	Project Leader	1	2.44	2.44	85.37	
	Project Manager	3	7.32	7.32	92.68	
	Project Specialist	3	7.32	7.32	100.00	
	Total	41	100.0	100.0		

i-ERP Users

D1: (D1: Current Job Position						
		Frequency	Percent	Valid Percent	Cum Percent		
Valid	Digital Manager	1	10.00	10.00	10.00		
	IT Manager	4	40.00	40.00	50.00		
	IT Practitioner	1	10.00	10.00	60.00		
	Operations Manager	1	10.00	10.00	70.00		
	Project Leader	1	10.00	10.00	80.00		
	Project Manager	1	10.00	10.00	90.00		
	Project Specialist	1	10.00	10.00	100.00		
	Total	10	100.0	100.0			

Table 3: Current Job Position



Figure 9: Current Job Position

The majority of ERP participants, about 19 (42.2%) have 1-3 years of experience; 12 (28.5%) have 4-10 years and 10 (23.8%) have more than 10 years of experience.

On the other hand, a total of 10 i-ERP indicated that 3 (27.2%) have 1-3 years of experience. While the majority 4 (36.3%) have 4-10 years and 3 (27.2%) have more than 10 years of experience. The following Table (4) and Figure (10) presents the outcomes.

D2: Work Experience Frequency PercentValid Cum Percent Percent Valid 1-3 years 19 46.34 46.34 46.34 29.27 4-10 years 12 29.27 75.61 24.39 24.39 100.00 More than 10 10 years Total 41 100.0 100.0

ERP Users

i-ERP Users

		Frequency	Percent	Valid	Cum
				Percent	Percent
Valid	1-3	3	30.00	30.00	30.00
	years				
	4-10	4	40.00	40.00	70.00
	years				
	More	3	30.00	30.00	100.00
	than 10				
	years				
	Total	10	100.0	100.0	





Figure 10: Work Experience

D3: Company Residence

The result indicated the majority of companies that are using ERP systems are located in Muscat 34 (82.9%). Whereas, 3 (7.3%) indicated that the company residence is in Al-sharqiya.

On the other hand, 8 (80%) of i-ERP users are located in Muscat. Whereas, 2 (20%) indicated that the company is located in Dhofar. Table (5) and Figure (11) presents the outcomes.

ERP Users

i-ERP Users

D3: Company Residence						
		Frequency	Percent	Valid Percent	Cum Percent	
Valid	Al- <u>Wusta</u>	1	2.44	2.44	2.44	
	Al- <u>sharqy</u> a	3	7.32	7.32	9.76	
	Batina	2	4.88	4.88	14.63	
	<u>Dhofar</u>	1	2.44	2.44	17.07	
	Muscat	34	82.93	82.93	100.00	
	Total	41	100.0	100.0		

D3: Company Residence						
		Frequency	Percent	Valid Percent	Cum Percent	
Valid	Dhofar	2	20.00	20.00	20.00	
	Muscat	8	80.00	80.00	100.00	
	Total	10	100.0	100.0		

Table 5: Company Residence





D4: Company Size

This research targeted only medium and large organizations. Results indicated that 28 (68.3%) of the companies using ERP systems are Large and 13 (31.7) are medium.

On the other hand, results indicated that the majority 9 (90%) of large companies are using i-ERP systems and 1 (10) company are medium. Table (6) and Figure (12) presents the outcomes.

ERP Users

i-ERP Users

D4: Company Size						
Frequency Percent Valid Percent				Cum		
					Percent	
Valid	Large	28	68.29	68.29	68.29	
	Medium	13	31.71	31.71	100.00	
	Total	41	100.0	100.0		

D4: Company Size						
		Frequency	Percent	Valid Percent	Cum Percent	
Valid	Large	9	90.00	90.00	90.00	
	Medium	1	10.00	10.00	100.00	
	Total	10	100.0	100.0		

Table 6: Company Size





Figure 12: Company Size

D5: Working Industry

Total

The result illustrated diversity of the industries implementing ERP systems. The result indicated that the majority of companies implementing ERP are working in Oil and Gas industry 10 (24%). Whereas, 7 (17%) are working in information technology sector.

Furthermore, the majority of the companies implementing i-ERP systems is working in Oil and Gas industry 4 (40%). Whereas, 2 (20%) are working in manufacturing sector. Table (7) and Figure (13) presents the outcomes.

D5: Working Industry FrequencyPercentValid PercentCum Percent Crushing 2.44 2.44 2.44 ValidEducation 9.76 12.20 9.76 Healthcare 7.32 7.32 19.51 Hospitality 2.44 2.44 21.95 Information Technology 17.07 17.07 39.02 Manufacturing 4.88 4.88 43.90 4.88 4.88 48.78 Non-Profit Oil and Gas 24.39 24.39 73.17 10 Professional Services 12.20 12.20 85.37 87.80 2.44 2.44 Telecommunication Transportation 9.76 9.76 97.56 2.44 2.44 real estate 100.00

41

100.0 100.0

ERP Users

i-ERP Users

D5: \	D5: Working Industry					
		Frequency	Percent	Valid Percent	Cum Percent	
Valid	Exhibtions and Events	1	10.00	10.00	10.00	
	<u>Goverment</u> company (RAFO)	1	10.00	10.00	20.00	
	Hater treatment	1	10.00	10.00	30.00	
	Manufacturing	2	20.00	20.00	50.00	
	Oil and Gas	4	40.00	40.00	90.00	
	Transportation	1	10.00	10.00	100.00	
	Total	10	100.0	100.0		

Table 7: Working Industry







D6: ERP software type

The result illustrated the majority of ERP and i-ERP users are implementing the system on-Premise. The second, highest type is private cloud, then Hybrid cloud. However, 7% of ERP users are implementing ERP in public cloud. Whereas i-ERP participants indicated that they are implementing i-ERP on premise, public cloud and Hybrid see Table (8) and Figure (14).

ERP Users

i-ERP Users

D6: Type of ERP Software							
		Frequency	Percent	Valid Percent	Cum Percent		
Valid	Hybrid Cloud	3	7.32	7.32	7.32		
	On-premise	18	43.90	43.90	51.22		
	Private Cloud	15	36.59	36.59	87.80		
	Public Cloud	5	12.20	12.20	100.00		
	Total	41	100.0	100.0			

D6: Type of ERP Software							
		Frequency	Percent	Valid Percent	Cum Percen		
Valid	Hybrid Cloud	2	20.00	20.00	20.00		
	On-premise	5	50.00	50.00	70.00		
	Private Cloud	3	30.00	30.00	100.00		
	Total	10	100.0	100.0			

Table 8: Type of ERP Software





Figure 14: Type of ERP Software

D7: ERP provider

As shown in Table (9) and Figure (15), the majority of ERP and i-ERP participants indicated that, their ERP system is provided by Oracle. As 22 (54%) of ERP users are dealing with Oracle and about 6 (60%) of i-ERP users are also dealing with Oracle. Furthermore, 6 (15%) of the companies implementing ERP are dealing with SAP and Microsoft. On the other hand, 3 (30) of i-ERP users are dealing with SAP provider.

ERP Users

i-ERP Users

D7: I	D7: ERP Provider							
		Frequency	Percent	Valid Percent	Cum Percen			
valid	Accurate	1	2.44	2.44	2.44			
	In house ERP	2	4.88	4.88	7.32			
	Microsoft	6	14.63	14.63	21.95			
	Oracle	22	53.66	53.66	75.61			
	PMS	1	2.44	2.44	78.05			
	SAP	6	14.63	14.63	92.68			
	Sage	1	2.44	2.44	95.12			
	Sita	1	2.44	2.44	97.56			
	Tally	1	2.44	2.44	100.00			
	Total	41	100.0	100.0				

D7: ERP Provider							
	Frequency	Percent	Valid Percent	Cum Percent			
Oracle	6	60.00	60.00	60.00			
SAP	3	30.00	30.00	90.00			
Ungerboeck Software, Even Business Management Sys	:1	10.00	10.00	100.00			
Total	10	100.0	100.0				

Table 9: System Provider





Figure 15: System Provider

Q8: In your opinion, Intelligent ERP refers to intelligent technologies such as; machine learning integrated with an ERP systems resulting into i-ERP.

Definition of i-ERP question was asked in order to study the knowledge of participants regarding to i-ERP systems. The result indicated that 31 (76%) of the participants agreed on i-ERP definition which presented the majority. Whereas, 8 (19%) of the participants were not sure and 2 (4.8%) of the participants went with disagreed.

On the other hand, 7 (70%) of i-ER users agreed and 3 (30%) have chosen maybe. The findings are summarized in Table (10) and Figure (16).

ERP Users

Q8: In your opinion, Intelligent ERP refers to intelligent technologies such as; machine learning integrated with an ERP systems resulting into i-ERP							
		Frequency	Percent	Valid Percent	Cum Percent		
	Disagree	2	4.88	4.88	4.88		
T 7 1' 1	Maybe	8	19.51	19.51	24.39		
v allo	Agree	31	75.61	75.61	100.00		
	Total	41	100.0	100.0			

i-ERP	Users

41.4.1.1

to intelligent EXP feters to intelligent technologies such as, machine learning integrated with an ERP systems resulting into i-ERP							
	Frequency	Percent	Valid Percent	Cum Percent			

valid	Maybe	3	30.00	30.00	30.00
	Agree	7	70.00	70.00	100.00
	Total	10	100.0	100.0	

Table 10: Q8: Intelligent ERP refers to intelligent technologies such as; machine learning integrated with an ERP systems resulting into i-ERP





Figure 16: Q8: Intelligent ERP refers to intelligent technologies such as; machine learning integrated with an ERP systems resulting into i-ERP

Research Questions Presentation

The second section of the questionnaire collected research questions upon research objectives. Descriptive analysis was conducted to analyze these data including mean, frequency, standard divination and percentage tests. Each research question has subset of multiple questions in order to enhance understanding.

Research Q1: What are the barriers and significance to implementing i-ERP?

As shown in Figure (17), in Q9, 90% of ERP users indicated that the high cost is the top barrier to implement i-ERP. Whereas 70% of i-ERP users indicated the significance to implement i-ERP is the need for predictive analytics and 60% due to readiness for quick innovation. The findings are summarized in Figure (18)







Figure 18: Significance to Implementing i-ERP

Research Q2: What is the maturity level of i-ERP adoption?

Questions 10 to 13 were asked about maturity level criteria. In Q10, 73% of ERP users and 70% of i-ERP users agreed that the higher the maturity level generates higher need for i-ERP system. The findings are summarized in Table (11) Figure (19).

ERP Users

i-ERP Users

Q10: In your opinion, higher maturity level of an organization generates higher need for i-ERP implementation							
		Frequency	Percent	Valid Percent	Cum Percent		
Valid	Maybe	11	26.83	26.83	26.83		
	Agree	30	73.17	73.17	100.00		
	Total	41	100.0	100.0			

Q10: In your opinion, higher maturity level of an organization generates higher need for i-ERP implementation

		Frequency	Percent	Valid Percent	Cum Percent
Valid	Maybe	3	30.00	30.00	30.00
	Agree	7	70.00	70.00	100.00
	Total	10	100.0	100.0	

Table 11: Q10: In your opinion, higher maturity level of an organization generates higher need for i-ERP implementation





Figure 19: Q10: In your opinion, higher maturity level of an organization generates higher need for i-ERP implementation

Moreover, as shown in Figure (20), 80% of i-ERP users indicated that the highest requirement that should be considered before implementing i-ERP is having stable IT infrastructure. However, in this regards 61% of ERP users agreed that the company has stable IT infrastructure to implement i-ERP. The findings are summarized in Table (12) Figure (21).





Q11: Do you think that the current IT infrastructure helps to move towards (i-ERP) implementation?							
		Frequency	Percent	Valid Percent	Cum Percent		
	Disagree	5	12.20	12.20	12.20		
Valid	Maybe	11	26.83	26.83	39.02		
	Agree	25	60.98	60.98	100.00		
	Total	41	100.0	100.0			

Table 12: Q11: Do you think that the current IT infrastructure helps to move towards (i-ERP) implementation?



Figure 21: Q11: Do you think that the current IT infrastructure helps to move towards (i-ERP) implementation?

Moreover, as presented in the previous page Figure (20), 70% of i-ERP users indicated that the company should consider data migration before implementing i-ERP system and 40% stated that process optimization is another factor. Whereas, in this regards 64% of ERP users agreed that the company is ready to optimize its processes and master data to implement i-ERP. The findings are summarized in Table (13) Figure (22)



Table 13: Q12: Do you think that your company is ready to optimize its processes, master data and restandardization?



Figure 22: Q:12 Do you think that your company is ready to optimize its processes, master data and restandardization?

Furthermore, in Q13 ERP users were asked whether the origination is ready for innovation. 61% of ERP users agreed that the company is ready to for innovation and hence implementing i-ERP systems. The findings are summarized in Table (14) Figure (23).

Q13: Do you think that your company is ready for innovation (run simple business process, analytics, big data LOT, etc.)							
		Frequency	Percent	Valid Percent	Cum Percent		
	Disagree	6	14.63	14.63	14.63		
Valid	Maybe	10	24.39	24.39	39.02		
	Agree	25	60.98	60.98	100.00		
	Total	41	100.0	100.0			

Table 14: Q13: Do you think that your company is ready for innovation (run simple business process, analytics, big data IoT etc.)



Figure 23: Q13: Do you think that your company is ready for innovation (run simple business process, analytics, big data IoT etc.)

Research Q3: How Machine Learning (ML) supports ERP processes?

Questions 14 to 18 were asked to measure research third objective. In Q14, 80.5% of ERP users and 100% of i-ERP users agreed that the combination of machine learning and ERP will result into best products. The findings are summarized in Table (15) Figure (24).

ERP Users

i-ERP Users

Q14: D into be	Q14: Do you believe that the combination of machine learning and ERP will result into best product?						
		Frequency	Percent	Valid Percent	Cum Percent		
	Disagree	1	2.44	2.44	2.44		
Valid	Maybe	7	17.07	17.07	19.51		
	Agree	33	80.49	80.49	100.00		
	Total	41	100.0	100.0			

Q14: Do you believe that the combination of machine learning and ERP will result into best product?						
		Frequency	Percent	Valid Percent	Cum Percent	
Valid	Agree	10	100.00	100.00	100.00	
	Total	10	100.0	100.0		

Table 15: Q14: Do you believe that the combination of machine learning and ERP will result into best product?





Figure 24: Q14: Do you believe that the combination of machine learning and ERP will result into best product?

Moreover, 73% of ERP users agreed that machine learning supports decision automation of ERP processes and 70% of i-ERP users agreed that machine learning has supported decision automation of ERP processes. The findings are summarized in Table (16) Figure (25).

ERP Users

i-ERP Users

Q15: Does machine learning support decision automation of ERP processes?						
		Frequency	Percent	Valid Percent	Cum Percent	
	Disagree	3	7.32	7.32	7.32	
Valid	Maybe	8	19.51	19.51	26.83	
	Agree	30	73.17	73.17	100.00	
	Total	41	100.0	100.0		

Q15: Does machine learning support decision automation of ERP processes?							
		Frequency	Percent	Valid Percent	Cum Percent		
Valid	Maybe	3	30.00	30.00	30.00		
	Agree	7	70.00	70.00	100.00		
	Total	10	100.0	100.0			

Table 16: Q15: Does machine learning support decision automation of ERP processes?



Figure 25: Q15: Does machine learning support decision automation of ERP processes?

In addition to that, 70% of ERP users agreed that the integration of machine learning and ERP will enhance internal workflow and customer service, and 100% of i-ERP users agreed that machine learning has enhanced internal workflow and customer service supported. The findings are summarized in Table (17) Figure (26).

ERP Users

Q16: Do you think that the integration of machine learning and ERP will enhance internal workflow and customer service

		Frequency	Percent	Valid Percent	Cum Percent
Valid	Maybe	12	29.27	29.27	29.27
	Agree	29	70.73	70.73	100.00
	Total	41	100.0	100.0	

i-ERP Users

 Q16: Does the integration of machine learning and ERP enhance internal workflow and customer service?

 Image: service of the integration of machine learning and ERP enhance internal workflow and customer service?

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Table 17: Q16: Do you think that the integration of machine learning and ERP will enhance internal workflow and customer service



Figure 26: Q16: Do you think that the integration of machine learning and ERP will enhance internal workflow and customer service

Moreover, 68% of ERP users agreed that ERP that support machine learning is able to define its business processes according to certain behavior, and 90% on that. The findings are summarized in Table (18) Figure (27).

