An In Depth Analysis of Digital Business Ecosystem with Moderating Effect of Enterprise Resource planning. A Case Study of Pakistan SME's

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CERTIFICATE

This is to certify that this thesis entitled: **"An in Depth Analysis of Digital Business cosystem with Moderating Effect of Enterprise Resource Planning. A Case Study of akistan SME's"** submitted by Ms. Nayab Javaid is accepted in its present form by the epartment of Business Studies, Pakistan Institute of Development Economics (PIDE), lamabad as satisfying the requirements for partial fulfillment of the degree of **Master of hilosophy in Business Economics**.

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Dedication

This thesis is dedicated to my mother, siblings, my teacher and my friends for always believing in me, inspiring me and encourage me to reach higher in order to achieve my goals.

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"Trust in Allah with all your heart and lean not on your own understanding; in all your ways acknowledged him, and he will make your path straight."

All thanks and praises to ALLAH Almighty, the merciful, the compassionate, who provided me the opportunity and strength to complete the research work within the stipulated time.

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Nayab Javaid

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LIST OF ABBREVIATION

SME'S	Small Medium Enterprises
ERP	Enterprise Resource Planning
DBE	Digital Business Ecosystem
TECH	Technology
BE	Business Environment
CK	Competence Knowledge
ICT	Information & Communication Technology

ABSTRACT

Digital Business Ecosystem is one of the most important factors to make the project successful. The purpose of this study was to analyze the enterprise resource planning moderating effect on the digital business ecosystem on the competence knowledge of the technology and the business environment of IT companies (SMEs) of Pakistan. The questionnaire was distributed among the respondents and 216 questionnaires were recorded for the data analysis process. Questionnaires were distributed among the employees of small and medium enterprises (SME'S) i.e. Islamabad, Rawalpindi, Lahore, and Faisalabad. To analyze the result, I utilized the method of structural equation (PLS-SEM) using the SmartPls software. This technique is applied to the data of 216 employees of small and medium enterprises. The first step is to find out the relationships between Technology, Business Environment, Competence Knowledge and Digital Business Ecosystem with the moderation effect of Enterprise Resource Planning. After the analysis, we find out that the moderation effect of Enterprise Resource Planning on Technology and Competence Knowledge and also on Business Environment is insignificant with the viewpoint from Pakistan, so we reject the hypothesis because there is no relationship between them.

Key Words: Digital Business Ecosystem, Technology, Business Environment, Competence Knowledge and Enterprise Resource Planning.

CHAPTER 01

INTRODUCTION

1.1 Introduction

A business ecosystem is an energetic structure interconnected with the population of organizations. Organizations may be universities, research centers, small firms, large corporation, public sector organizations and other parties which affect the system. An ecosystem is an environment of self-sustainment, collaboration, self-organization, and development. The ecosystem exists in nature as abiotic and an abiotic species with the biological ecosystem and their physical environment. The digital business ecosystem is a European concept, establish the digital infrastructure to create a digital environment for networking Nachira et al. 2007.

If we tend to follow the principle of convolution, the business ecosystem ought to be independent. This implies that government interference isn't needed to survive in a very native or world market. The profitable ecosystem contributes to variation through an organization, prevalence, and co-evolution. Within the business ecosystem, there's competition and cooperation at a similar time. The digital business ecosystem relies on the surroundings and properties of measurability, organization, property, and self-adoptability that are galvanized by the natural ecosystem. This could be capable of supporting the cooperation, sharing of information and development of open technologies and adjective technologies and organic process business models (Nichira and louarn, 2007).

Some important and basic features of digital business ecosystems support collective learning development, creation of innovation, the flow of efficient knowledge and the implementation of the other actors with the ecosystem. The first research was conducted

on the digital ecosystem, around 2000, once the action set up of Europe 2002 (Council of the European Commission, 2000) establish the digital ecosystem term.

After that, the digital business ecosystem community was shaped (Nachira et al. 2007). From 2004 to onward, the concept of the Digital Business Ecosystem was also supported by the other European projects. The digital ecosystem provides the advantages of information and communication technology (ICT) in terms of enhancing the dynamic interactions in network surroundings by networking numerous and diverse actors. Through the natural system options, it's simple to provide innovation at a comprehensive level and additionally economic development. The thought of the digital system was promoted and developed by the digital system community distinguishes itself from the idea of open supply and peer-to-peer nature, a loosely coupled server system (Nachira and Louarn, 2007).

Within the field of the digital business system, the self-regulation options play a crucial role. Through economical electronic services, ICT supports social science and biological development. The main role of the Digital Business system is to assembling and enhancing the economical and relationships with the system. In line with Fukuyama (1995), to extend and to keep up the high level of trust ends up in property growth and development.

Digital Business Ecosystem has grown its roots from a natural ecosystem. The natural ecosystem provides digital clothing to the business ecosystem. Digital Business ecosystem has started as a necessity to revolutionize the business ideas, tradition business models. The digital ecosystem gives a brand new method of technology to create the Digital Business ecosystem. The natural ecosystem is an Associate in Nursing

setting referring to a specific space of physical element containing all the living and non-living organisms in it.

Digital Business Ecosystem (DBE) could be a combination of the Digital ecosystem (DE) and Business ecosystem (BE).

The digital Business ecosystem is outlined by the numerous different authors in many alternative ways. A combined definition would be that it's a distributive, loosely coupled, demand-driven, self-organization, cooperative software package setting, wherever every entity is sort of responsive and proactive. All the entities are connected via digital infrastructure to get the benefits. Digital Business Ecosystem accomplishes by adopting information and communication technology (ICT).

DBE Basic Definition,

The business ecosystem is an associated economic community supported by a foundation of an interacting organization and people of the business world.

Digital Business Ecosystem is very useful and a great help for SMEs by allowing them to expand at a global level. Using the Digital Business Ecosystem technologies, SMEs can get access to the global level. Digital Business Ecosystem is an association with the SMEs of the region to compete globally with the customers, competitors and partner organizations. Due to the interactions and knowledge sharing, the SMEs enables go towards new ideas, innovations of the business model and able to adapt like a changing market. The digital business ecosystem is becoming part of a new generation of information and communication technology (ICT). SMEs users can interact with each other with the help of technology. It is an open-source internet-based infrastructure that is providing a free mutual ground, where all the business organizations of Pakistan can

manage, compete and cooperate equally. Some characteristics of the Digital Business Ecosystem are:

- DBE will turn the internet into a successful environment where facilities can be settled and brought into true spirits.
- DBE will be freely licensed and based on the open-source principle.
- There will not a single owner of the technology.
- Any organization will not control or dominate the DBE.

It is hoped that through analysis, the Digital Business Ecosystem trend will help to set the Pakistan SMEs filing to its succeeding deployment.

Digital Business Ecosystems can provide SMEs with great competitive advantages. Small and Medium Enterprises for any developed economy is the most important sector. SMEs are the greatest and largest source of services and employment. They represent a significant part of the value. They're conjointly the most supply of recent innovations. Innovation, development, and property of the economy have a straight relationship with the strength and success of those tiny and medium enterprises businesses. In the field of business analysis, the Digital Business ecosystem could be a new conception. It had been coined within the capital of Portugal Agenda in March 2000 and after that Digital Business Ecosystem projects were managed by the European Framework Program (FP6) and (FP7). By taking into consideration that the biological ecosystem is hoping to achieve it, specifically how the biological ecosystem is defined, how it progress and how it can be classified and organized.

To get a formal definition for the biological ecosystem checked out the few dictionary definitions first. According to The New Shorter Oxford English lexicon (1993), a

biological ecosystem is "a system of organism sleep in a habitation, in conjunction with those options of the bodily surroundings with that they interrelate". The Merriam-Webster Third New International lexicon of nation Language (1986) defines a biological ecosystem as "a community of living creatures with air, water, and alternative sources". World Resources Institute (2001, 11) declares that "ecosystems don't seem to be simply accumulations of species, they're organisms joined of biological and no biological matter and natural powers that collaborate and change". Each ecosystem signifies a result of a particular challenge to life (WRI 2001, 3). Cells, ecosystems and economic systems area unit they're} conjointly "real equilibrium systems" and thus act in ways in which are their "own straight explanations" (Kauffman 1995, 22).

The biological ecosystem is divided into main 5 classes, fresh system, forest, coastal ecosystem, agroecosystem, and biome.

Frosch and Gallopoulos (1989) were introduced to the industrial ecosystem concept in Scientific American. The basic idea behind this is to protect the environment by natural means. The industrial ecosystem is an equivalent of a biological ecosystem, where all physical material is reprocessed extremely and professionally. This concept is barely managed in any industrial processes however the modification of behaviors of each producer and customer would facilitate the United States of America to sustain our standard of existing while not shattering the surroundings (Frosch & Gallopoulos 1989, 145). Korhonen et al. (2001, 146) offer a sample of associate degree industrial ecosystem's completely different quantitative and energy drifts in Finnish biological science trade. They need to be separated the pours into four collections containing the

carbon, wood matter, energy, and nutrients. As issues to energy, the goal is decreasing the utilization of non-sustainable fuel (Korhonen et al. 2001, 150).

Three main objectives of the industrial ecosystem:

1) Effective use of virgin solid

2) Smallest use of virgin material

3) Minimum and not hurtful waste (Korhonen et al. 2001, 148).