ERP Users

Q17: In your opinion, ERP that support machine learning is able to define its business processes according to certain behavior.							
		Frequency	Percent	Valid Percent	Cum Percent		
	Disagree	2	4.88	4.88	4.88		
Valid	Maybe	11	26.83	26.83	31.71		
	Agree	28	68.29	68.29	100.00		
	Total	41	100.0	100.0			

i-ERP Users

Q17: In your opinion, ERP that support machine learning is able to define its business processes according to certain behavior.

 Frequency
 Percent
 Valid Percent
 Cum Percent

Valid	Maybe	1	10.00	10.00	10.00
	Agree	9	90.00	90.00	100.00
	Total	10	100.0	100.0	

Table 18: Q17: In your opinion, ERP that support machine learning is able to define its business processes according to certain behavior.



Figure 27: Q17: In your opinion, ERP that support machine learning is able to define its business processes according to certain behavior.

Furthermore, this question was asked in order to identify the relationship between i-ERP and IoT. In Q18, 61% of ERP users and 100% of i-ERP users agreed i-ERP will be hooked to internet of things. The findings are summarized in Table (19) Figure (28).

E

ERP Users

Q18: Do you think that i-ERP will be hooked to internet of things?							
		Frequency	Percent	Valid Percent	Cum Percent		
	Disagree	1	2.44	2.44	2.44		
Valid	Maybe	15	36.59	36.59	39.02		
	Agree	25	60.98	60.98	100.00		
	Total	41	100.0	100.0			

i-ERP	Users
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Q18: Do you think that i-ERP will be hooked to internet of things?							
		Frequency	Percent	Valid Percent	Cum Percent		
Valid	Agree	10	100.00	100.00	100.00		
	Total	10	100.0	100.0			

Table 19: Q18: Do you think that i-ERP will be hooked to internet of things?



Figure 28: Q18: Do you think that i-ERP will be hooked to internet of things?

Research Q4: How i-ERP affects the performance of medium and large organizations in Oman?

Questions 19 to 24 were asked in order to compare the effectiveness of ERP and i-ER systems on certain processes. In Q19, 70% of ERP users agreed that ERP system enhances business processes performance. On the other hand, 80% of i-ERP users agreed that i-ERP system enhances business processes performance. The findings are summarized in Table (20) Figure (29).

ERP Users

Q19: Does the current ERP system enhance business processes performance at your organization?							
		Frequency	Percent	Valid Percent	Cum Percent		
	Disagree	1	2.44	2.44	2.44		
Valid	Maybe	11	26.83	26.83	29.27		
	Agree	29	70.73	70.73	100.00		
	Total		100.0	100.0			

i-ERP Users

Q19: Does i-ERP system enhances business processes performance at your organization							
		Frequency	Percent	Valid Percent	Cum Percent		
Valid	Maybe	2	20.00	20.00	20.00		
	Agree	8	80.00	80.00	100.00		
	Total	10	100.0	100.0			

Table 20: Q19: Does the current system enhance business processes performance at your organization?





Figure 29: Q19: Does the current system enhance business processes performance at your organization?

Moreover, 73% of ERP users agreed that ERP system enhances financial performance. On the other hand, 80% of i-ERP users agreed that i-ERP system enhances financial performance. The findings are summarized in Table (21) Figure (30).

ERP Users

Q20: Does the current ERP system enhance financial performance at your organization?							
		Frequency	Percent	Valid Percent	Cum Percent		
	Disagree	1	2.44	2.44	2.44		
Valid	Maybe	10	24.39	24.39	26.83		
	Agree	30	73.17	73.17	100.00		
	Total	41	100.0	100.0			

i-ERP Users

Q20: Does i-ERP system enhances financial performance at your organization?							
		Frequency	Percent	Valid Percent	Cum Percent		
Valid	Maybe	2	20.00	20.00	20.00		
	Agree	8	80.00	80.00	100.00		
	Total	10	100.0	100.0			

Table 21: Q20: Does the current system enhance financial performance at your organization?



Figure 30: Q20: Does the current system enhance financial performance at your organization?

In addition to that, 63% of ERP users agreed that ERP system enhances employees' productivity. On the other hand, 100% of i-ERP users agreed that i-ERP system enhances employees' productivity. The findings are summarized in Table (22) Figure (31).

ERP Users

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-	_		_	~	~ • •	- ~

Q21: D organiz	Q21: Does the current ERP system improve employees' productivity at your organization?						
		Frequency	Percent	Valid Percent	Cum Percent		
	Disagree	4	9.76	9.76	9.76		
Valid	Maybe	11	26.83	26.83	36.59		
	Agree	26	63.41	63.41	100.00		
	Total	41	100.0	100.0			

Q21: Does i-ERP System improve employees' productivity at your organization?						
		Frequency	Percent	Valid Percent	Cum Percent	
Valid	Agree	10	100.00	100.00	100.00	
	Total	10	100.0	100.0		

Table 22: Q21: Does the current system improve employees' productivity at your organization?





Figure 31: Q21: Does the current system improve employees' productivity at your organization?

Furthermore, 61% of ERP users agreed that ERP system enhances real-time access information. On the other hand, 90% of i-ERP users agreed that i-ERP system enhances real-time access information. The findings are summarized in Table (23) Figure (32).

ERP Users

i-ERP U	sers
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Q22: Does the current ERP system support real time access information						
		Frequency	Percent	Valid Percent	Cum Percent	
	Disagree	6	14.63	14.63	14.63	
Valid	Maybe	10	24.39	24.39	39.02	
	Agree	25	60.98	60.98	100.00	
	Total	41	100.0	100.0		

Q22: E	Q22: Does i-ERP system support real time access information							
		Frequency	Percent	Valid Percent	Cum Percent			
Valid	Maybe	1	10.00	10.00	10.00			
	Agree	9	90.00	90.00	100.00			
	Total	10	100.0	100.0				

Table 23: Q22: Does the current system support real-time access information?



Figure 32: Q22: Does the current system support real-time access information?

Moreover, 46% of ERP users agreed that ERP system supports quick innovation. On the other hand, 100% of i-ERP users agreed that i-ERP system supports quick innovation. The findings are summarized in Table (24) Figure (33).

ERP Users

Q23: Does the current ERP system support quick innovation at your organization?								
	Frequency Percent Valid Percent Cum Percent							
	Disagree	9	21.95	21.95	21.95			
Valid	Maybe	13	31.71	31.71	53.66			
	Agree	19	46.34	46.34	100.00			
	Total	41	100.0	100.0				

i-ERP Users

Q23: Does i-ERP system support quick innovation at your organization							
		Frequency	Percent	Valid Percent	Cum Percent		
Valid	Agree	10	100.00	100.00	100.00		
	Total	10	100.0	100.0			

Table 24: Q23: Does the current system support quick innovation at your organization?



Figure 33: Q23: Does the current system support quick innovation at your organization?

Finally, 36% of ERP users agreed that ERP system supports predictive analytics. On the other hand, 90% of i-ERP users agreed that i-ERP system supports predictive analytics. The findings are summarized in Table (25) Figure (34).

ERP Users

i-ERP Users

Q24: Does the current ERP system support predictive analytics at your organization?							
		Frequency	Percent	Valid Percent	Cum Percent		
	Disagree	13	31.71	31.71	31.71		
Valid	Maybe	13	31.71	31.71	63.41		
	Agree	15	36.59	36.59	100.00		
	Total	41	100.0	100.0			

Q24: Does i-ERP system support predictive analytics at your organization							
		Frequency	Percent	Valid Percent	Cum Percent		
Valid	Maybe	1	10.00	10.00	10.00		
	Agree	9	90.00	90.00	100.00		
	Total	10	100.0	100.0			

Table 25: Q24: Does the current system support predictive analytics at your organization?



Figure 34: Q24: Does the current system support predictive analytics at your organization?
Analysis of the Questionnaire Result

In order to analyze the questionnaire, the main methods were used mean, standard deviation and skewness which heolps to identify the central tendency and relevance of responses. The following Table (26) shows the classification of mean impact degree, as it is taken in 0.5 intervals.

Mean Value	Degree of Impact
0.5 -1	Very low
1-1.5	Low
1.5 – 2	Moderate
2 – 2.5	High
2.5 – 3	Very high

 Table 26: Impact Dgree of Mean

Source: (Bulushi, 2018)

Whereas, the skewness is used in order to measure the symmetry in data distribution. The rule of Thumb is shown in Table (27) that classifies the level of symmetry.

Skewness value	Level of symmetrical
Between -0.5 and 0.5	Fairly symmetrical
Between -1 and -0.5	
Or	Moderately skewed
Between 0.5 and 1	
Less than -1	Highly skewed
Or	
Greater than 1	

 Table 27: Skewness Level of Symmetry

Source: (Jain, 2018)

Factor Analysis and Reliability Test

For the current research, principle component analysis is being implemented as well as reliability test. Principle component analysis shows the most effective components that influence statistical analysis. Whereas, reliability test is applied on the research questions in order to show the questions internal consistency, determined by Chronbach's α test.

The result in the following Table (28) indicates that the ERP research includes 9 most effective components that could influence the statistical analysis. Furthermore, the following Scree Plot figure (35) illustrates that 9 most effective and sustainable components out of 20 appear together at the top of the diagram.

Total Variance Explained				
		Initial Eigenvo	alues	
Component	Total	% of Variance	Cumulative %	
1	3.81	15.86	15.86	
2	3.51	14.63	30.50	
3	2.60	10.84	41.33	
4	2.25	9.38	50.71	
5	2.04	8.51	59.23	
6	1.55	6.45	65.68	
7	1.20	4.98	70.66	
8	1.08	4.51	75.18	
9	1.00	4.16	79.33	



Table 28: Principle Components Analysis of ERPSurvey Group Questions



However, the following components in tables bellow indicated higher reliability result. The following Table (29) shows the result of component 1 which has the highest reliability. Table (30) shows the result of component 5 which is the second highest reliability.

Case Processing Summary				
		N	%	
Cases	Valid	41	100.00	
	Excluded	0 .00		
	Total	41 100.00		
Reliability Statistics				
Cronba	ch's Alpha	N of Items		
	.75	19		

Table 30: Reliability Test of ERP Component 1: Q (from 9 - 12) and from Q (14 - 24)

Case Processing Summary						
		N	%			
Cases	Valid	41	100.00			
	Excluded	0 .00				
	Total	41 100.00				
Reliability Statistics						
Cronbach's Alpha N of Items						
.72 14						

Table 29: Reliability Test of ERP Component 5: From Q (8 - 10), from Q (14 -19) and from Q (21-24)

The accepted Chronbach's α value should be above 0.7 which means that the questions of the research are real, valid and stable. As shown in table (31) the reliability test for the entire questions of ERP survey is 0.73 which means that the research is reliable

Case Processing Summary					
		N	%		
Cases	Valid	41	100.00		
	Excluded	0	.00		
	Total	41	100.00		
Reliabilit	y Statistics				
Cronbad	ch's Alpha	N of	Items		
.73 24					
I <u> </u>					

Table 31: Reliability Statistics - Chronbach's α of ERP Result for Q1 to Q24

On the other hand, factor analysis for i-ERP result indicted 2 effective components that could influence the statistical analysis. Table (32) shows the result of component 1 which has the highest Chronbach's α . Table (33) shows the result of component 2 which is the second highest reliability.

Case Processing Summary					
		N	%		
Cases	Valid	10	100.00		
	Excluded	0	.00		
	Total	10	100.00		
Reliabilit	y Statistics				
Cronbach's Alpha N of Items					
	.88	16			

Table 32: Reliability Test of i-ERP Component 1: Q (from 8 – 10), Q13, Q17, Q19, Q22 and Q24

Case Processing Summary						
		N	%			
Cases	Valid	10 100.00				
	Excluded	0 .00				
	Total	10 100.00				
Reliability Statistics						
Cronbach's Alpha N of Items						
.86 19						

Table 33: Reliability test of i-ERP Component 2: From Q (8 - 14), from Q (16 - 19) and from Q (21 - 24)

Table (34) indicates the reliability test for the entire questions of i-ERP survey Chronbach's α is 0.85 which means that the research is reliable real, valid and stable.

Case Processing Summary						
	N %					
Cases	Valid	10	100.00			
	Excluded	0 .00				
	Total	10	10 100.00			
Reliabilit	Reliability Statistics					
Cronbach's Alpha N of Items						
	.85 24					

Table 34: Reliability Statistics - Chronbach's α of i-ERP Result for Q1 to Q24

Demographic Data Analysis

Demographic data plays an important role as it reflects the background of the participants, company and software being implemented. Table (35) illustrates the cross-tabulation statistic in order to compare the relation between different variables. First of all, the organization's size has high impact on the type of ERP implemented. According to (Saa et al., 2017), most of large organizations prefer on-premise ERP system due to security. On the other hand, medium organizations use private cloud in order to reduce cost and ensure security. The result of the survey indicated that (36.59%) which is the majority of large organizations are implementing ERP system on-premise and around 14.6% of medium organizations are implementing ERP in private cloud.

	Crosstabulation.				
size	Hybrid Cloud	On-premise	Private Cloud	Public Cloud	Total
Large	2.44%	36.59%	21.95%	7.32%	68.29%
Medium	4.88%	7.32%	14.63%	4.88%	31.71%
Total	7.32%	43.90%	36.59%	12.20%	100.00%

Table 35: ERP Organization Size vs. Software Type

In addition to that, i-ERP Respondents also supported the above result. Table (36) indicates that 50% of large organizations are implementing i-ERP system on-premises and 10% of medium organizations are implementing i-ERP in private cloud.

	TypeOfERP			
size	Hybrid Cloud	On-premise	Private Cloud	Total
Large	20.00%	50.00%	20.00%	90.00%
Medium	.00%	.00%	10.00%	10.00%
Total	20.00%	50.00%	30.00%	100.00%

Table 36: i-ERP Organization Size vs. Software Type

Nowadays most of the industries need at least ERP system in order to keep their business run. The following Table (37) indicated that ERP system is being implemented by various industries. It is obvious that the majority of respondents are from Oil and Gas industry. About 14% of them implemented ERP on-premises while 9.7% implemented ERP in private cloud.

	IspeOfERP.				
industry	Hybrid Clo	udOn-premi	sePrivate Clo	ouciPublic Clo	nd Total
Crushing	.00%	.00%	2.44%	.00%	2.44%
Education	2.44%	4.88%	.00%	2.44%	9.76%
Healthcare	.00%	2.44%	.00%	4.88%	7.32%
Hospitality	.00%	2.44%	.00%	.00%	2.44%
Information Technology	2.44%	2.44%	9.76%	2.44%	17.07%
Manufacturing	.00%	4.88%	.00%	.00%	4.88%
Non-Profit	2.44%	2.44%	.00%	.00%	4.88%
Oil and Gas	.00%	14.63%	9.76%	.00%	24.39%
Professional Services	.00%	4.88%	7.32%	.00%	12.20%
Telecommunication	.00%	.00%	.00%	2.44%	2.44%
Transportation	.00%	2.44%	7.32%	.00%	9.76%
real estate	.00%	2.44%	.00%	.00%	2.44%
Total	7.32%	43.90%	36.59%	12.20%	100.00%

Table 37: ERP Organization's Industry vs. Software Type

In addition to that, Table (38) indicates that about 40% of i-ERP respondents are from Oil and Gas industry; 30% implemented i-ERP on-premise and 10% implemented in private cloud. This demographic result matches with the ERP respondents. As oil and gas company represented 24.3% of ERP respondents this could be due to business need and work flow of this industry.

	I	TypeOf(i-ERP)					
industry	Hybrid Cloud	On-premise	Private Cloud	Total			
Exhibtions and Events							
	.00%	.00%	10.00%	10.00%			
Goverment company (RAFO)							
	.00%	.00%	10.00%	10.00%			
Hater treatment							
	10.00%	.00%	.00%	10.00%			
Manufacturing							
	10.00%	10.00%	.00%	20.00%			
Oil and Gas							
	.00%	30.00%	10.00%	40.00%			
Transportation							
	.00%	10.00%	.00%	10.00%			
Total							
	20.00%	50.00%	30.00%	100.00%			

Table 38: i-ERP Organization's Industry vs. Software Type

Research Q1: What are the significance and barriers to implementing i-ERP?

This question was aiming to identify significance and barriers to implement i-ERP system in order to overcome them.

As shown in Figures (17) Page (45), 70% of i-ERP users indicated that the significance to implement i-ERP system is the need for predictive analytics. Furthermore, 60% indicated that the need for readiness for quick innovation and digital transformation. However, prior studies indicated that 26.5% of the companies implemented i-ERP to digitalize their business (Morris et al., 2017).