Mitleton-Kelly (2003, 23) with on a social ecosystem, the organizations are always co-evolving. Mitleton-Kelly (2003, 29) highlights that co-evaluation cannot occur in segregation, but it happens with the ecosystem. In society, the people or societies are perpetually growing in a very cooperative atmosphere that is named as an ecosystem. Mitleton-Kelly's social ecosystem put together organizations contributes and that they are prejudiced by the businesses of every alternative and are being influenced by the co-existing bodies among that quite common ecosystem. The key purpose in describing a social ecosystem is that the reciprocity between the objects. One necessary spectacle among a social ecosystem is co-evolution. Rothschild (1990, xi) shapes that "an industrial economy is completed as a living ecosystem. Laissez-faire economy looks like a living ecosystem.

The economic ecosystem determined the natural living sort of a natural ecosystem as a key development. Some characteristics of the economic ecosystem are exploitation, collaboration, competition, co-operation, learning, and growth. According to Rothschild, the necessary motivation accountable for the amendment in economic is surprisingly associated with those that originate in the natural ecosystem. Though, deviations within the economic ecosystem are a lot faster than those that originate in

the natural ecosystem. Rothschild offers the name of his economic ecosystem as environmental science. Rothschild provides a sort of analogies among economic and natural ecosystems. In his analogy, organizations function biological organisms and conjointly industries as species. Just like the species and therefore the organism that frames the ecosystem at an international level, the world's industries and companies conjointly frame the impromptu coevolved to make a living ecosystem. Similar to the entities and categories that make the general ecosystem, the world's organizations and businesses have impetuously co-evolved to make an enormous living ecosystem (Rothschild 1990, 337). Rothschild's ecosystem effectiveness is glad by existence. Inadequacy, what is more, is disciplined by extermination. (Rothschild 1990, 224).

Pakistan's ICT industry is heavily influenced by the overall media landscape of the country. By the end of 2008, Pakistan had 350 newspapers, 74 radio stations, 70 private TV channels, 1600 cable operators, 3.5 million cable subscribers and over Rs.10 billion of investment in satellite (Hamid, 2008). Pakistan is a country where about 60% of its population is in the 15 to 29 years of the age group which shows a huge human capital. The country has more than 2000 IT companies and continuously increasing in numbers every year, the workforce of around 300,000 IT professionals who are experts in the ongoing and emerging IT products. The universities produce more than 20 thousand IT degree holders and engineers every single year. Presently, Pakistan has 14 Software robotics parks (a type of IT dedicated commercial building). Pakistan's IT-based exports have increased twenty times in the last ten years and stand at $2.4 billion.

Pakistan has from time to time developed various policy instruments for the promotion of the SME sector (SMEDA, 2017). The central bank of the country, SBP; the Small and Medium Enterprises Development Authority, SMEDA; the Security and Exchange

Commission of Pakistan, SECP, Pakistan Software Houses Association the Ministry of Information Technology (MOiT) and various provincial ecosystems such as Prime Minister Youth Business Loans (PMYBL) and e-Rozgar Ecosystem have been launched to tap on the potential of ICT SMEs of the country (SMEDA, 2017).

1.2 Problem Statement

Normally people know about the Digital Business Ecosystem and its role and impact on SMEs. With new opportunities and innovations in ICT, SMEs have to face new threats. A digital business ecosystem is a new approach for SMEs to enter into the market at the global level, innovations and compete with large corporations in the world (Strommen-Bakhtiar, A and Razavi, A. 2008).

The researcher could not have accessed any research study dealing with the DBE on any success of the project. Digital Business Ecosystems can provide SMEs with great competitive advantages. Therefore, this study will investigate the link between Technology, Business Environment and Competence knowledge towards the Digital Business Ecosystem while examining the moderating role of Enterprise Resource Planning.

1.3 Significance of the Study

This study will improve the capability of small and medium enterprises and provide a digital policy as a modern means. Digital Business Ecosystem is very useful and a great help for SMEs by allowing them to expand at a global level. Using the Digital Business Ecosystem technologies, SMEs can get access to the global level. Digital Business Ecosystem is an association with the SMEs of the region to compete globally with the customers, competitors and partner organizations. In the complex era of technology coupled with talent capability firms maximize their profit with many innovations and

applied tactics, this made competition much more complex and demanding. Digital Business Ecosystem provides a platform for new innovations, adoption of new technologies and also able to compete with others at a global level.

1.4 Research Gap

The moderator role of Enterprise Resource Planning as the link between Technology, Business environment and Competence knowledge towards the Digital Business Ecosystem is examining. This study will thus fulfill the gap by applying the digital business ecosystem in SMEs showing the link between technology, business environment and competence knowledge (Khalil, Dominic, Bin Hassan & Mushtaq, 2011).

This new finding strategy will support long term or groundbreaking research.

1.5 Research Questions

1. What is the impact of the Digital Business Ecosystem on SMEs?
2. What is the relationship between Technology and Digital Business Ecosystem?
3. What is the relationship between the Business Environment and Digital Business Ecosystem?
4. What is the relationship between the Competence Knowledge and Digital Business Ecosystem?
5. Does Enterprise Resource Planning moderates the relationship between Technology, Business Environment, Competence Knowledge and Digital Business Ecosystem?

1.6 Research Objectives

1. To evaluate the impact of the Digital Business Ecosystem on SMEs.
2. To examine the Moderating role of Enterprise Resource Planning between the Digital Business Ecosystem.
3. To examine the Moderating role of Enterprise Resource Planning between Technology, Business Environment and Competence Knowledge.
4. To investigate the victims of prevailing problems.
5. Finding the combined effect of Enterprise Resource Planning on Digital Business Ecosystem, Technology, Business Environment, and Competence Knowledge.

CHAPTER 02

LITERATURE REVIEW

2.1 Digital Business Ecosystem

A digital business system is assembled once the acceptance of Internet-based technologies for business is on its level wherever "business facilities and also the computer code modules area unit maintained by a rife computer code state of affairs, that indications associate degree organic process and self-organizing performance" (Nachira 2002, 10).

2.2 Moore's Business Ecosystem

The author classifies the people and interacting organizations as an organism of a business system. They support the business world and check out to show it into associate degree system wherever they're impetuously coordinated with one another and everyone other organisms or entities that exist within the system. As per Moore business system contains customers, stakeholders, producers, competitors, distributors, and suppliers. Corporations that attaining a leader's role is key to the business system and referred to as "the keystone species" (Moore 1996, 9, 25, 26). Such organizations or corporations are tendency setters and influence the co-evolutionary processes. Moore additionally outlines the business system as associate degree "extended system of equally accessory organizations, suppliers, financing, customary bodies, communities of consumers, lead producers, trade association, different stakeholders, brotherhood, government establishments, quasigovernmental establishments and different interested parties (Moore 1998, 168). Moore any arguments concerning the term "business ecosystem" ought to get replace the span of "industry" as a result of economic activities can't be connected with the actual trade.

2.3 Iansiti and Levien's Business Ecosystem

Iansiti and Levien (2004) used to study a business system by the employment of a biological system or natural system. They discuss each of the ecosystems and argue that there's a relationship among each of the ecosystems. The results of their research show that each biological system and business system, organisms share typical living surroundings and that they rely upon one another for his or her sustained existence.

The business system feature embodies connectedness, fragmentation, competition and cooperation (Iansiti and Levien, 2004, 35).

Iansiti and Levien (2004, 46) 3 vital success factors of business system, productivity, sturdy and talent to make opportunities.

Iansiti and Levien (2004) gift the four different roles concerning the business system that a company will take,

- Keystone Organizations
- Niche Players
- Dominators
- Hub Landlords

Each of them plays a vital role in the business ecosystem.

2.4 Definitions of Variables

2.4.1 Technology

As we all know that digital technology becomes so advance and reshaping the social activities at a large scale, which we can say short as digital transformation.in our daily routine, Digital technologies became absorbed, persuading the approach we tend to work, our statement and shopper performances (Aral et al. 2013; McDonald and Russel-

Jones 2012). Moreover, digital technologies more providing to the changed different desires of shoppers to associate the physical with the digital world (Henfridsson et al. 2014). As an associate outcome, businesses through industries area unit suffering a distinction of apace dynamical demands (Priem et al. 2013), it currently even affects areas that have perpetually relied on physical materiality.

From the elemental question on SME start-up, business funding to SME internationalization method, technology perpetually happens to be the necessary variables for SME (Chong, 2012; Rahman et al., 2014). Technology alone is essentially spoken the machinery, tools and instrument to hurry up business operations (Radam et al., 2008; Saunila et al., 2014) whereas innovation, on the opposite hand, manages to drill the culture of making one thing new and valuable whether or not a brand new product or service, production method, structure or body system (Hult et al., 2004; Tseng, 2014). In general, SMEs operate at low levels of technology (Bharati and Chaudhury, 2015; Kurnia et al., 2015) that generate lower productivity. Further, technology additionally had been placed mutually thanks to the following innovation in business. Technological innovation refers to the method by that corporations implement the strategy and begin production of products/services that area unit new the business regardless of whether or not the products/services area unit new their competitors or their customers or the planet (Mytelka and Farinelli, 2000).