However, as shown in Figure (18) page (45), ERP respondents indicated that the high cost of i-ERP system is the top barrier. However, i-ERP system could be customized to meet business size which could be a way of reducing cost. In addition to that the implementation of i-ERP system is more flexible and could be done within short period of time which minimizes the cost. An unclear benefit was categorized as the second barrier and then transformation from legacy system. It was also agreed by (Mahmood 2019; Lewis 2019) through interview as the main barrier is education. People usually are not aware of the benefits of such systems and hence resisted to alter.

Research Q2: What is the maturity level of i-ERP adoption?

This question was aiming to investigate the relationship between organizational maturity level and the need to implement i-ERP. Furthermore, ERP participants were asked questions to determine the readiness to implement such system. First of all, both of ERP and i-ERP users highly agreed that a mature organization needs advanced system such as i-ERP. The mean value (2.71) indicates very high degree of impact according to level of mean impact Table (26), the Standard deviation value (0.45) and the skewness value (-1.09) shows highly skewed according to the Level of symmetrical which mean that data distribution is mostly agree. Analysis is presented in Figure (36).



Figure 36: Frequencies and Histogram of Maturity Level of ERP Users

Furthermore, Figure (37) indicated very high value of mean (2.70), the Standard deviation value (0.48), the skewness value (-1.04) also shows highly skewed which mean majority of i-ERP respondents agreed on the question which accords with the result obtained from ERP users.



Figure 37: Frequencies and Histogram of Maturity Level of i-ERP Users

As discussed in Chapter 2, maturity level has great impact on the need of having i-ERP. The company can determine its level of maturity based on the Companies' IT infrastructure, optimizing processes and readiness to innovation. The questions from (11- 13) were aiming to

identify whether the organization is enough mature to implement i-ERP systems. ERP responses indicated high value of mean (2.49), standard deviation value of (0.71) and skewness value (-1.05) shows highly skewed which mean that the majority of ERP users have stable IT infrastructure to move towards i-ERP systems. In addition to that, according to ERP responses the second highest factor was readiness to innovation. The result indicated high value of mean (2.46), standard deviation value (0.74) and skewness value (-1.01) shows highly skewed result which means that the majority of ERP user agreed that the company is willing to innovate and implement advanced technologies like i-ERP system. As per discussed previously, fifth factor of maturity level is to determine the organization's readiness to innovate and grow with regards to business strategy, scope and objectives. Also (Mahmood 2019) stated that the company should consider company's business strategy in order to determine whether i-ERP system will satisfy them and enhance innovation. Finally, question 12 was aiming to determine whether processes optimization and master data are ready for i-ERP implementation. The result indicated high value of mean (2.32) which means that most respondents agreed that the company's processes and master data are ready to implement i-ERP. The Standard deviation value of (0.72) and skewness value (-0.57) shows moderately skewed which mean that the distribution is moderate among responses. Accordingly, the result indicates that most of the companies implanted ERP systems are enough mature and ready to shift towards i-ERP system.

On the other hand, i-ERP users were asked to share their experience regarding to maturity level factors. Responses indicated very high value of mean (3.00) which means that IT infrastructure has very high degree of impact on implementing i-ERP system. Furthermore, i-ERP participants also agreed that processes optimization and master data is essential part of i-ERP implementation plan as the mean value of (2.9) indicates very high degree of impact. Reediness to innovation also was the second highest factor that encouraged the company to implement i-ERP system. As shown in Figure (18) page (45).

Research Q3: How Machine Learning (ML) supports ERP processes?

This question was aiming to identify the relationship between machine learning and ERP processes. However, both ERP users and i-ERP users highly agreed that the combination of ML and ERP will result into best product. ERP responses indicated very high value of mean (2.78), Standard deviation value of (0.47) shows that most respondents agreed that the integration of machine learning and ERP would result into valuable product. In addition, the mean of i-ERP responses indicated very high value of mean (3.00) and standard deviation of (0.47) which means that most i-ERP users agreed that.

Moreover, question 15 was aiming to identify the perception of ERP users whether ML support decision automation of ERP processes. Figure (38) indicates very high value of mean (2.66) which indicates very high degree of impact, standard deviation value (0.62) and skewness value (-1.65) shows highly skewed which means that data distribution is mostly agreed on the relationship of machine learning and decision automation.



Figure 38: ERP Users: Frequency and Histogram of of ML and decicison automation in ERP System

On the other hand, i-ERP users were asked to share their experience regarding to relationship between machine learning and ERP process automation. Figure (39) also indicates very high value of mean (2.70), standard deviation value (0.48) and skewness value (-1.04) shows highly skewed which mean that majority of i-ERP respondents also agreed.

However, according to (Chakraborty, 2018) machine learning plays an important role in integrating the different organizations' processes in order to enhance real-time and automotive decision.



Figure 39: i-ERP Users: Histogram and Frequency of of ML and decicison automation in ERP System

Moreover, Q16 was aiming to investigate whether the integration of machine learning and ERP will enhance internal workflow and customer service. ERP responses indicated very high value of mean (2.71) which means that the majority of participants agreed that the ERP embedded with machine learning enhances internal workflow and customer service. Likewise, i-ERP users shared their practical experience in i-ERP with very high value of mean (3.00).

In addition, Q17 was aiming to determine the perception of ERP users in terms of whether machine learning can define business processes. Result indicates very high value of mean (2.63), Standard deviation value (0.58) and skewness value (-1.36) which shows highly skewed. This mean that most ERP respondents agreed that machine learning can determine business processes based on certain behavior. On the other hand, the result of i-ERP users indicates very high value of mean (2.90), standard deviation value of (0.32) and skewness value (-3.16) also shows highly skewed which mean majority of i-ERP respondents also agreed that machine learning helps ERP system to define business processes.

Research Q4: How i-ERP affects the performance of medium and large organizations in Oman?

This research question was aiming to evaluate the effectiveness of i-ERP systems by comparing the performance of ERP and i-ERP systems. Figure (4) summarizes the comparison between both systems. After that, the analyses of the separate questions are provided.



Figure 40: Summary of ERP and i-ERP Systems Effectiveness

First of all, Q19 aimed to compare the effectiveness of ERP and i-ERP systems in regard to processes performance. ERP responses indicated very high value of mean (2.68), standard deviation value (0.52) and skewness value (-1.36) shows highly skewed which means that most respondents agreed that ERP system enhance processes performance.

The analysis are summarized in Figure (41)



Figure 41: Frequency and Histogram of Current ERP System Enhances processes Performance Histogram

On the other hand, the result of i-ERP responses has slight increase on processes enhancement more than ERP system. Figure (42) indicated very high value of mean (2.70), standard deviation value (0.42) and skewness value (-1.78) shows highly skewed which mean majority of i-ERP respondents agreed that i-ERP system enhances processes performance. According to (Paschek et al., 2017), 29% of the companies in 2017 expressed their need to i-ERP system to automate, optimize and enhance processes.



Figure 42: Frequency and Histogram of Current i-ERP System Enhances processes Performance Histogram

Furthermore, Q20 aimed to compare financial performance between ERP and i-ERP systems. The following Figure (43) of ERP users responses indicates very high value of mean (2.71), Standard deviation value (0.51) and skewness value (-1.52) shows highly skewed result which means that the majority of ERP user respondents agreed that ERP system enhances financial performance.



Figure 43: Frequency and Histogram of Current ERP System Enhances Financial Performance Histogram

On the other hand, i-ERP system has slight increase on financial enhancement more than ERP system. Figure (44) indicates very high value of mean (2.80), standard deviation value (0.42) and skewness value (-1.78) shows highly skewed which mean majority of i-ERP respondents agreed that i-ERP system enhances processes performance. According to (Chakraborty, 2018) i-ERP system reduce operational cost by automating and facilitating business processes which saves save time and hence improve financial performance.



Figure 44: Frequency and Histogram of Current i-ERP System Enhances Financial Performance Histogram

Moreover, Q21 was aiming to evaluate and compare employees' productivity. ERP system responses indicated high value of mean (2.54) which means that most respondents agreed that ERP system enhances employees' productivity. On the other hand, the result obtained from i-ERP systems responses is reasonably high on compared to ERP system. It indicates a very high value of mean (3.00) which shows that all participants agreed on that.

Furthermore, Q22 aimed to compare the effectiveness between both systems in regard to realtime-access information. Figure (45) of ERP system responses indicates very high value of mean (2.46), standard deviation value (0.74) and skewness value (-1.01) shows highly skewed result which mean that the majority of ERP user respondents agreed that ERP system enhances financial performance real-time-access information.



Figure 45: Frequency and Histogram of Current ERP System Supports Real-Time Access

On the other hand, the result obtained from i-ERP system results has noticeable increase on realtime-access information over ERP system. Figure (46) indicates very high value of mean (2.90), standard deviation value (0.32) and skewness value (-3.16) shows highly skewed which mean majority of i-ERP respondents agreed that i-ERP system enhances processes performance. This result contradicts with the result of prior studies in Chapter2; i-ERP system overcomes the traditional flow of information by automating decision making to provide real-access time access information.



Figure 46: Frequency and Histogram of Current i-ERP System Supports Real-Time Access

Moreover, Q23 was aiming to compare the innovation between both systems. ERP system responses indicate moderate value of mean (2.00). On the other hand, the result of i-ERP responses indicates very high value of mean (3.00) which is reasonably higher ERP system.

Finally, Q24 aimed to compare predictive analytics between both systems. Figure (47) of ERP system responses indicate moderate value of mean (2.05), standard deviation value of (0.84) and skewness value (-0.09) is fairly symmetrical which mean that there is high distribution among maybe and disagree options. Furthermore, a noticeable number of respondents disagreed that ERP system supports predictive analytics.



Figure 47: Frequency and Histogram of Current ERP System Supports Predictive Analytics Histogram

On the other hand, the result of i-ERP system has noticeable increase on predictive analytics over ERP system. Figure (48) indicates very high value of mean (2.90), standard deviation value (0.32) and skewness value (-3.16) shows highly skewed which mean majority of i-ERP respondents agreed that i-ERP system enhances predictive analytics.

PerfERPPre	dictiveAnal	ytics		HISTOGRAM
N	Valid	10		8- 7-
	Missing	0		6 5
Mean	_	2.90		4
Std Dev		.32	erci.	2- 5td. Dev = 0.32
Minimum		2.00	Frequ	Mean = 2.9 0 2.0 2.2 2.4 2.6 2.8 3.0 3.2 N = 10.00
Maximum		3.00		PerfERPPredictiveAnalytics

Figure 48: Frequency and Histogram of Current i-ERP System Supports Predictive Histogram

Correlation Analysis

Organizational processes are highly integrated and each component could affect the others. The following table (39) includes the correlations between the variables that are taken as factors that measure the effectiveness of ERP systems.

		FRPDef	HiahCost	TimeToMiarate	LeancySystem	MeetsRea	RusinessCase	Trainina	UnclearRenifts	Security	Maturityl evel	IT Infrastructure	Ontimizel
FRPDef	Pearson	1.00	03	.18	.11	18	.16	.10	05	07	.28	01	opunizer
210 201	Correlation	1.00									.20		
	Sia, (2-		.875	.247	.480	.256	.306	.528	.757	.648	.079	.954	
	tailed)												
	N	41	41	41	41	41	41	41	41	41	41	41	
HighCost	Pearson	03	1.00	16	.48	.28	.32	.34	.51	.16	.17	01	
	Correlation												
	Sig. (2-	.875		.312	.001	.080	.041	.031	.001	.312	.282	.972	
	tailed)												
	N	41	41	41	41	41	41	41	41	41	41	41	
TimeToMigrate	Pearson	.18	16	1.00	.72	09	.48	.50	.22	07	02	01	
	Correlation												
	Sig. (2-	.247	.312		.000	.596	.001	.001	.158	.672	.900	.958	
	tailed)												
	N	41	41	41	41	41	41	41	41	41	41	41	
LegacySystem	Pearson	.11	.48	./2	1.00	.04	.00	.59	.48	.07	.06	05	
	Correlation	400	001	000		707	000	000	001	650	707	760	
	519. (2* tailed)	.400	.001	.000		./9/	.000	.000	.001	.039	.707	.700	
	N N	41	41	41	41	41	41	41	41	41	41	41	
MaateRaa	Rearcon	- 19	29	- 00	04	1.00	- 02	02	54	21	- 16	10	
meetaney	Correlation	.10	.20	.03	.04	1.00	.05	.05		.21	.10	.15	
	Sin (2-	256	080	596	707		857	857	000	187	315	232	
	tailed)	1250		1000			1007	1007		1207	1010	1202	
	N	41	41	41	41	41	41	41	41	41	41	41	
BusinessCase	Pearson	.16	.32	.48	.66	03	1.00	.56	.63	.01	.15	19	
	Correlation												
	Sig. (2-	.306	.041	.001	.000	.857		.000	.000	.941	.348	.231	
	tailed)												
	N	41	41	41	41	41	41	41	41	41	41	41	
Training	Pearson	.10	.34	.50	.59	.03	.56	1.00	.23	26	04	09	
	Correlation												
	Sig. (2-	.528	.031	.001	.000	.857	.000		.148	.103	.803	.591	
	tailed)												
	N	41	41	41	41	41	41	41	41	41	41	41	
UnclearBenifts	Pearson	05	.51	.22	.48	.54	.63	.23	1.00	.32	.09	01	

Table 39: Correlation Between ERP Variables

However, the following table (41) was extracted from ERP responses which indicated that realtime access information has the highest relationship with quick innovation (0.65). On the other hand the relationship between quick innovation and employee's productivity tends to be the lowest (0.21). Furthermore, the following figure (49) presents the positive correlation between real-time access information and quick innovation

Correlations

		PerfERPRealTimeAccess	PerERPInnovation
PerfERPRealTimeAccess	Pearson Correlation	1.00	.65
	Sig. (2-tailed)		.000
	N	41	41
PerERPInnovation	Pearson Correlation	.65	1.00
	Sig. (2-tailed)	.000	
	N	41	41





Figure 49: Scatterplot of Real-Time Access Information vs. Innovation

Furthermore, the following table (41) includes the correlations between the variables that are taken as factors that measure the effectiveness of i-ERP systems.

Correlations							
		PerfERPProcesses	PerfERPFinancial	PerfERPEmplproductivity	PerfERPRealTimeAccess	PerERPInnovation	PerfERPPredictiveAnalytics
PerfERPProcesses	Pearson Correlation	1.00	.37	NaN	.67	NaN	.67
	Sig. (2-tailed)		.286	NaN	.035	NaN	.035
	N	10	10	10	10	10	10
PerfERPFinancial	Pearson Correlation	.37	1.00	NaN	17	NaN	17
	Sig. (2-tailed)	.286		NaN	.645	NaN	.645
	N	10	10	10	10	10	10
PerfERPEmplproductivity	Pearson Correlation	NaN	NaN	NaN	+Infinity	NaN	+Infinity
	Sig. (2-tailed)	NaN	NaN		.000	NaN	.000
	N	10	10	10	10	10	10
PerfERPRealTimeAccess	Pearson Correlation	.67	17	+Infinity	1.00	NaN	1.00
	Sig. (2-tailed)	.035	.645	.000		NaN	.000
	N	10	10	10	10	10	10
PerERPInnovation	Pearson Correlation	NaN	NaN	NaN	NaN	NaN	+Infinity
	Sig. (2-tailed)	NaN	NaN	NaN	NaN		.000
	N	10	10	10	10	10	10
PerfERPPredictiveAnalytics	Pearson Correlation	.67	17	+Infinity	1.00	+Infinity	1.00
	Sig. (2-tailed)	.035	.645	.000	.000	.000	
	N	10	10	10	10	10	10

Table 41: Correlation Between i-ERP Variables

On the other hand, i-ERP survey result indicated that the higher relationship is between Processes Performance and real-time access information (0.67); similarly, between processes performance and predictive analytics 0.67) as shown in Table (42). However, On the other hand the relationship between processes performance and financial performance tends to be the relatively lowest (0.37). Furthermore, the following Figure (50) presents the positive correlation between process performance and quick innovation predictive analytics.

Correlations						
		PerfERPProcesses	PerfERPFinancial	PerfERPPredictiveAnalytics	PerfERPRealTimeAccess	
PerfERPProcesses	Pearson Correlation	1.00	.37	.67	.67	
	Sig. (2- tailed) N	10	.286	.035	.035	

Table 42: Process Performance vs. Financial Performance



Figure 50: Scatterplot of Process Performance vs. Financial Performance

5.4 Summary

The findings and data analysis of qualitative quantitative questions (interview and survey) were interpreted in this chapter. The main finding of this research indicates positive perception on the effectiveness of i-ERP system compared with ERP system. Both inferential and descriptive statistical techniques were utilized. In addition to that, the research findings were supported and powered by literature review.