2.4.2 Business Environment

Small and Medium Enterprises (SMEs) constitute one of the most important sectors of any developed economy. They're the biggest sources of employment and represent a significant part of any nation's GDP. In several cases, they're conjointly the supply of innovation. Supporting tiny and Medium-sized Enterprises (SMEs) is thus one of the

most important economic policies for many international players. The innovation, growth, and property of the economy have an on the spot relationship with the vitality and success of those tiny businesses (Amir R Razavi et al. 2010). The innovations, affiliations, competition, and collaborations of those enterprises depends on many factors from a healthy economy and this is often one among the explanations, despite their crucial roles in different aspects of society, for the support and hefty investment in them, provided in a very massive scale (Paul J Krause et al. 2010).

2.4.3 Competence Knowledge

Although e-learning systems and technologies have evolved significantly and matured somewhat since the origination, practitioners, and teachers should still be attentive within the method they apply technology and construct e-learning contents. They need to endlessly think about new concepts, new learning ways and make the most fashionable technology to accommodate the popular learning designs concerned in e-learning (Vanessa Chang Jiang and Christian Get. 2007).

Over the past few years, several have tried to develop e-learning systems to form learning more practical, less costly and adjustable to the wants of the individual learner (C.Trummer.2005). The educational ecosystem conditions characterize vital elements of an ecosystem's learning system and that they square measure suffering from external and internal influences. Normally these conditions square measure dynamic and changing, however, potential impacts on the system rely on the lifecycle of the examined system. The conditions are also driven by the business to use staff with outstanding skills, influenced by domain data and government policy like changes to the tutorial learning strategy or changes in course info.

2.4.4 Enterprise Resource Planning

Enterprise Resource coming up with is a business method management package that enables a company to use a system of integrated applications to manage the business and change several back workplace functions associated with technology, services, and human resources.

Jacobs and Bendoly (2003) outlined ERPs as cherish "business structures, abundant within the same manner that physical highway organizations do" (p. 234). Davenport (1998) outlined ERPs as "multifaceted fragments of software" (p. 122) whose application demanded nice capitals; they could deliver profits. Bingi et al. (1999) additionally counseled, implementation disaster might need incurable consequences.

ERP systems don't seem to be simple systems that generate knowledge from daily operations, however, it also is a very important tool for providing data for deciding. The findings of this study can facilitate SMEs to higher implement ERP systems as a result of they cannot learn through trial and error and face negative economic prices within the long-run failure to recover ERP system investment. This study can highlight the priorities that SMEs have to be compelled to target to extend their possibilities of gaining ERP system advantages.

Enterprise resources coming up with (ERP) systems square measure extremely advanced data systems. The implementation of those systems may be a troublesome and high-value proposition that places tremendous demands on company time and resources (Elisabeth J. Umble et al, 2003). A sure-fire ERP project will cut the fat out of operative prices, generate additional correct demand forecasts, speed production cycles, and greatly enhance client service. ERPs emerged by the first Nineties by integration programs that in the previous decade's existed singly across practical areas

(Jacobs and Edward Weston Junior., 2007. Mabert et al. (2003b) outlined ERPs as "enterprise-wide on-line interactive systems that support cross-functional processes employing a common database" (p. 302). Al-Mashari et al. (2003) prompt that a basic ERP consisted of information, associate application, associated an integrated interface.

2.4.5 SMEs

SMEs usually indicate tiny and medium-sized enterprises however there's no agreement on one definition of SMEs and because of this complication, it's tough to outline SMEs. Looking at their contribution within the economic development moreover as their existing social conditions, variations exist concerning the definition of SMEs between countries and even inside a similar country between completely different sectors and governmental agencies (Dar et al., 2017). There's no uniform definition of SMEs within the literature but, European Commission outlined SMEs as those corporations that use lesser than 250 workers. In West Pakistan, SMEs are outlined otherwise by numerous sources particularly "Small and Medium Enterprises Development Authority (SMEDA)" Sindh Industries Department, Federal Bureau of Statistics, geographic area tiny Industries Corporation, banking company of West Pakistan, SME Bank and geographic area Industries Department (SMEDA, 2018).

Due to the importance of trade and commerce, the government of West Pakistan has established a body to market SMEs that is understood as "Small and Medium Enterprises Development Authority" (SMEDA). The most responsibility of SMEDA is the formulation of policies to market and facilitate SMEs. Further, it helps in the provision of coaching and education to entrepreneurs (Hyder & Lussier, 2016).

However, the definition of SMEs provided by SMEDA that defines "SMEs as corporations having up to 250 workers and paid-up capital up to Rs. twenty-five Million

and annual sales up to Rs. 250 Million" (SMEDA, 2018). Moreover, SMEs are in the main categorized as tiny or medium on the idea of the range of workers within the firm; because it is sort of tough to urge money info from SMEs in West Pakistan (Hafeez, 2014).

SMEs are vital for economic development and development of nations. Pakistan, SMEs will dominate the trade and promote economic development, wealth creation and impoverishment reduction. Sher Ayub (2016) realize that SMEs tributary regarding four-hundredth of GDP West Pakistan, SMEs account for regarding ninety-two of firms in West Pakistan and regarding seventy-eight of commercial workforces. Therefore, the importance of SMEs in Pakistan's growth is incredibly vital. SMEs play a very important role in the expansion of the economies of developing countries. SMEs also are referred to as major sources of the use of generation for numerous countries (Dundon & Wilkinson, 2018). However, Chiang (2018) explicit that, few studies are conducted related to the SME's performance in developing countries together with West Pakistan. In West Pakistan, few studies are characterizing the impact of innovation capabilities on SME's performance (Haroon et al., 2013).

SMEs contribute fifty-nine .59% to the GDP of West Pakistan and share eightieth of the overall job employment (SMEDA, 2010; international Entrepreneurship Monitor, 2012; Ministry of Finance, Government of West Pakistan, 2017. consistent with Economic Survey of West Pakistan (2017), ninetieth of the Pakistani businesses are SMEs (Ministry of Finance, Government of West Pakistan, 2017) and little businesses are extremely vital for developing counties (Rao, 2014; Ratten, 2014; Hyder and Lussier, 2016). However, solely four-hundredth has communication code for business

operation (Ahmed et al., 2010). This reality could be a clear sign that SMEs have a lack of IT data.

Researchers claimed that latest information on Pakistani SMEs isn't out there (Hyder and Lussier, 2016) however; Ahmed et al. (2010) unconcealed that the majority of Pakistani SMEs has not advanced telecommunications and interconnectivity capabilities, as solely four-hundredth SMEs have communication code

2.4.6 Enterprise Resource Planning and SMEs

Due to its complexity and price tag, the Enterprise Research Program (ERP) system has traditionally been used by large companies. However, many software companies, from leading SAP companies to Microsoft ERP software companies, target products and services to small and medium-sized enterprises (SMEs). With cloud computing and improved technology infrastructure, SMEs can now have an IT platform similar to their larger challengers. The implementation of an ERP system is a complex process, and many issues affect the successful implementation of these systems.

Experts in the field, feel pressured by top management to complete implementation with fewer resources and time, which leads to high failure rates for ERP system implementation. This study helps identify key success factors that have the greatest impact on SME ERP implementation, with a focus on factors that increase the likelihood of successful implementation of these systems. The study also focuses on decision support aspects of system implementation, from factors related to conclusion support to self-assurance in decision making as system outputs.

As with several different technological advancements, ERP systems were at first enforced primarily in massive organizations. Their relative absence from SMEs could also be the most reason why analysis focuses on massive firms (e.g. Somers and

Viscount Nelson, 2001; Mabert et al., 2003b; Mandal and Gunasegaram, 2003; Umble et al., 2003; Nah and Delgado, 2006). However, recently, vendors have begun to supply SME-specific ERP (Bingi et al., 1999; Bell and Orzen, 2007; Deep et al., 2008).

ERP focuses on 3 ways. First, it identifies the factors which will achieve success and unsuccessful in implementing ERP in SMEs. Second, it explains however and why bound factors could apply to SMEs. Third, it strengthens the requirement for doing additional analysis of data technology (IT) for SMEs.

2.5 Relationship between Technology and Digital Business Ecosystem

The digital business ecosystem creates new forms of value creation in the network where the digital groundwork improves the appliance of self-organization (Weber P et al. 2017). The digital business system community appreciated that bring existence into info and communication technologies (ICTs). It facilitates to attain the objectives and challenges i.e. higher jobs, higher growth and social inclusion (COM 2004). This technique, useful to social and economic procedures and their digital image, is reliable with the changes within the invention processes transported by networks of users or producers (Benkler, 2006), that explained the processes of technological and social invention and have helped the USA imagine the event of business policy (O'Callagan, 2004).

Therefore, the foundation of the Digital Ecosystem Initiative is that public sector interventions should aim to create favorable conditions for businesses. The optimal intervention scale is considered to be at the regional level, and multi-stakeholder policy development and implementation processes may be more effective (Nachira, F, Dini, P, & Nicolai, A. 2007). The policy of supporting SMEs shifts from a personal approach to a background-focused approach, aiming to create an environment conducive to SME

business and its network, consistent with the "helping SMEs move to the digital" (EC,2001a). It includes three features:

- Promote a framework and favorable condition for the businesses.
- Provide the facilities to the businesses.
- Information and communication technology (ICT) skills are provided.