Following conclusion in chapter 6 will contain further summary of the research findings with regards to project objectives. In addition to that, research contribution to sustainability and students reflection will be highlighted. Finally, future work and recommendations will be proposed.

Chapter 6: Conclusion

Overall, aim of this study is to evaluate the effectiveness of i-ERP system in medium and large organizations' performance. The specific research objectives were; (1) Identify significance and barriers, (2) To investigate the maturity level of i-ERP adoption, (3) To investigate how Machine Learning (ML) supports ERP processes, (4) To evaluate the effectiveness of i-ERP in medium and large organization's performance. Previous research chapters (Chapter 1 – Chapter 5) discussed the scope and nature of the research in the introduction. In this chapter, research contribution to sustainable development will be explicated. In addition to that student reflection on learning gained will be discussed. Accordingly, recommendations and future work will be suggested.

The following will summarize the research findings per objectives that are extracted from all research chapters.

As per objective 1, the highest barrier not to implement i-ERP is the high cost of the system as (60%) of the participants agreed on this barrier. Whereas, the second barrier indicated that there is no clear benefits for such system and the third was resist to transforming from legacy system. This result also matches with prior studies as it was stated by IDC in 2017, around 45% prevent implementing i-ERP due to cost of the system which is considered as the top concern. However, in-depth interviews indicated agreed that the cost of i-ERP system could minimized by customizing it based on company size and need. Furthermore, the implementation of i-ERP system is much easier and more flexible than the traditional ERP system which could also minimize cost.

For Objective 2, according to (Chumo, 2016) the most important factors to insure that the company is mature to implement such system are; communication, insure that the system matches with business strategy and scope of the project (IT infrastructure, Processes optimization and readiness to innovate). However, the findings indicated that the majority of ERP participants (61%) indicated that the IT infrastructure is ready to move towards i-ERP system. Around (46%) of the participants indicated that the company is ready to optimize its processes, master data. In addition to that, (61%) indicated that the company is ready for innovation. Accordingly, it would be possible the companies participated in the questionnaire to move towards i-ERP if top management agree and if it is aligned with the business strategy.

Furthermore, objective 3 covered the functionality of i-ERP system. According to (Koelsch, 2019) this generation of ERP systems helps the organizations to enhance processes and automate decision making by using machine learning to analyze and predict. However, 70% indicated that machine learning supports decision automation and 100% indicated that integration of machine learning and ERP will enhance internal workflow and customer service. Furthermore, the majority of participants who claimed that they are implementing ERP also agreed that machine learning supports ERP processes.

As per objective 4, the research was targeting both medium and large organizations that are implementing ERP and i-ERP system in order to compare and determine the effectiveness of i-ERP system. The result indicated that i-ERP system is more effective than ERP system in terms of processes enhancement, financial performance, employees' productivity, real-time access information, quick innovation and predictive analytics. However, this exploratory research could be a preliminary for future researches as it was indicated by (IDC, 2018) that by 2019 around 60% of the companies will be able to measure the performance of intelligent ERP on resources, processes and people optimization.

To conclude, the result of this exploratory research could be used to enrich future researches in this area. The interpretation of the questions has indicated the effectiveness i-ERP system. The interviews also indicated that such system can be successfully customized and implemented within medium organizations. Finally, the research questions were fulfilled and answered through the research chapters and the next sections will highlight related future work and recommendations.

6.1 Research Contribution to Sustainable Development

This study aimed to evaluate the effectiveness of i-ERP system which aims to largely contribute to shifting to e-Oman. The following lines define the contribution to sustainability in terms of; environment, economic and social.

- This research was planned in a way that contributes to save environment. The researcher designed and adopted on line survey scheme to avoid printing hard copy forms in order to save cost and environment as well. This goes under concept of "Go Green" which protects the environment.
- The study discussed features of i-ERP system which contribute to automate business processes hence eliminating the use paper which contributes to save environment.
- The study has evaluated the performance of i-ERP systems which helps in saving cost, hence insuring economic sustainability
- The study provided an overview of the relationship between i-ERP and economic sustainable development.
- The study proposed roadmap that shows the contribution of i-ERP system to innovativebased economy.
- This study will help the government to pursue with activities of e-Oman by enhancing the role of advanced technologies.
- The study illustrated the significance of i-ERP systems in the digital transformation which ensures social and economic sustainability.
- The results obtained from the study could be used as preliminary research for further studies which will enhance knowledge and social wealth.
- A researcher provided recommended future research on same related topics which helps to sustain and develop this research work and adoption of the idea among a large segment of users and researchers.

6.2 Student Reflection

This section is to provide the student's reflection, knowledge and experience learned and challenges faced throughout the research phases. This research was an instrument for enjoyment due to my passion to these topics as the researcher has completed courses in SAP Business Processes Integration, Associate Project Manager and becoming SAP Material Management (MM) Consultant. Despite from the challenges faced, this research is a continuous and endless journey. All the research objectives were successfully accomplished, and the researcher was able to provide sufficient and powerful solution for the problem and recommendations.

However, the main challenges were faced in the early stage; defining the exact topic area in deciding whether to proceed or not due to lack researches in this topic as it is one of the modern and hot trend technology. Furthermore, this i-ERP topic was not discussed in the form of Oman except one news-paper of the system implementation. These challenges were solved by searching for sufficient number of prior reports, case studies and researches globally and link it to Oman region. Further challenge was in collecting data from organizations, as some organizations consider it as confidential data whereas some others have not responded to participate.

On the other hand, plenty of experience and knowledge were gained throughout the research period. Starting from the art of choosing proper topics based on data availability, validity and uniqueness. Further experience gained in reaching the target sample and accessing data. Thus, communication skills were highly developed especially through communicating with people from different background in the interview which taught the researcher to respect other perspectives and beliefs. In addition to that, writing and research skills were improved for example; designing the questionnaire, well writing of justifications. Furthermore, comprehensive understanding of research methodologies and deciding the appropriate one was gained and would help for future post graduate studies. Time management was another element gained as this project assisted in arranging tasks to be completed within the limited time.

Overall, the project objectives were successfully completed. Also, the experience gained from this research assisted the researcher to become better researcher and to overcome weaknesses.

6.3 Future Research

Although, a lot of research has been conducted on ERP systems, the new generation of this ERP is relatively growing right now. Thus, the area of this topic is recently going broad. However, this topic is considered to be unique as no further studies were conducted in Oman on i-ERP system. Thus, it provides some recommendations to transfer to digitalization era, which mainly depends on such advanced technologies. However, this exploratory study could be as a stepping point for other researchers, ERP providers and organizations to continue investigating the other aspects of this topic as suggested bellow:

- Further study can expand the measurements and analysis tool in evaluating the effectiveness of i-ERP system.
- Further evaluation of i-ERP effectiveness in terms of; ROI and alignment with business strategy.
- Evaluation of i-ERP performance for separate modules; could solve the problem for the organizations that are concentrating in separate module such as; HR or Finance.
- It is also suggested to study the impact of the automated processes of i-ERP system on employees' productivity
- A comprehensive case studies of the challenges faced companies while implementing i-ERP system could overcome any future failure
- It is necessary to investigate risks associated with implementing i-ERP.
- Challenges facing Oman in transferring to i-ERP adoption.
- Further research could be i-ERP contribution to innovative-based economy
- The role of i-ERP system in the transformation to digitalization era.
- The result of this study stated that 61% of ERP users and 100% i-ERP users agreed that i-ERP system will be hooked to IoT. Accordingly, Future research could investigate the effectiveness of i-ERP system in IoT.

6.4 Recommendations

The following recommendations are drawn based on the analysis of qualitative and quantitative findings:

- ERP providers should plan events and spread the awareness of such system. Provider companies should encourage researchers to publish further researches and reports emphasizing the effectiveness and the importance of i-ERP system.
- It is recommended raise result of this research to Information Technology Authority (ITA) for importance of having such intelligent systems in the contribution to national information infrastructure (NII).
- ITA may consider i-ERP system in transfer to e-Oman.
- Project managers may align i-ERP system adoption with the business strategy, vision and mission.
- Organizations may maintain experienced and trained and skilled team who are familiar with ERP processes and features.
- The organizations should plan list of requirements that contribute to originations development in order to determine the proper system that fulfill them.
- This study could be a stepping point for the government in order to start planning for strategies that support i-ERP implementation in government sectors as it will facilitate processes, eliminate manual transactions and reports which leads to satisfy citizen and contribute to e-Oman as well.

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Appendices

Appendix 1: The Questionnaires

ERP Users Survey

9/6/2019

"Transforming ERP to i-ERP: A case Study of Medium and Large Organization's Performance in Oman"

"Transforming ERP to i-ERP: A case Study of Medium and Large Organization's Performance in Oman"

The objective of this research is to evaluate effectiveness of (I-ERP) in medium and large organization by investigating barriers, requirements and maturity level to implementing I-ERP.

Demographic Information

1. 1- What is your job level? * Mark only one oval.
Project Manager
Project Coordinator
Project Analyst
Project Specialist
Project Leader
IT Manager
IT Practitioner
Other:
2. 2- Years of experience in ERP Systems * Mark only one oval.
1-3 years
4-10 years
More than 10 years
3. 3- The company residence * Mark only one oval.
Muscat
Musandam
O Dhofar
Dakhlilyia
Batina
Al-sharqya
O Dhahria
Al-Wusta
4 4- Company Size *
Mark only one oval.
Large (more than 99 workers)
Medium (26 - 99 workers)
5. 5- From which industry * Mark only one oval.
Manufacturing
Telecommunication
Healthcare
Education
Non-Profit
Professional Services
Information Technology
Oil and Gas
Other:

https://docs.google.com/forms/d/12lpwk321DthdAEn--KzZ0iJs90cgmXtgwSagOKP57ks/edit

9/6/2019

"Transforming ERP to i-ERP: A case Study of Medium and Large Organization's Performance in Oman"

6. 6- What is the type of ERP deployment at your organization? * Mark only one oval.

On-premise

Public Cloud

Private Cloud

Hybrid Cloud

7. 7- The name of ERP provider *

Mar	only one oval.
\subset) SAP
\subset) Oracle
C) Microsoft
C) Sage
C) Epicor
C) Infor
C) NetSuite
\subset) IFS
C) IQMS
C) Other:

Objective 1: To identify requirements and barriers to implementing i-ERP

8.8-In integ	your opinion, Intelligent ERP refers to intelligent technologies such as; machine learning rated with an ERP systems resulting into i-ERP *
Mark	only one oval.
\bigcirc	Agree
\bigcirc	Maybe
\bigcirc	Disagree
9. 9- W ł	at is/are the barriers to adopting i-ERP? *
Chec	k all that apply.
	High Cost
	Time to Migrate
	Transform from legacy system
	Current ERP System meets requirements
	No strong business case
	Training
	Unclear benefits
	Security
	Other:

Objective 2: To investigate the maturity level to implement i-ERP

10. 10- In your opinion, higher maturity level of an organization generates higher need for i-ERP implementation *
Mark only one oval.

	07487	,
C	\supset	Agree
C	D	Maybe
C	D	Disagree

11. 11- Do you think that the current IT infrastructure helps to move towards (i-ERP) implementation? *

Mark only one oval.

(Maybe
	21 U 22
-	

Disagree

https://docs.google.com/forms/d/12lpwk321DthdAEn--KzZ0iJs90cgmXtgwSagOKP57ks/edit

9/6/2019 "Transforming ERP to i-ERP: A case Study of Medium and Large Organization's Performance in Oman" 12. 12- Do you think that your company is ready to optimize its processes, master data and re-standardization? * Mark only one oval. Agree C Maybe Disagree 13. 13- Do you think that your company is ready for innovation (run simple business process, analytics, big data IoT etc.) * Mark only one oval. Agree Maybe Disagree Objective 3: To investigate how machine learning support ERP 14. 14- Do you believe that the combination of machine learning and ERP will result into best product? * Mark only one oval. O Agree Maybe Disagree 15. 15- Does machine learning support decision automation of ERP processes? * Mark only one oval. Agree Maybe Disagree 16. 16- Do you think that the integration of machine learning and ERP will enhance internal workflow and customer service * Mark only one oval. O Agree Maybe O Disagree 17. 17- In your opinion, ERP that support machine learning is able to define its business processes according to certain behavior. * Mark only one oval. C) Agree Maybe Disagree 18. 18- Do you think that i-ERP will be hooked to internet of things?* Mark only one oval. Agree Maybe Disagree Objective 4: To evaluate effectiveness of (i-ERP) in medium and large organization 19. 19- Does the current ERP system enhances business processes performance at your organization? * Mark only one oval.

C)	Agree
C	\supset	Maybe
C	7	Disagree

https://docs.google.com/forms/d/12lpwk321DthdAEn--KzZ0iJs90cgmXtgwSagOKP57ks/edit

9/6/2019	"Transforming ERP to i-ERP: A case Study of Medium and Large Organization's Performance in Oman"
d	20. 20- Does the current ERP system enhances financial performance at your organization? * Mark only one oval.
	Agree
	Disagree
:	21. 21- Does the current ERP system improves employees productivity at your organization? ** Mark only one cval.
	Agree
	Maybe
	Disagree
:	22. 22- Does the current ERP system support real time access information *
	Maybe
	Disagree
3	23. 23- Does the current ERP system support quick innovation at your organization? * Mark only one oval.
	Agree
	Maybe
	Disagree
3	24. 24- Does the current ERP system support predictive analytics at your organization?* Mark only one oval.
	Agree
	Maybe
	U Disagree

25. 25- Based on your experience, what system would you recommend to be implemented for your organization and why?

https://docs.google.com/forms/d/12lpwk321DthdAEn--KzZ0iJs90cgmXtgwSagOKP57ks/edit

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I-ERP Users Survey

9/6/2019

"Transforming ERP to i-ERP: A case Study of Medium and Large Organization's Performance in Oman"

"Transforming ERP to i-ERP: A case Study of Medium and Large Organization's Performance in Oman"

The objective of this research is to evaluate effectiveness of (i-ERP) in medium and large organization by investigating barriers, requirements and maturity level to implementing i-ERP.

Demographic Information

1. 1- What is your job level? *	
Mark only one oval.	
Project Manager	
Project Coordinator	
Project Analyst	
Project Specialist	
Project Leader	
IT Manager	
IT Practitioner	
Other:	
2. 2- Years of experience in ERP Systems * Mark only one oval.	
1-3 years	
4-10 years	
More than 10 years	
3. 3- The company residence * Mark only one oval.	
Muscat	
Musandam	
O Dhofar	
Dakhlilyia	
Batina	
Al-sharqya	
Dhahria	
Al-Wusta	
4. 4- Company Size *	
Mark only one oval.	
Large (more than 99 workers)	
Medium (26 - 99 workers)	
Other:	
5. 5- From which industry *	
Mark only one oval.	
Manufacturing	
Telecommunication	
Healthcare	
Education	
Non-Profit	
Professional Services	
Information Technology	
Oil and Gas	
Other	

https://docs.google.com/forms/d/1D7NkLFGAOKJAoqNitWPsl4gBOthI6JrZ0aFU1mDrYFw/edit
9/6/2019

"Transforming ERP to i-ERP: A case Study of Medium and Large Organization's Performance in Oman"

6. 6- What is the type of i-ERP deployment at your organization? * Mark only one oval.

On-premise

Public Cloud

Private Cloud

Hybrid Cloud

 \bigcirc

7. 7- The name of i-ERP provider *

Mark c	only one oval.
\bigcirc	SAP
\bigcirc	Oracle
\bigcirc	Microsoft
\bigcirc	Sage
\bigcirc	Epicor
\bigcirc	Infor
\bigcirc	NetSuite
\bigcirc	IFS
\bigcirc	IQMS
\bigcirc	Other:

Objective 1: To identify requirements and barriers to implementing i-ERP

8. 8- In your opinion, Intelligent ERP refers to intelligent technologies such as; machine learning integrated with an ERP systems resulting into i-ERP * Mark only one oval.