The digital business ecosystem is a technical infrastructure that is based on the peer to peer software technology, connect the services and information through internet links. It is specially designed to integrate, enable businesses to create and to operate both software services and the real-world for SMEs through a digital network (Cruz and Campos, 2004). The DBE is easily affordable for small companies as well as for larger companies because it is open-source software licensed. Peer to peer software means that every single company can use it and there is no dominant company, so every company has equal rights. DBE required both the knowledge and the technology.

We have sure that industrial business, on their planned levels of business prototypes and ecosystems (Priem et al. 2013), are regenerate by the digital invention, i.e., groupings of digital and physical options for a brand new product (Yoo et al. 2010). Therefore, the foremost essential levels of the IT business revolution celebrated by Venkatraman (1994). Through digital technologies, the organizations can deliver the goods the main business enhancements, like making new models for businesses (Fichman ET a. 2014).

Digital technology converts into advance technology and redesigning the activities of societies at a giant scale that maybe say as digital transformation in our daily routine. Digital technologies became fascinated, influence the approach our effort, our

declaration and client routines (Aral et al. 2013; McDonald and Russel-Jones 2012). Moreover, digital technologies square measure progressively providing to the custom-made completely different wants of shoppers to subordinate the physical with the digital world (Henfridsson et al. 2014). As a result, businesses through industries square measure suffering a distinction of hurriedly variable demands (Priem et al. 2013).

H1: Technology would be positively associated to Digital Business Ecosystem.

2.6 Relationship between Business Environment and Digital business Ecosystem

Maintaining an associate degree optimized model for supporting the enterprise relationships wants a compound illustration. One in every of the well-known metaphorical tries for grasping this complexness is that of a 'business ecosystem'. This describes the business atmosphere as an associate degree economic community that "is supported by a foundation of interacting organizations and people, the organisms of the business world." (J.F Moore. 1993)

With the introduction of the net and accumulated property, "Digital Business Ecosystems" are introduced as associate degree evolution within the business world. (F.Nachira. 2002). Stimulated by the natural Ecosystems, Digital Ecosystems square measure is seen as having four properties, Interaction and engagement, Balance, Domain clustered and loosely coupled and organization (E. Yangtze and M. West. 2006).

The synthesis of the idea of Digital Business Ecosystems emerged in 2002 by adding 'digital' ahead of Moore's (1996) "business ecosystem" within the Unit ICT for the business of the board of director's General info Society of the European Commission.

A Digital Business system results from the structurally coupled and co-evolving digital system and business system. A network of digital ecosystems can provide opportunities for participation within the world economy to SMEs and less developed or remote areas. These new styles of dynamic business interactions and world co-operation among organizations and business communities, enabled by digital system technologies, square measure deemed to foster native economic processes. This can preserve native information, culture, and identity and contribute to beat the digital divide." (European Commission. 2008)

Increasing the conversion of business processes, products, and services makes it imperative to develop a more robust understanding of digital business methods. Digital methods like investments generally info technology and IT outsourcing square measure major components of overall business strategy, generally permitting companies to differentiate from competitors and alternative times making demands to evolve to competitive norms (Tafti et al. 2013).

At the foremost general level, strategic posture could be a firm's level of activity during a given strategic dimension relative to the business average. analysis in strategic management argues that a firm's strategic posture relative to its competitors at any purpose in time influences in progress decisions concerning R&D, marketing, innovation, and alternative activities (Mol and Birkinshaw 2009; Porter 1979; Smith et al. 2001). According to Nachira (2002: 18), the Digital Business system is meant "to produce associate degree integrated, distributed pervasive network of native digital ecosystems for little business organizations and for native e-governance that collaborate the exchanging dynamically resources, applications, services, and knowledge". It additionally addresses the vast challenges related to structure and cultural variations

that affect the activities of SMEs (Burn 2000; Hornby et al., 2004). This can be particularly therefore only if SMEs tend to avoid legal risks like those encountered in cross-border commerce (Nachira 2002:6). Our purpose here is to ascertain a mental object of restrictive problems, making ready the bottom for the more elaboration of restrictive design and governance models within the field.

The innovations, affiliations, competition, and collaborations of those enterprises depends on many factors from a healthy economy and this can be one in every of the explanations, despite their crucial roles in alternative aspects of society, for the support and extended investment in them, provided during a massive scale (Paul J Krause et al. 2010).

H2: Business Environment would be positively associated to Digital Business Ecosystem.

2.7 Relationship between Competence Knowledge and Digital business Ecosystem

Dini, P., & Nicolai, A. (2003), The Digital Business system project aims to supply AN ASCII text file distributed atmosphere which will support the spontaneous evolution and composition of software system services, components, and applications. We tend to believe there's a lot of to be gained from basing the complicated and distributed software system technology that the Digital Business system would require on style principles and theoretical models derived from the physical and biological sciences so theories of organization and algorithms from organic process computation area unit of key importance.