\subset) Agree
C) Maybe
\square) Disagree
. 9- WI	nat factors
Chec	k all that app

- 9. 9- What factors has encouraged you organization to move towards (i-ERP) implementation? * Check all that apply.
 - Complex business processes
 Readiness for quick innovation
 - Need for predictive analytics
 - Digital Transformation

Other:

Objective 2: To investigate the maturity level to implement i-ERP

10. 10- In your opinion, higher maturity level of an organization generates higher need for i-ERP implementation *

Mark only one oval.
Agree
Maybe
O Disagree
11. 11- What is/are requirements to adopting i-ERP? * Check all that apply.
Financial Capabilities
Stable IT infrastructure
Intensive change management and training
Complex business processes
Time to Migrate
Training
Data Migration
Other:

https://docs.google.com/forms/d/1D7NkLFGAOKJAoqNitWPsI4gBOthI6JrZ0aFU1mDrYFw/edit

9/6/2019	"Transforming ERP to i-ERP: A case Study of Medium and Large Organization's Performance in Oman"
	12. 12- From your experience, the company should have stable IT infrastructure to move towards (i- ERP) implementation? *
	Maybe
	Disagree
	13. 13- From your experience, the company should consider optimizing its processes, master data and re-standardization to shift into (i-ERP) *
	Mark only one oval.
	Agree
	O Maybe
	Disagree
	Objective 3: To investigate how machine learning support ERP
	14. 14- Do you believe that the combination of machine learning and ERP will result into best
	Mark only one oval.
	Agree
	Maybe
	O Disagree
	15. 15- Does machine learning support decision automation of ERP processes? * Mark only one oval.
	Agree
	Maybe
	Disagree
	16. 16- Does the integration of machine learning and ERP enhance internal workflow and customer service? *
	Mark only one oval.
	Agree
	O Maybe
	O Disagree
	17. 17- In your opinion, ERP that support machine learning is able to define its business processes
	Mark only one oval.
	Agree
	Maybe
	O Disagree
	18. 18- Do you think that i-ERP will be hooked to internet of things? *
	Maybe
	Disagree
	—
	Objective 4: To evaluate effectiveness of (i-ERP) in medium and
	large organization
	19. 19- Does i-ERP system enhances business processes performance at your organization? * Mark only one oval.

Agree Maybe Disagree

https://docs.google.com/forms/d/1D7NkLFGAOKJAoqNitWPsl4gBOthI6JrZ0aFU1mDrYFw/edit

9/6/2019	
5/0/2015	

"Transforming ERP to i-ERP: A case Study of Medium and Large Organization's Performance in Oman"

20. 20- Does i-ERP system enhances financial performance at your organization?* Mark only one oval.

\bigcirc	Agree
\bigcirc	Maybe

Disagree

21. 21- Does the i-ERP system improves employees productivity at your organization?*

Mari	k only one oval
C	Agree
\subset) Maybe

Disagree

22. 22- Does i-ERP system support real time access information *

Mar	k only one oval
C	Agree
\subset) Maybe

Disagree

23. 23- Does i-ERP system support quick innovation at your organization * Mark only one oval.

Mari	KC	only one
\subset)	Agree
\subset)	Maybe
_	÷	

Disagree

24. 24- Does i-ERP system support predictive analytics at your organization *

Mark	only one oval
\square) Agree
C) Maybe
C) Disagree

25. 25- Based on your experience, what system would you recommend to be implemented for your organization and why?

Powered by	
Google Form	6

https://docs.google.com/forms/d/1D7NkLFGAOKJAoqNitWPsl4gBOthI6JrZ0aFU1mDrYFw/edit

Appendix 2: Official Correspondence to Distribute the Questionnaire



Appendix 3: Interviews Approvals



Letter of Consent

Dear Interviewee

I would like to thank you for participating in the research "Transforming ERP to i-ERP: A case Study of Medium and Large Organization's Performance in Oman" the objective of this research is to identify requirements and barriers to implementing i-ERP, investigate the maturity level to implement i-ERP, investigate how machine learning support ERP and evaluate effectiveness of (i-ERP) in medium and large organization.

I highly appreciate your feedback and time line taken for the interview. I believe that all your inputs and thoughts will be valuable and beneficial to the research.

Terms and condition:

- You have no obligation to mention your name as part of this thesis.
- -- Your participation is voluntary and there is no penalty if you don't participate and you may withdraw at any time.
- You have the right to be informed about the content of this research.
- There are no specific benefits from your participation and there are no risks resulting from your participation. It is my responsibility to prevent harms.
- The conversation will be recorded and erased after transcription.

If you agree to the terms, please sign bellow:

Participant Name

Signature De Sophan yeven

Bayan Hamad, MEC College,

Researcher Name

Signature Bary

Date 30t April 2019

Date 30th. April . 2019

واحة المعرفة م ص.ب : ۷۹. الره 11 FEOF12 -ماتف: فاكس: ٢٨ ٢٤٤٤٦ ٨١ س.ت : ۱۱۵۱۶۰۱ ww.mec.edu.om

Middle East College LLC Knowledge Oasis Muscat P.O. Box 79, PC 124, Al Rusayl, Sultanate of Oman Phone: +968 24531400 Fax: +968 24446028 CR No: 1656406 www.mec.edu.om



Letter of Consent

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Your participation is voluntary and there is no penalty if you don't participate and you may withdraw at any time.

You have the right to be informed about the content of this research.

There are no specific benefits from your participation and there are no risks resulting from your participation. It is my responsibility to prevent harms.

The conversation will be recorded and erased after transcription.

If you agree to the terms, please sign bellow:

Faisal Said Albalushi Participant Name

Paug

Signature

Bayan Hamad, MEC College,

Researcher Name

1/5/2019

Date

1.5.2019 Date

كلية الشرق الأوسط ش.م.م واحد العرفة مسقط ص.ب ٢٩٠ الرمز البريدي : ٢٤ الرسيل، سلطنة عمان هاتف: ٢٠٠ ٢٤٤٤٦ ٢٩٩ س.ت : ٢٠٤٢٢٦ ١٩٩ w.mc.cedu.om

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Letter of Consent

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Terms and condition:

You have no obligation to mention your name as part of this thesis.

Your participation is voluntary and there is no penalty if you don't participate and you may withdraw at any time.

You have the right to be informed about the content of this research.

There are no specific benefits from your participation and there are no risks resulting from your participation. It is my responsibility to prevent harms.

The conversation will be recorded and erased after transcription.

If you agree to the terms, please sign bellow:

Vazim Mahamood Participant Name

a Signature

Both

Signature

May 15.2019 Date 15.2019 Date 15.2019

Bayan Hamad, MEC College,

Researcher Name

ص.ب: ٧٩. المز الب هاتف: ٠٠٤١٣٥٤٠٠ ٨١٨ A1A 12221.1A فاكس: Fax: +968 24446028 س.ت : ۱۱۵۱٤۰۱ www.mec.edu.om

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Appendix 4: Research Proposal



MBA (IT) / Research Proposal Form

Please **type** and fill in the following form as completely as possible. Once completed and reviewed by supervisors then submit an electronic copy to MEC. Thank you.

	Details	
Student Name	Bayan Mohammad Hamad	
Course	MBA (IT)	
Email	Pg17F1857@mec.edu.om	
First Supervisor	Dr. Smitha Nair	
2 nd Assessor		
Project Details		

Project Title:

A proposed title of the project

An Exploratory Study "Transforming ERP to i-ERP: A case Study of Medium and Large Organization's Performance in Oman"

Abstract/ Summary:

Please provide some background about the project, company, situation and overall summary as to the nature of problem and what is required (approx 500 words)

Nowadays most organizations, regardless to their type or size, depend on Enterprise Resource Planning (ERP) Systems. With the rapid increase of business needs, new intelligent technologies have been combined with the traditional ERP systems to shape out the concept of intelligent ERP (i-ERP). The numerous numbers of those intelligent technologies make the concept of intelligent ERP broad. Prior study stated that there is difference between traditional ERP and I-ERP. Enterprise Resources Planning refers to the system that collects information from the enterprise, unifies them in order to manage business processes; sales, marketing, production, manufacturing, finance and others. While Intelligent-ERP refers to the new technologies embedded with ERP that improves recording massive amount of information with automated predictive techniques (Jenab et al., 2018). The benefits of



i-ERP systems are debatable due to variances of business requirements, size, type and complexity. However, the common benefit of such system is to improve overall business processes and support innovation more quickly. Companies aim to improve their operations in order to take advantage in the global market. They implement advanced tools and techniques to achieve high quality. A study was conducted in Asia, Europe and North America stated that 21% of the companies started implementing intelligent ERP in 2018 and this number will increase more in the very near future due to its contribution to internet of things (IoT) (Panorama Consultation Agency, 2018). Recently, it has been observed that machine learning played an important role in enhancing organizations' performance and decision making. Hence, machine learning could assist ERP to enhance processes and prediction, improve planning of operations via algorithms that learn from experience and adapt to business rules and environment. Most of the companies in Oman are using ERP Systems and some of them already moved their ERP system to the cloud. This research is conducted to provide feasibility study to investigate i-ERP applications and their effectiveness on companies' operations in Oman. It will cover the organizations that apply i-ERP in Oman in order to identify the effectiveness of the system on the organizations operations. On the other hand the study will also extend to the companies that are using traditional ERP in order to identify requirements and barriers of implementing i-ERP systems to investigate the maturity level of i-ERP adoption. Further, this research will primarily contribute to investigate how machine learning could support ERP processes and enhance its functionality and improve the performance. Further, the study may be implemented to evaluate the effectiveness of i-ERP in medium and large organizations' performance in Oman. The expected outcomes would range from understanding the overall role of machine learning in i-ERP implementation and Recommendation about the importance of having such intelligent systems in the contribution to national information infrastructure (NII).

Objectives

List overall objectives of the project. These should be measurable and will be used in part assessment in determining the level of achievement of the project.

(Can be a breakdown of what you are trying to achieve and can be representative of activities/phases that are to be conducted in arriving at the project deliverables)



1- To identify barriers and significance to implementing i-ERP.

- 2- To investigate the maturity level of i-ERP adoption.
- 3- To investigate how Machine Learning (ML) supports ERP processes.
- 4- To evaluate the effectiveness of i-ERP in medium and large organization's performance.

Project Outcomes:

Provide a list of key outcomes of the conducted project (can be for each of the above objectives/ stages) these can be studies, reports, recommendations etc

Based on the project objectives mentioned above, following are the main expected outcomes of the project:

- 1- Deep understanding of ERP processes and machine leaning algorithms to clearly identify the correlation.
- 2- Deep understanding of cloud ERP
- 3- Investigation about the companies implementing i-ERP in Oman and identify whether such system has improved company's operations.
- 4- Investigation about the companies implementing traditional ERP to identify barriers to implementing i-ERP
- 5- Provide more systematic and theoretical analysis to investigate the maturity level of i-ERP adoption.
- 6- Provide some statistics on i-ERP that helps in the development of Oman industry improvement.
- 7- Recommendation to Information Technology Authority (ITA) about the importance of having such intelligent systems in the contribution to national information infrastructure (NII).
- 8- Prepare journal article and conference paper from the research.



Why are you interested in the project?

Provide a reason for your interest, what greater general interest it serves (In Industry or as part of Research) and who it could benefit (the target audience(s) that this project would be beneficial to)

Nowadays, massive amount of information flows within the organization where the traditional means like phones and emails can no more handle them. Hence ERP systems recently exist in every single organization. However, business need also expands and require more intelligent and innovative systems to meet business need. Intelligent ERP has drawn considerable attention recently. The proposed research was selected based on my interest and due to some important factors. First of all, as SAP MM Consultant, cloud ERP is one of the latest released technologies that influence organization's performance. I-ERP also has an important role in contribution to Oman industry improvement. In addition to that, by reviewing prior researches, it is clear that there is lack of information on this topic. Hence, this research will carry new information about i-ERP that helps organizations to identify benefits and fill gaps.

What are the key questions the project attempts to answer? These should be testable in some way.

- 1- What are the requirements and barriers to implementing i-ERP?
- 2- What is the maturity level of i-ERP adoption?
- 3- How Machine Learning (ML) supports ERP processes?
- 4- How i-ERP affects the performance of medium and large organizations in Oman?

What research methods do you intend to use?

The Methodology that will be used in the research is as follow:

- A literature review will be conducted as a secondary data to define research area, gaps on existing solutions, define objectives and formulate research questions



Qualitative and quantitative methodology will be used to collect primary data through the following methods or tools:

- Qualitative: Data collected through interviews
- o Quantitative: Data collected from survey

- Descriptive research methodology will be implemented where the results will be built based on the survey of data collected from medium and large organizations that are implementing ERP or i-ERP as a sample of the study. The data will be categorized and interpreted by WEKA or other equivalent software. Various statistical analytics could be applied to analyze the quantitative data such as; mean, standard deviation, t-test, regression or any other statistics method. Beside numerical presentation, quantitative data also could be visualized in form of graph or table which facilitates understanding

- Comparative research methodology will be implemented in order to compare the effectiveness of ERP and i-ERP in organizations' performance.

What primary and/or secondary data sources do you intend to use?

In this present research, primary and secondary data will be used in order to produce accurate research.

- Primary source is mainly depends on questionnaire and interviews.

Questionnaire will be distributed online using Google Drive Survey. The questionnaire will be in a form of closed and opened questions. The closed questions would be in form of limited options while the open will allow the respondent to write their opinion. The questionnaire is expected to be divided into three parts. First part about organizations demographic information. While the second part will include information regarding to ERP or i-ERP system they are using, organizational benefits and barriers of implementing such advanced system. Finally the third part will be an open question to express the respondent's opinion. Interviews will be conducted face-to-face by meeting i-ERP Providers in order to clearly understand the efficiency of the product and i-ERP users to investigate whether such system enhance organizational performance.



Secondary source will be completed via prior conferences paper, Journal

Articles, books, mater and PhD thesis, companies' reports, case studies of companies have implemented i-ERP.

Provide draft chapter headings for your report

Abstract Declaration of Originality Acknowledgment of content List of Tables List of Figures Chapter 1: Introduction 1.1 Preface about i-ERP 1.2 Research Problem 1.3 Research Objectives 1.4 Research Questions 1.5 Significance of Research 1.6 Research Limitation 1.7 Structure of Research 1.8 Conclusion Chapter 2: Literature Review 2.1 Background about ERP 2.2 Background about Machine Learning 2.3 how machine learning support ERP 2.4 Intelligent ERP (i-ERP) 2.5 Chapter Summary Chapter 3: Methodology 3.1 Research Process 3.2 Approach 3.3 Data collection Tools 3.4 Study sample 3.5 Ethical issues 3.6 Chapter Summary Chapter 4: Data Analysis 4.1 Analysis of questionnaire 4.2 Analysis of interview 4.3 Summary Chapter 5: Conclusion 5.1 Final Results 5.2 Contribution to the study 5.3 Future research 5.4 Recommendation 5.5 Conclusion



5.6 Student Reflection

Reference Appendices

Gantt Chart

Please attach or outline a project schedule (Gantt chart) which incorporates the phases of your project and activities to undertake, duration, start and end dates, any milestones/ deliverables and major dependencies.

tt t	Paște	X Cut Copy • Format Pi Clipboard	Times New Ron + 12 + 9	2 2 2 1 • • •	Respe Schedule	on Track - ct Links ate	anually hedule Sch	Auto Ins nedule Task	pect Move Mo	de Task	Summery Milestone Deliverable	Information	Notes Details Add to Timeline Properties	Scroll to Task E Fill *	
Mo	on 4/22 5	tart	, May 5, 18 , M	lay 19,	/25/19 join 7, "19	jun	16, 19		130, 19	Jul 14,7	19 _j lal	28, 19	Aog 11, 19	Aug 25, '19) Fi nish Fi18/30/19
	0	Task 🖕	Task Name	Duration	• Start •	Finish	• Pred	ecessors ,	21,'19 M T W T	Apr 2 F S S N	18, '19 T W T F S	May 5, '19 S M T W	May 12, '1	19 May W T F S S M	19, '19 T W T 1
1		त्री	⁻ Intelligent ERP (i-ERP)	95 days	Mon 4/22/19	Fri 8/30/19	1		-		_			_	
2		*	^E Chapter 1: Introduction	20 days	Mon 4/22/19	Fri 5/17/19	1		2	-	_	_	_		
3	-	8	Preface about i-ERP	4 days	Mon 4/22/19	Thu 4/25/1	9			1					
4			Research Problem	3 days	Fri 4/26/19	Tue 4/30/1	9 3								
5		0	Research Objectives	2 days	Wed 5/1/19	Thu 5/2/19	4				<u>`</u>				
6		8	Research Questions	2 days	Mon 5/6/19	Tue 5/7/19	k i								
7	111	10	Significance of Research	3 days	Mon 5/6/19	Wed 5/8/1	9						-		
8	11	8	Research Limitation	1 day	Fri 5/10/19	Fri 5/10/19	7						\$ 5/10		
9		3	Structure of Research	2 days	Mon 5/13/19	Tue 5/14/1	9 8		1						
10		8	Conclusion	2 days	Thu 5/16/19	Fri 5/17/19	9							`	
11		*	Chapter 2: Literature Review	23 days	Sat 5/18/19	Tue 6/18/1	9							-	
12		3	Background about ERP	4 days	Mon 5/20/19	Thu 5/23/1	9								
13		0	Background about Machine Learning	6 days	Fri 5/24/19	Fri 5/31/19	12								i
14		1	how machine learning support ERP	4 days	Mon 6/3/19	Thu 6/6/19	13								
15		8	Intelligent ERP (i-ERP)	1 day	Thu 5/13/19	Thu 6/13/1	9 14		1						
16	-	3	Chapter Summary	1 day	Tue 6/18/19	Tue 6/18/1	9 15		1						
17		*	* Chapter 3: Methodology	9 days	Wed 6/19/19	Sun 6/30/1	9								
					** =le les	lan la	-		1.4	1					



Appendices

- Attaran, M. & Deb, P., 2018. Machine learning: the new 'big thing' for competitive advantage. *Int. J. Knowledge Engineering and Data Mining*, 5(4), pp.277-305.
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Reviewed					
Date					
Date					
Date					

Return of form to University

Thank you for completing the form.