The idea is to get, through the Digital Business system, a software system that will adapt to the SMEs instead of the opposite means around. During this manner the project aims to supply SMEs with a replacement cost-efficient technology paradigm for

achieving business results through the innovative use of ICTs, reducing their time to plug and facilitating the enlargement of their business networks.

Technologies have progressed through the e-learning system extensively and mature slightly since the teachers, practitioners, and origin stay to intent within the means they placed on the idea of e-learning and technology. They demand to continue considering the ways new concepts and exploit on the fashionable technology to supply accommodations to the varied in e-learning (Vanessa river and Christian Guet. 2007). A few years before, several have tried to vary e-learning systems to create the information of learning a lot of operatives, less luxurious and adjustable to the requirements of the particular beginner (C.Trummer.2005).

H3: Competence Knowledge would be negatively associated to Digital Business Ecosystem.

2.8 Enterprise Resource Planning moderate with Technology and Digital Business Ecosystem

Enterprise resource coming up with (ERP) systems area unit designed to deal with the matter of fragmentation of knowledge in business organizations. ERP systems promise to computerize a complete business with a collection of computer code modules covering activities all told areas of the business. Moreover, ERP is currently being promoted as a fascinating and significant link for enhancing integration between all useful areas among the producing enterprise, and between the enterprise and its upstream and downstream mercantilism partners (Joseph R. Muscatello. 2003).

ERP systems' developers, systems integrators and consultants have systematically been turning their sights on smaller enterprises (Fleishaker, 1999; Parker, 1999). These smaller makers may be adversely affected if they fail to upgrade their info technology

(IT) with systems that will promptly communicate with their larger provide chain partners or with company headquarters (Chalmers, 1999).

H4: Enterprise Resource Planning would be moderate the negative correlation between Technology and Digital business Ecosystem**.**

2.9 Relationship between Business Environment, Enterprise Resource Planning and Digital Business Ecosystem

Pakistan being one of the most populous countries of the world constitutes a significant share in the global market, till to date approximately 6.8 million businesses were registered in Pakistan (World Bank, 2018). Approximately 90% of the businesses were registered as SMEs and most are owned and operated by the families over the decades (Adom, 2015). With the emergence of the financial integration of foreign businesses entering into international markets, SMEs from Pakistan also started participating in the international markets and capture their respective market share. While, on the other hand existing family-owned businesses operating in international are losing their market share and most of the family-owned SMEs are struggling for the international market exposure (Rahman, Uddin, & Lodorfos, 2017; Kano & Verbeke, 2018). Total exports of Pakistan are 24.7 billion US dollars and SMEs in Pakistan contribute a significant portion in total exports of Pakistan. SMEs contribute about 40% of national GDP and cater to 80% of the non-agriculture labor (SMEDA, 2018).

Pakistan was placed 126 among 140 states concerning technology readiness, innovation, and infrastructure and focus on business sophistication (World Economic Forum, 2016).

H5: Enterprise Resource Planning would be moderate the negative correlation between Business Environment and Digital business Ecosystem.

2.10 Relationship between Competence Knowledge, Enterprise Resource Planning and Digital Business Ecosystem

The two general objectives of the DBE project are to provide a recognized advantage in the innovative development of software applications by small and medium-sized enterprises and to achieve greater adoption of information and communication technologies (ICTs) by SMEs (Paolo Dini 2013). The search for the opportunities based on the assumption that third-country communities extend traditional concepts of value creation to SMEs. That is, while digital platform owners must continue to carefully manage the value they create internally, they must carefully acquire the capabilities to manage value creation that occurs externally (Parker et al., 2017).

The DBE will achieve the goals by adopting a multidisciplinary approach based on mechanisms and models of biology, physics, business and the social sciences to develop a distributed open source environment that can support spontaneous development and integration of services, components and services software applications (Paolo Dini 2013).Digital technologies are also transforming the structure of social relations in consumer and business environments with social networks and social networks (Susarla and Tan 2012).

The transformation of ICT adoption from burden to opportunity for local and international development reflects two of the project's key objectives:

- Activate SME providers to gain competitiveness in the software market.
- Provide e-business software solutions capable of adapting to the needs of local SMEs, enhancing ICT adoption and economic growth at local innovation hubs.

To achieve this vision, the Digital Business Ecosystem integrates a distributed environment with the flood of software types that combine to form complex services and applications that respond to the needs and requirements of users.

H6: Enterprise Resource Planning would be moderate the negative correlation between Competence Knowledge and Digital business Ecosystem.

2.11 Theoretical Framework

To create a better understanding of the digital business ecosystem, a framework was necessary to support the DBE. For this purpose, the Zachman framework is used. Zachman framework also included in the questionnaire. The digital business ecosystem is becoming a more and more popular concept for modeling and structure distributed systems in