The following is for Office use only

Date received:

Comments by checker:

Appendix 5: Research Ethics Form

Document Name & Type	Research Ethics and Bio-Sa	fety Author/Department	Centre for Research &
Approval Date	Approval Form	Effective Date	27/02/2018
Review Date	24/02/2019	Next Review Date	23/02/2020
RESEARCH	ETHICS AND BI	O SAFETY APPRO	OVAL FORM
You should use this East College. This	s checklist only if you are ca normally applies to:	arrying out a research projec	t through Middle
• Und	ergraduate students		
• Pos	tgraduate students		
• All f	aculty members		
Research Ethics	and Biosafety Approval C	hecklist	
Applicant Details		1	
Name : Bayan	Mohammad Hamad	E-mail PG17F1867	
Department PC	à studies centre	Date 22.4.2019	
Course Name	MBA(IT)	Title of Project "Tranfor i - ERP	ming ERP to
Project Details		a Case Large in (Orgaizadin's
Summary of the pr	oject (Maximum 120 words):	
Research Obie	ctives		
1- To identify	requirements and barriers to	o implementing i-ERP.	
2- To investig	ate the maturity level of i-EF	RP adoption.	
3- To investig	ate how Machine Learning	(ML) supports ERP processe	es.
4- To evaluate	e the effectiveness of i-ERP	in medium and large organi	zation's
performance	e. 	(hased Theoretical etc.)	
Research Desi Descriptive on the surv implement	research design will be imp vey of data collected from n ting ERP or i-ERP as a samp	plemented where the results y nedium and large organizatio ple of the study.	will be built based ns that are
		to investore in ander	to compare the



Document Name & Type	Research Ethics and Bio-Safety Approval Form	Author/Department	Centre for Research & Consultancy
Approval Date	26/02/2018	Effective Date	27/02/2018
Review Date	24/02/2019	Next Review Date	23/02/2020

effectiveness of ERP and i-ERP in organizations' performance.

Methods of data collection

.

o Qualitative: Data collected through interviews

o Quantitative: Data collected from survey



Document Name & Type	Research Ethics and Bio-Safety Approval Form	Author/Department	Centre for Research & Consultancy
Approval Date	26/02/2018	Effective Date	27/02/2018
Review Date	24/02/2019	Next Review Date	23/02/2020

Hiddle East College

Participants in your research

1. Will the project involve human participants?	Yes	No
2. Will this project involve animals or plants?	Yes	140

Risk to Participants

3.	Will the project involve human patients/clients, health professionals, and/or patient (client) data and/or health professional data?	Yes	NO
4.	Is there a risk of physical discomfort to those taking part?	Yes	Nor
5.	Is there a risk of psychological or emotional distress to those taking part?	Yes	NO
6.	Is there a risk of challenging the deeply held beliefs of those taking part?	Yes	NC
7.	Is there a risk that previous, current or proposed criminal or illegal acts will be revealed by those taking part?	Yes	NO)
8.	Will the project involve giving any form of professional, medical or legal advice, either directly or indirectly to those taking part?	Yes	NO
9.	Is there any possibility that this project put humans, animals and plants at risk of their health and survival?	Yes	No
10). Is there any risk of toxic/infectious agents in conjunction with animals or plants that could harm participants and/or environment?	Yes	NO

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Document Name & Type	Research Ethics and Bio-Safety Approval Form	Author/Department	Centre for Research & Consultancy
Approval Date	26/02/2018	Effective Date	27/02/2018
Review Date	24/02/2019	Next Review Date	23/02/2020

Risk to Researcher

11. Will this project put you or others at risk of physical harm, injury or death?	Yes	No
12. Will this project put you or others at risk of abduction, physical, mental or sexual abuse?	Yes	No
13. Will this project involve participating in acts that may cause psychological or emotional distress to you or to others?	Yes	No
14. Will this project involve observing acts which may cause psychological or emotional distress to you or to others?	Yes	No
15. Will this project involve reading about, listening to or viewing materials that may cause psychological or emotional distress to you or to others?	Yes	No
16. Will this project involve you disclosing personal data to the participants other than your name and the University as your contact and e-mail address?	Yes	No
17. Will this project involve you in unsupervised private discussion with people who are not already known to you?	Yes	No
18. Will this project potentially place you in the situation where you may receive unwelcome media attention?	Yes	NO
19. Could the topic or results of this project be seen as illegal or attract the attention of the security services or other agencies?	Yes	Nor
20. Could the topic or results of this project be viewed as controversial by anyone?	Yes	No

Page 4 of 8 Controlled Copy. Printed copies of this document are uncontrolled. The controlled version of this document is available on the CMS.

Document Name & Type	Research Ethics and Bio-Safety Approval Form	Author/Department	Centre for Research &
pproval Date	26/02/2018	Effective Date	27/02/2018
Review Date	24/02/2019	Next Review Date	23/02/2020

Middle East College

Yes

No

V

21.	Does your project involve the use of biohazardous material or produce	
	biohazardous waste that may put you or others at risk of diseases?	

Informed Consent of the Participant

22. Are any of the participants unable mentally or physically to give consent?	Yes	No
23. Do you intend to observe the activities of individuals or groups without their knowledge and/or informed consent from each participant (or from his or her parent or guardian)?	n Yes	No

Participant Confidentiality and Data Protection

24. Will the project involve collecting data and information from human participants who will be identifiable in the final report?	Yes	NO
25. Will information not already in the public domain about specific individuals or institutions be identifiable through data published or otherwise made available?	Yes	No
26. Do you intend to record, photograph or film individuals or groups without their knowledge or informed consent?	Yes	NO
27. Do you intend to use the confidential information, knowledge or trade secrets gathered for any purpose other than this research project?	Yes	No

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Document Name & Type	Research Ethics and Nin C. f.		
Approval Date	Approval Form	Author/Department	Centre for Research & Consultancy
Review Date	20/02/2018	Effective Date	27/02/2018
	24/02/2019	Next Review Date	23/02/2020

Gatekeeper Risk

28. Will this project involve collecting data outside the buildings of MEC?	¥/s	N
29. Do you intend to collect data in shopping centres or other public places?	Yes	Z
30. Do you intend to gather data within nurseries, schools, colleges, any organization or ministries?	Ves	1×2

Other Ethical Issues

31. Is there any other risk like ethical, moral, legal or issue not covered above that may pose a risk to you or any of the participants?

Yes No

** If you have answered **Yes** to any of these questions (18, 20, 25, 28, 29,30) it is mandatory to get an No Objection Certificate from the concerned organization or participants either to do the research in their premises or to use and publish the data pertaining to their organization or the participant.

In the absence of the No Objection Certificate the project will be treated as a high risk project and will have to be approved by the institutional Research Ethics and Biosafety Committee.

** If you have answered Yes to any other questions mentioned

above(1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,19,21,22,23,24,26,27,31) it is mandatory to refer that project to the institutional Research Ethics and Biosafety Committee.



Principal Investigator Certification

If you answered **No** to **all** of the above questions, then you have described a low risk project. Please complete the following declaration to certify your project.

Agreed restrictions to project to allow Principal Investigator Certification

Please identify any restrictions to the project, agreed with your Supervisor or any concerned stakeholder related to the project to allow you to sign the Principal Investigator Certification declaration.

Principal Investigator's Declaration

Please ensure that you:

- 1- Tick all the boxes below and sign this checklist.
- 2- Principal investigator must get their Supervisor and Department Research co-ordinator to countersign this declaration.

I believe that this project **does not require research ethics and biosafety approval**. I have completed the checklist and kept a copy for my own records. I realise I may be asked to provide a copy of this checklist at any time.

I confirm that I have answered all relevant questions in this checklist honestly.

I confirm that I will carry out the project in the ways described in this checklist. I will

MEC_CRC_FOR_001_01	Page 7 of 8
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Document Name & Type	Research Ethics and Bio-Safety Approval Form	Author/Department	Centre for Research & Consultancy
Approval Date	26/02/2018	Effective Date	27/02/2018
Review Date	24/02/2019	Next Review Date	23/02/2020

Middle Fast Online

I confirm that I will carry out the project in the ways described in this checklist. I will immediately suspend research and request a new ethical and biosafety approval if the project subsequently changes the information I have given in this checklist.

Principal Investigator

Date 22.4.2019

Supervisor and Research Co-ordinator

I have read this checklist and confirm that it covers all the ethical and biosafety issues raised by this project. I also confirm that these issues have been discussed with the principal investigator and will continue to review in the course of supervision.

Countersigned Afiles (Supervisor) Date 22/4/2019 Countersigned Dr. Ja and Mark (Department Research Co-ordinator)

Daté 01/05/2019.

* Student is expected to produce Noc fand Informed Consent.

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Appendix 6: MBA (IT) Midterm



MBA (IT) PROGRAMME

Masters Dissertation-Midterm Review Presentation-Status Report

(Fall / Spring / Summer 20_)

Student ID	PG17F1857	
Student Name	Rayan Mohemmad Idri) Hamad	
Programme	MBA-IT	
Dissertation title	Then exploratory study on Transforming ERP to ITE	RP: Acase
Date and Time of Presentation	27. May . 2019 - 12:00 PM	in Oman.

Checklists	Remarks by Supervisor
Sufficient literature review is conducted	Yes
Research methodology is framed and justified including methods of data collection and aimed sample size.	To be reviewa
Questionnaires/interview questions are framed and they are aligned to research objectives (the same should be approved by supervisor)	* Yes
Student is ready/started collecting data	Almost racely

A. Status of work undertaken so far filled by student (Introduction, Literature Review, Research Methodology, Data Collection etc.)

- Literature chapter is completed - Methodology chapter decided and already sturbed. - Methodology chapter decided and already sturbed. - Survey questions and interview question are ready to be - Poster Presedution is completed & reviewed.

MEC_PG_MRF_037_v2

كلية الشرق الأوسط Middle East College B. Remarks by the supervisor regarding the status of work 50% of the dissertation work had been completed. Presented the poster. I have seen the comments of the supervisor. Signature of Supervisor: Signature of Student:
 Date:
 Date:

 *This progress report form has to be posted on Moodle. The Supervisor shall give the comments back to you.

MEC_PG_MRF_037_v2



"Transforming ERP to i-ERP: A case Study of Medium and Large Organization's Performance in Oman"

Introduction

Nowadays most organizations, regardless to their type or size, depend on Enterprise Resource Planning (ERP) Systems. With the rapid increase of business needs, new intelligent technologies have been combined with the traditional ERP systems to shape out the concept of intelligent ERP (i-ERP). The numerous numbers of those intelligent technologies make the concept of intelligent ERP broad. However, intelligent-ERP refers to the new technologies embedded with ERP systems that improve recording massive amount of information with automated predictive techniques (Jenab et al., 2019). Recently, it has been observed that machine learning played an important role in enhancing organizations' performance and decision making. Hence, machine learning could assist ERP to enhance processes and prediction, improve planning of operations via algorithms that learn from experience and adapt to business rules and environment (Morris et al., 2016). Most of the companies in Oman are using ERP Systems and some of them already shifted to intelligent ERP systems. However, Oman 2040 vision aims to enhance the performance of different sectors such as; health, education manufacturing, oil and gas and others by adapting high quality systems. Therefore, such intelligent systems might contribute to achieve the prospective objectives.

This research aims to study the effectiveness of i-ERP systems in medium and large organization in Oman and investigate the maturity level to shift towards such intelligent system.

Methodology Secondary Data Literature Review Quantitative data (Survey) Primary Data Qualitative data (Interview) Merging quantitative and qualitative data using comparative and descriptive methodology Interview data analysis Survey collected data analysis Triangulation to finalize the report and recommendations

Objectives

1- To identify barriers to implementing i-ERP.

2- To investigate the maturity level of i-ERP adoption.

3. To investigate how Machine Learning (ML) supports ERP processes.

4. To evaluate the effectiveness of i-ERP in medium and large organization's performance.

Expected Deliverables

- 1. Deep understanding of ERP processes and machine leaning algorithms to clearly identify the correlation.
- Investigation about the companies implementing i-ERP in Oman and identify whether such system has improved company's operations.
- about the 3. Investigation companies implementing traditional ERP to identify barriers to implementing i-ERP
- 4. Provide more systematic and theoretical analysis to investigate the maturity level of i-ERP adoption.
- 5. Provide some statistics on i-ERP that helps in the development of Oman industry improvement.

2nd Phase Plan Work Plan

Data Collection

(Complete Chapter 3)

Data Analysis

(Complete Chapter 4)

(Complete Chapter 5)

Finalizing the Thesis

Thesis Submission and Presentation

Recommendations and Conclusions

1-30 June

- 14

2 - 20 Sep

Literature Review

When traditional ERP was released in the previous years the companies that implemented the system could gain advantage over competitors in integrating and streaming business processes. However, this traditional ERP systems is considered to be complex to implement and run. In addition to that, it doesn't directly contribute to innovation. On the other hand, intelligent ERP system brings improvement in flexibility, agility and complexity that meet the current digital era. (Chakraborty, 2018)

A company can analyze the value of a system based on four quality criteria; quality of business' processes, speed of operation, flexibility and cost (Jenab et al., 2019). Intelligent ERP supports intelligent architectures that provide real-time or close real-time processes rather than the traditional operations (Ellingsen & Mukherjee, 2018). Moreover, an Intelligent-ERP system helps organization to shift from records management to smart system that learns from previous experience and business rules to predict better outcomes and suggest recommendations. (Vlasov et al., 2017)

Arvara, CIO at BW Group, claimed that in the next 2 years about 85 % of the companies will be doing its tasks without human interaction. Hence, this generation of ERP will take part of this experience. (Chakraborty, 2018)





Middle East College MBA (IT) - Spring 2019 Bayan Mohammad Hamad - PG17F1857 Supervisor: Dr. Smitha Nair

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Appendix 7: ERP Certificates



CERTIFICATE

SAP Global Certification

We hereby confirm that

Bayan Mohammed Idris Hamad

is certified as

SAP Certified Associate Project Manager

Certificate ID: 0014252451 Certified on: October 01, 2015

Walldorf, January 08, 2017

une mon

Michael Kleinemeier Member of the Global Managing Board of SAP SE Global Service & Support





CERTIFICATE

SAP Global Certification

We hereby confirm that

Bayan Mohammed Idris Hamad

is certified as

SAP Certified Associate - Business Process Integration with SAP ERP 6.0 EhP6

> Certificate ID: 0014252451 Certified on: May 21, 2015

Walldorf, January 08, 2017

1. Alleine mon

Michael Kleinemeier Member of the Global Managing Board of SAP SE Global Service & Support









Appendix 8: Draft of Journal Article

"Transforming ERP to i-ERP: A case Study of Medium and Large Organization's Performance in Oman"

Bayan Mohammad Al Hamad¹, Smitha Sunil Kumaran Nair²

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Abstract Implementation of advanced technologies becomes a key concern nowadays in order to keep the businesses running. Concern howauds in order to keep the businesses running. Businesses are rapidly growing, and their processes are getting complicated more than ever. Thus, there is high need for advanced technologies like intelligent (i-ERP) to support and boost organizations' performance. This exploratory research aimed to evaluate the effectiveness of i-ERP system in medium and large organizations in Oman. Furthermore, it aimed to identify barriers and significance to implement such system in order to investigate the maturity level of i-ERP adoption. Finally, this research primarily contributed to investigate how machine learning could support ERP processes to enhance its functionality performance. This research was conducted through reviewing of related literatures. Also qualitative and quantitative methods were utilized including interview and questionnaire. Interviews were conducted with $\frac{4}{4}$ employees working in different sectors, and the questionnaire was distributed to 51 public and private organizations in Oman. Among which 41 of the companies are implementing ERP systems and 10 implementing i-ERP systems in order to compare the effectiveness of both systems on the organizations' operations. The main finding of this exploratory research revealed that i-ERP system enhances the performance of organizations compared with traditional ERP systems. Thus it is necessary to conduct feasibility study for i-ERP implementation within medium and large organizations. In addition to that, interviews results indicated that i-ERP system could benefits medium organization based on their mission and vision. The research recommendations aim to contribute to the understanding of i-ERP features and its effectiveness on organizational performance for possibility of adoption i-ERP system by business owners.

Key Words: i-ERP, Enterprise Resource Planning, ERP, Machine learning, Organizations' Performance, Maturity Level, ERP implementation

I. INTRODUCTION

This is the era where organizations are no more asking whether to peruse to digital transformation rather than how to move forward before it is too late. The modernization of IT assists is one of the main pillars to enhance organizations' processes and run innovation [1]. His Majesty Sultan Qaboos bin Said that "Information technology and communications have now become the main elements that move forward the development process in this third millennium; therefore, we have accorded our attention to finding a national strategy to develop the skills and abilities of citizens in this domain with the aim of further developing e-government services". [2].

ERP systems have been a powerful tool to improving organizational performance and integrating processes in the last decades. However, in this age of information, legacy systems are being replaced with advanced systems that are capable to fulfil the renewable requirements [3]. Intelligent-ERP (i-ERP) is the new generation of ERP system that leverages machine learning to enhance processes, improve employees' productivity, enable innovation and contribute to digital transformation. [4] It basically gathers data from various resources and here the concept of IoT and mobile technologies take a place as it will be connected to the ERP system. Then, big data will aggregate data in one database to assist machine learning and analytics to classify and prioritize the data in order to produce the outcomes.

Figure 1 illustrates the main architecture of i-ERP system. [5]



According to [6] this new generation of ERP will be hooked to the internet of things due to its tendency to support innovation, real-time processes and predictions. The above discussion obviously emphasizes that i-ERP may enhance the performance of different sectors such as; health, education manufacturing, oil and gas and others by adapting high quality systems. Hence, such advanced system could build innovative based economy that depends on creativity, integrity, scalability and mobility which are all characteristics of digital economy which will add value to governmental and private sectors in Oman.

Very limited literatures have discussed ERP system in Oman, and declared that ERP systems are more expensive for small companies [7]. Accordingly this research focuses on evaluate the effectiveness of i-ERP system of Medium and large organizations in Oman by comparing both, the performance of the traditional ERP system and intelligent ERP systems. Furthermore, it covers barriers and maturity level to implement i-ERP.

II. LITERATURE REVIEW

ERP term is acronym for enterprise resource planning, but this name doesn't reflect the actual concept and capability of the system as it is more than planning system. ERP is a system that integrates and automates business processes regardless to the size or type of the organization [8]. Other researchers [9] defined ERP as a technological concept that combines different modules such as; production, manufacturing, finance, marketing, human resource and others to plan the goods and services of the entire business.

A. Transformation From ERP to i-ERP

When traditional ERP was released in the previous years, the companies that implemented the system could gain advantage over competitors in integrating and streaming business processes. However, this traditional ERP is considered to be back-end system and complex to implement and run. In addition to that, it doesn't directly contribute to innovation. On the other hand, intelligent ERP system brings improvement in flexibility, agility and complexity that meet the current digital era. Arvara, CIO at BW Group, claimed that in the next 2 years about 85 % of the companies will be doing its tasks without human interaction. Hence, this generation of ERP will take part of this experience. [3]

Intelligent-ERP (i-ERP) is the new generation of ERP Systems. I-ERP can be defined as a smart ERP system embedded with advanced technologies such as; machine learning and advanced analytics [10]. According to [3] i-ERP system refers to the system that uses machine learning and predictive analytics to generate high level of innovation which makes the system "proactive rather than reactive". Intelligent ERP system is the modern trend of ERP that incorporate machine learning in order to support digital transformation of organizational core processes [11].

B. Benefits of Implementing i-ERP

A company can analyze the value of a system based on four quality criteria; quality of business processes, speed of operation, flexibility and cost. [10]

a) Process Improvement

Intelligent-ERP plays a vital role in business processes by determining the new wave of processes and enhances current processes. The rapid changes of business processes become challenging, and the customers are expecting to be served with high quality products promptly. ERP that embedded with machine learning is capable to automatically adapt and optimize internal processes to meet business needs. A study was conducted at 25 German companies in 2017, expected that by 2020, 60% of the companies will desire independent and intelligent process [12]. I-ERP improves and automates existing processes in different modules for example; in finance module, the cash application software learns from previous data cleaning to automatically predict the accuracy of incoming invoice [13].

Moreover, the intelligent architecture of the ERP supports real-time or close real-time processes rather than the traditional operations. This intelligence is clearly noticed in the supply chain as the company could start manufacturing once it receives the order without holding surplus inventory and it avoids accepting orders that is above capacity [13]. In addition to that machine learning also can predict the shortage and send notification to the supplier to replenish the raw material needed for present manufacturing. Such feature will be also beneficial for Ecommerce where the system will be able to make a response for an order at a real-time which will lead to customer satisfaction [3].

b) Company Operations

Organizations always are looking for innovative ways to manage its resources. Intelligent ERP tends to attain this goal by optimizing human, business processes, technology and assets. The machine learning embedded with ERP systems learns from massive amount of data which leads to innovative products and enhance employees' productivity. An Intelligent-ERP system helps organization to shift from records management to smart system that learns from previous experience and business rules to predict better outcomes and suggest recommendations. It is expected that by 2019 around 60% of the companies will be able to measure the performance of intelligent ERP on resources, processes and people optimization.

According to [6] i-ERP enhances automotive decision making at machine level in manufacturing industry by determining capacity, quality and cost [6]. This kind of intelligent decision making will drive the organization towards agility and digital edge. Moreover, intelligent ERP enables learning, analyzing and controlling massive amount of data on real-time basis by using in memory computing (IMC). [14]

c) Flexibility

Intelligent ERP is supporting more fixable services. The cloud now is providing more than cutting cost of hardware components and integrating several plants belong to the enterprise. It enables vendors to take advantage of computational economic, integrating business services outside the organization and using machine learning to analyze and predict. [6]

In traditional ERP, the workers were only able to access data via central data repository while in the new generation of ERP workers can access information about processes via mobile devices. Hence, the information will be processed and displayed promptly which leads to more fixable business environment. [6]. Furthermore, i-ERP provide features that support user experience (UX) by providing friendly user-interface with automated set of tasks that didn't exist in the legacy system. In addition to that the learning environment provided by machine learning supports guidance for the expected step to be completed in different tasks; suppliers, customers, hiring procedures, payment and collection methods. Such features help employees to be more effective and productive [3].

d) Cost

According to [3] i-ERP is easy to be managed, installed and reduces the overall operational cost by automating the manual processes which results in saving time. In addition to that, the company can chose the implementation model to be in cloud which saves cost. A prior study claimed that by 2020, 40% of the large organization will shift 60% of their function to the public cloud. This adds advantage over the traditional ERP systems which are complex to implement and manage which results in adding unpredicted cost for implementation, maintenance and training. Moreover, machine learning capabilities inside the ERP system minimizes many organizational functions by automating processes which will results in reducing labor costs. For example in procurement and sourcing processes, i-ERP learns and analyzes prior purchases orders (PO) to automatically generate upcoming PO which reducing redundancy and eliminating manual steps. I-ERP also automates cash management process by enabling the system to use auditing techniques. [14]

e) Innovation

Intelligent ERP helps in executing new ideas which are unprecedented by predicting contract and goods expiration and consumption. Accordingly build effective negotiation with suppliers. The customer can also predict his transaction according to personal data and retrain. [13]. Moreover, Intelligent ERP also provide detailed and secured performance indicator in real-time manner. Hence, problems can be identified early. According to Chakraborty, the emergence of i-ERP is an essential part of transformation strategy from pre-digital age to postdigital age. [3]

C. Barriers to implementing i-ERP System

Some companies prevent implementing i-ERP systems due to security concerns. However, some ERP providers like Oracle has released intelligent ERP that automatically responds to threats in minutes rather than months [15]. Changing the business environment or transformation of the legacy system is another barrier that prevents companies from shifting to i-ERP. Such transformation of the legacy system will lead to consuming time for migration, added expenses and training. However, business requirements changes frequently and the companies try to create competitive advantage and meet customers' need which will be no more possible through the legacy system. [16] . Prior study was conducted by IDC in 2017 on 300 SAP customers in 9 countries, presents several challenges why companies are not sure to implement i-ERP systems. First of all, around 45% which is the top concern of the companies are preventing implementation of such system due to cost of implementation, while 35% claimed that there is a lack of in-house capabilities. Furthermore, around 40% don't want to migrate from the legacy system and 20% have concerns of training users. In-depth interview results indicated that some companies have other reasons such as; customization limitation and unclear business benefits [4].

D. Organizational Maturity level to implement i-ERP

According to [17] Organizational maturity level refers to the organization's ability and readiness to change its processes culture, individual, resources and technology in a stabilized and optimized manner. According to [18] in order to identify the maturity level to adopt a new system, the company should align the desired system with the following six factors. First of all, communication factor; the organization should conduct communication with project manager, vendors and other stakeholders in order to identify how such system will add value to the organization. Second, the company should measure the value of such project and the expected outcomes to ensure the future success. Third, the authorized party should share the result with management to align it with the business strategy. Fourth, this factor ensures that IS decisions are aligned with the business strategies. Fifth, this factor considers the scope of the project. IT determines organization's readiness to grow and innovate, capability of its infrastructure, financial capacities, and timeframe, Finally, training and human resource are essential in any organization. Upon the mentioned factors, the company can determine its level of maturity based on the desired maturity metrics.

Most organizations try to move towards digital era and adopting advanced technologies. According to [4] there are different types of organizations and their needs vary based on their business nature. However, a deep interview with some organizations indicated common maturity criteria to move towards i-ERP System. The company should align the project with its business strategy by investigating whether it is ready to digitalize its business. Several interviews indicated that digitalizing information is the most concern which is basically controlled by ERP systems. Hence, i-ERP helps the organization to capture knowledge, protect it and processes it on real-time basis. The statistic shows that 26.5% of the companies are planning to implement i-ERP to digitalize their business while 21.6% already shifted due to same reason. On the other hand 13.3% of the companies didn't decide yet. Many organizations suggested perusing in the field of integrating machine learning and ERP as the range of tasks automated helps the organization to stay competitive, enhance employees' productivity and performance Statistics shows that 26.5% of the companies are planning to implement i-ERP to enhance employees productivity while 28.4% has already implemented the system for this reason. On the other hand, 15.6% are not sure. However, the organization should have stable IT infrastructure and data management plan to be able to transform to i-ERP system. According to statistics data migration was the leading challenge; as 15.6% of the companies that implemented i-ERP faced. Furthermore, financial capabilities and time frame is another concern. Finally, involve employees in the early stage of the implementing i-ERP project to be familiar with such change.

E. ERP and i-ERP in Oman

Organizations in Oman are expanding, and it is no more possible to manage them without at least ERP system. However, there is insufficient literature on ERP systems in Oman. In addition to that, there is no clear statistics about the number of ERP or i-ERP users in. One study only attempted to cover the maximum number of ERP users in the country in order to study the effectiveness of ERP system. The study stated that organizations agreed that the cost of ERP implantation and users training are not expensive compared to the value it adds to the business. Most of responses indicated that ERP system is able to reduce operating cost, assist decision making and real-time data. [7]. Another study was conducted that aims to investigate the success factors of applying this system indicated that ERP system is rapidly growing in Oman market especially in different sectors specially manufacturing. More than 30 large companies in Oman are implementing ERP systems including; "Bank Muscat, Khimji Ramdas, Oman LNG, Omantel, OTE Group, Oman Cement Company, Petroleum Development Oman, Ahlibank, Suhail Bahwan group, Sohar Aluminum, Vale Oman, Oman Methanol Company, Powertech Engineering, and many others" [19]. Moreover, a case study was conducted on Omantel to examine the success factor of ERP implementation revealed that implementation of Hybrid ERP could reduce the cost up to 80%. Hybrid ERP helps in saving capacity by storing some information onpremise and the other part in cloud or private. However, there are some challenges in implementing Hybrid ERP; managing master data, coordinating business activities and integrating business processes that are hosted in different places. Furthermore they considered stakeholder involvement from the beginning to be the most important factor for successful implementation [20].

However, some organizations in Oman already shifted to the new generation of ERP. Intelligent ERP plays a vital role in digital transformation, as all the organizations aim to develop their processes and enhance productivity. There are no available studies that covered intelligent ERP in Oman so far. Recently Oman Observer news published that Raysut Cement Company (RCC) has successfully implemented intelligent ERP "SAP S/4 HANA and SAP Success Factor for HR" as they consider it an essential step with regards to digital transformation. According to Al Tamimy, Chief of HR and Administrative Affairs, this intelligent system will digitalize the HR solutions, facilitate and integrate processes and achieve interaction among employees. In addition to that Fadhel, Head of IT, stated that this i-ERP will provide better services to customers quickly. Intelligent ERP systems also support the organizations' business strategies and objectives. The implementation of i-ERP took 5 months and the system was officially lunched in the first day of January 2019. [21]

III. Research Methodology

Quantitative and qualitative are the two main methodologies used to study the effectiveness of i-ERP system of medium and large organization in Oman. The literature review has provided information regarding to significance and barriers to implement i-ERP system, the maturity level to implement i-ERP system, and prior studies of system effectiveness in Oman. Accordingly, the survey questions were formulated. A questionnaire is designed to explore the perspective of ERP and i-ERP users regarding the effectiveness of the current system in order to compare the efficiency.

A. ERP and i-ERP in Oman

For the current research, and since there is no clear statistics of ERP or i-ERP users in Oman, non-probability sampling type of convenient was utilized. Convenient sampling is the most common type where a researcher can approach the available sample. The advantage of this type is its scalability compared to other survey analysis as it will derive the important perceptions. There are several reasons for selecting such technique. First of all, lack of population statistics. Secondly, convenience sampling can resolve time and cost limitations [22]. Third, it is difficult to reach all companies for different reasons [23]. Accordingly, a sample of 51 participants is sufficient for the current research, 41 of ERP users and 10 of i-ERP users were selected due to the small population of the companies that implemented i-ERP system in the Sultanate.

B. Primary Data Source

The interviews and questionnaire are the primary source of collecting data. Interviews were conducted with 4 experts
from different industries to support the information obtained from the literature review. Furthermore, interviews help understanding the parameters to evaluate the effectiveness of i-ERP system. Moreover, the interviews helped in understanding the barriers and maturity level to implement i-ERP system. The questionnaire were structured and formulated based on research objective literature review and interviews.

C. Secondary Data Source

The secondary data was collected from priors studies such as; books, journal article, conference paper, reports and newspaper on the topics; significance and barriers to implementing i-ERP, maturity level of i-ERP adoption, and effectiveness of i-ERP in medium and large organization's performance worldwide and in Oman.

D. Data Analysis Techniques

IV. Research Survey Findings and Analysis

As per objective 1, the highest barrier not to implement i-ERP is the high cost of the system as (60%) of the participants agreed on this barrier. Whereas, the second barrier indicated that there is no clear benefits for such system and the third was resist to transforming from legacy system. This result also matches with prior studies as it was stated by IDC in 2017, around 45% prevent implementing i-ERP due to cost of the system which is considered as the top concern. However, in-depth interviews indicated agreed that the cost of i-ERP system could minimized by customizing it based on company size and need. Furthermore, the implementation of i-ERP system is much easier and more flexible than the traditional ERP system which could also minimize cost. For Objective 2, the most important factors to insure that the company is mature to implement such system are; communication, insure that the system matches with business strategy and scope of the project (IT infrastructure, Processes optimization and readiness to innovate)[18]. However, the findings indicated that the majority of ERP participants (61%) indicated that the IT infrastructure is ready to move towards i-ERP system. Around (46%) of the participants indicated that the company is ready to optimize its processes, master data. In addition to that, (61%) indicated that the company is ready for innovation. Accordingly, it would be possible the companies participated in the questionnaire to move towards i-ERP if top management agree and if it is aligned with the business strategy

As per objective 4, the research was targeting both medium and large organizations that are implementing ERP and i-ERP system in order to compare and determine the effectiveness of i-ERP system. The result indicated that i-ERP system is more effective than ERP system in terms of processes enhancement, financial performance, employees' productivity, real-time access information, quick innovation and predictive analytics. However, this exploratory research could be a preliminary for future researches as it was indicated by [14] that by 2019 around 60% of the companies will be able to measure the performance of intelligent ERP on resources, processes and people optimization.

V. Conclusion

The main finding of this research indicates positive perception on the effectiveness of i-ERP system compared with ERP system. Both inferential and descriptive statistical techniques were utilized. In addition to that, the research findings were supported and powered by literature review.

The result of this exploratory research could be used to enrich future researches in this area. The interpretation of the questions has indicated the effectiveness i-ERP system. The interviews also indicated that such system can be successfully customized and implemented within medium organizations. Finally, the research questions were fulfilled and answered through the research chapters and the next sections will highlight related future work and recommendations.

VI. Recommendation

The following recommendations are drawn based on the analysis of qualitative and quantitative findings: ERP providers should plan events and spread the awareness of such system. Provider companies should encourage researchers to publish further researches and reports emphasizing the effectiveness and the importance of i-ERP system. It is recommended raise result of this research to Information Technology Authority (ITA) for importance of having such intelligent systems in the contribution to national information infrastructure (NII). ITA may consider i-ERP system in transfer to e-Oman. Furthermore, Project managers may align i-ERP system adoption with the business strategy, vision and mission.

In addition to that, Organizations may maintain experienced and trained and skilled team who are familiar with ERP processes and features. The organizations should plan list of requirements that contribute to originations development in order to determine the proper system that fulfill them. Finally, his study could be a stepping point for the government in order to start planning for strategies that support i-ERP implementation in government sectors as it will facilitate processes, eliminate manual transactions and reports which leads to satisfy citizen and contribute to e-Oman as well.

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Appendix 9: Student Dissertation Diary

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Document Name & Type	MBA (IT) Dissertation Diary	Author/Department	Head, Centre for Postgraduate Studies
Approval Date	20/03/2017	Effective Date	20/03/2017
Review Date	17/01/2019	Next Review Date	16/01/2020

Diary – Spring / Summer / Fall

Name of Student: Bayan Mohammad Hamad	Week 1
Name of Supervisor: Dr. Smitha Nair	
Dissertation Topic:	
"Transforming ERP to i-ERP: A case Study of Medium and I	arge Organization's
Performance in Oman"	

Date/ Day: 20 March 2019 Time: 8:30 – 9:15 am Venue: Dr. Smitha Office

Tasks as per project plan	Actual tasks taken up / completed
- Defining and agreeing the area of research	 Define possible topics Asked to search for previous studies to fix the topic
Comments / observations / ren	narks by the Student
Remarks / Comments by the S	upervisor
Discussion on topics of interest	was done Advised to stick on the current topic as there is
a lot of scope for this area of re	esearch that could be explored during the 2 semesters.
(Cart	
Signature of Student: Bayan Ha	amad Signature of Supervisor:
Date: 20 March. 2019	Date:

MEC_PGC_FOR_011_01 Page 16 of 17
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Date: 28 March 2019



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Approval Date	20/03/2017	Effective Date	20/03/2017
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	 large organizations in Oman? Deciding the scope of the research Defining the content of literature review Request to complete ethics form
Comments / observations / rem	arks by the Student
Remarks / Comments by the Su	pervisor
Reviewed the research ethical a	pproval form. Discussed the scope of the dissertation
Signature of Student: Bayan Har	mad Signature of Supervisor:

Date:





Document Name & Type	MBA (IT) Dissertation Diary	Author/Department	Head, Centre for Postgraduate Studies
Approval Date	20/03/2017	Effective Date	20/03/2017
Review Date	17/01/2019	Next Review Date	16/01/2020

Name of Student: Bayan Mohammad HamadWeek: 2Name of Supervisor: Dr. Smitha Nair

Dissertation Topic: "Transforming ERP to i-ERP: A case Study of Medium and Large Organization's

Performance in Oman"

Date/ Day: 28 March 2019 Time: 11 -12 am Venue: Dr. Smitha Office

Tasks as per project plan	Actual tasks taken up / completed	
• Defining and agreeing on project topic and objectives	• Defining research topic : "Transforming ERP to i-ERP: A case Study of Medium and Large Organization's Performance in Oman"	
	Defining research objectives 1- To identify significance and barriers to implement i-ERP To investigate the metastic level of i EDD eduction	
	2- To investigate the maturity level of 1-ERP adoption.	
	3- To investigate how Machine Learning (ML)	
	supports ERP processes.	
	4- To investigate how Machine Learning (ML)	
	supports ERP processes.	
	5- To evaluate the effectiveness of i-ERP in medium and large organization's performance.	
	• Defining research Questions 1- What are the requirements and barriers to implementing i-ERP?	
	2- What is the maturity level of i-ERP adoption?	
	3- How Machine Learning (ML) supports ERP processes?	
	4- How i-ERP affects the performance of medium and	

MEC_PGC_FOR_011_01 Page 14 of 17
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Review Date	17/01/2019	Next Review Date	16/01/2020

Name of Student: Bayan Mohammad Hamad	Week: 3
Name of Supervisor: Dr. Smitha Nair	
Dissertation Topic:	
"Transforming ERP to i-ERP: A case Study of Medium and L	arge Organization's
Deutenmenes in Omen'	

Tasks as per project plan	Actual tasks taken up / completed
- Discussion of Research Methodology	 Fixing research methodology : Descriptive, correlation and Inferential Clarification of Proposal
Comments / observations / rer Remarks / Comments by the S	narks by the Student upervisor
Discussed about research meth	odology to be followed for the dissertation

Signature of Student: Bayan Mohammad	Signature of Supervisor:
Date: 5 April 2019	Date:

Diary – Spring / Summer / Fall

MEC_PGC_FOR_011_01 Page 13 of 17
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Review Date	17/01/2019	Next Review Date	16/01/2020

Name of Supervisor: Dr. Smitha Nair	
Dissertation Topic:	
"Transforming ERP to i-ERP: A case Study of Medium and Large Organi Performance in Oman"	zation's

Date/ Day: 13 April 2019 Time: 2 – 2:20 pm Venue: Dr. Smitha Office

Tasks as per project plan	Actual tasks taken up / completed	
- Introduction	- Defining the content of the introduction.	
Comments / observations / ren	narks by the Student	
Remarks / Comments by the Su	ipervisor	
Provided advice and suggestions on the subtopics in the initial chapter		

Signature of Student: Bayan Mohammad	Signature of Supervisor:
Date: 13 April 2019	Date:



Date: 22 April 2019



Document Name & Type	MBA (IT) Dissertation Diary	Author/Department	Head, Centre for Postgraduate Studies
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Review Date	17/01/2019	Next Review Date	16/01/2020

Diary – Spring / Summer / Fall

Name of Student: Bayan Mohammad Hamad	Week: 5
Name of Supervisor: Dr. Smitha Nair	L.
Dissertation Topic:	
"Transforming ERP to i-ERP: A case Study of Medium and Lan	rge Organization's
Performance in Oman"	

Date/ Day: 22 April 2019 Time: 3:00 – 4:00 PM Venue: Dr. Smitha Office

0 0.00400 DEVID NO 10 10 10		
Tasks as per project plan	Actual tasks taken up / completed	
- Proposal Review	- Proposal was reviewed and agreed	
Comments / observations / ren	narks by the Student	
	·	
Remarks / Comments by the S	unervisor	
Remarks / Comments by the 5		
Dissertation proposal was revi	owod	
Dissertation proposal was reviewed		
L		
Signature of Student: Bayan M	ohammad Signature of Supervisor:	

MEC_PGC_FOR_011_01	Page 11 of 17
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Name of Student: Bayan Mohammad Hamad	Week: 7
Name of Supervisor: Dr. Smitha Nair	
Dissertation Topic: "Transforming ERP to i-ERP: A case Study of Medium and Large Organiz Performance in Oman"	ation's

Date/ Day: 5 May 2019 Time: 11:30 – 12 am Venue: Dr. Smitha Office

Tasks as per project plan	Actual tasks taken up / completed
- Literature Review	 First draft of the literature review was submitted and reviewed Feedback was given
Comments / observations / ren	narks by the Student
Remarks / Comments by the Supervisor Feedback provided on the literature review chapter	

Signature of Student: Bayan Mohammad	Signature of Supervisor:
Date: 5 May 2019	Date:





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Name of Student: Bayan Mohammad Hamad	Week: 8
Name of Supervisor: Dr. Smitha Nair	
Dissertation Topic:	
"Transforming ERP to i-ERP: A case Study of Medium and Larg	ge Organization's
Performance in Oman"	

Date/ Day: 14 May 2019 Time: 2:30 – 3 pm Venue: Dr. Smitha Office

Tasks as per project plan	Actual tasks taken up / completed	
- Introduction and poster presentation	 First draft of the introduction was submitted and reviewed Feedback was given Discussion of methodology and research design Announcement to prepare the poster for presentation 	
Comments / observations / rer	narks by the Student	
Remarks / Comments by the S	upervisor	
Initial chapters were reviewed and provided suggestions		

Signature of Student: Bayan Mohammad	Signature of Supervisor:
Date: 14 May 2019	Date:

MEC_PGC_FOR_011_01 Page 9 of 17
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Approval Date	20/03/2017	Effective Date	20/03/2017
Review Date	17/01/2019	Next Review Date	16/01/2020

Date/ Day: 21 May 2019 Time: 8 – 8:45 am Venue: Dr. Smitha Office

Tasks as per project plan	Actual tasks taken up / completed
- Poster, Introduction and literature were Reviewed	 First draft of Methodology was submitted and. Review the research poster Feedback was given to add Gantt Chart and figure of methodology to the poster Introduction and literature review chapter were approved Discussion of writing the survey
Comments / observations / ren Questionnaire should be written	narks by the Student based on objectives, literature review and prior reports
Remarks / Comments by the S	upervisor
Poster for mid term presentati	on was reviewed

Signature of Student: Bayan Mohammad	Signature of Supervisor:
Date: 21 May 2019	Date:

MEC_PGC_FOR_011_01 Page 8 of 17
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Approval Date	20/03/2017	Effective Date	20/03/2017
Review Date	17/01/2019	Next Review Date	16/01/2020

Name of Student: Bayan Mohammad Hamad	Week: 10
Name of Supervisor: Dr. Smitha Nair	
Dissertation Topic:	
"Transforming ERP to i-ERP: A case Study of Medium and La	arge Organization's
Performance in Oman"	

 Date/ Day: 1 June 2019
 Time: 3 - 4 am
 Venue: Dr. Smitha Office

Tasks as per project plan	Actual tasks taken up / completed
- Data Collection	 Review survey questions Review questions of interview Feedback was given to edit questions' structure
Comments / observations / rer	narks by the Student
Remarks / Comments by the S	upervisor
Reviewed the questionnaires a	nd provided feedback

Signature of Student: Bayan Mohammad	Signature of Supervisor:
Date: 1 June 2019	Date:

Diary – Spring / Summer / Fall

MEC_PGC_FOR_011_01 Page 7 of 17
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Approval Date	20/03/2017	Effective Date	20/03/2017
Review Date	17/01/2019	Next Review Date	16/01/2020

Name of Student: Bayan Mohammad Hamad	Week: 11
Name of Supervisor: Dr. Smitha Nair	
Dissertation Topic:	
"Transforming ERP to i-ERP: A case Study of Medium and L	arge Organization's
Performance in Oman"	

<u> </u>		24
Date/ Day: 8 June 2019	Time: 10-11	Venue: Dr. Smitha Office

Tasks as per project plan	Actual tasks taken up / completed
- Methodology and Questionnaire	 Submit first draft of research Methodology Interview questions and survey were approved Getting NOC letter from the college to start collecting data online through (Google survey) and interview.
Comments / observations / ren	narks by the Student
Remarks / Comments by the S	upervisor
Reviewed research methodolog	y chapter

Signature of Student: Bayan Mohammad	Signature of Supervisor:
Date: 8 June 2019	Date:





Document Name & Type	MBA (IT) Dissertation Diary	Author/Department	Head, Centre for Postgraduate Studies
Approval Date	20/03/2017	Effective Date	20/03/2017
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	the could have
Name of Supervisor: Dr. Smitha Nair	·
Dissertation Topic:	
"Transforming ERP to i-ERP: A case Study of Medium and Large Organ	ization's
Performance in Oman"	

Date/ Day: 16 June 2019 Time: 11-11:30 am Venue: Dr. Smitha Office

Tasks as per project plan	Actual tasks taken up / completed
 Research Methodology Track Progress 	- Research Methodology chapter was approved
Comments / observations / rer	narks by the Student
Remarks / Comments by the S	upervisor
Reviewed the Project Manager	nent chapter

Signature of Student: Bayan Mohammad	Signature of Supervisor:
Date: 16 June 2019	Date:





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Review Date	17/01/2019	Next Review Date	16/01/2020

Name of Supervisor: Dr. Smitha Nair	
Dissertation Topic:	
"Transforming ERP to i-ERP: A case Study of Medium and Large Or	ganization's
Performance in Oman"	

Date/ Day: 24 June 2019 Time: 2:30 – 3:15 pm Venue: Dr. Smitha Office

Tasks as per project plan	Actual tasks taken up / completed
- Research Analysis	 Entering the survey data in PSPP software. Approve research Findings and analysis statistic to be applied. Request to start Analysis Chapter, project management.
The analysis chapter should be c techniques)	ompleted based on research methodology chapter (Analysis
Remarks / Comments by the S	upervisor
Provided advice on the statistic	cal software and the respective chapter
Signature of Students Down M	above ad Signature of Supervisory
Date: 24 June 2019	Date:

MEC_PGC_FOR_011_01 Page 4 of 17
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Document Name & Type	MBA (IT) Dissertation Diary	Author/Department	Head, Centre for Postgraduate Studies
Approval Date	20/03/2017	Effective Date	20/03/2017
Review Date	17/01/2019	Next Review Date	16/01/2020

Name of Student: Bayan Mohammad Hamad	Week: 20
Name of Supervisor: Dr. Smitha Nair	
Dissertation Topic:	
"Transforming ERP to i-ERP: A case Study of Medium and La	arge Organization's
Performance in Oman"	

Date/ Day: 18 August 2019 Time: 8 – 9 am Venue: Dr. Smitha Office

Tasks as per project plan	Actual tasks taken up / completed
 Project Management Chapter Finding and Analysis Chapter 	 First Draft of Analysis and Project management chapter were submitted. Feedback was given to add Gantt Chart in Project Management Chapter Feedback was given on analysis chapter regarding to design and adding conclusion at the end of the chapter Request to write the conclusion
Comments / observations / ren Each chapter should be complete	narks by the Student ed before proceeding with the next chapter
Remarks / Comments by the S Analysis chapter was reviewed	upervisor
Signature of Student: Bayan M	ohammad Signature of Supervisor:

Signature of Student: Bayan Mohammad	Signature of Supervisor:
Date: 18 August 2019	Date:

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Approval Date	20/03/2017	Effective Date	20/03/2017
Review Date	17/01/2019	Next Review Date	16/01/2020

Name of Student: Bayan Mohammad Hamad	Week: 21
Name of Supervisor: Dr. Smitha Nair	
Dissertation Topic:	
"Transforming ERP to i-ERP: A case Study of Medium and Lar	ge Organization's
Performance in Oman"	

Date/ Day: 1 Sep 2019	Time: 9-10 am	Venue: Dr. Smitha Office

Actual tasks taken up / completed		
 First Draft of the research was submitted Feedback was given to adjust conclusion and Request to reduce the number of words 		
marks by the Student		
apervisor was helpful and help in facilitating progress and l organized order		
upervisor		
cussed. Feedback provided on the final chapters		

Signature of Student: Bayan Mohammad	Signature of Supervisor:
Date: 1 Sep 2019	Date:





Document Name & Type	MBA (IT) Dissertation Diary	Author/Department	Head, Centre for Postgraduate Studies
Approval Date	20/03/2017	Effective Date	20/03/2017
Review Date	17/01/2019	Next Review Date	16/01/2020

k: 21	Week: 21
s	nization's

 Date/ Day: 4 Sep 2019
 Time: 3-4 pm
 Venue: Dr. Smitha Office

Tasks as ner project plan	Actual tasks taken up / completed	
- Research Final Draft	 Final draft of the research was submitted and approved 	
Comments / observations / remarks by the student		
Remarks / Comments by the Supervisor		
Reviewed the final draft thesi	s	

Signature of Student: Bayan Mohammad	Signature of Supervisor:
Date: 4 Sep 2019	Date: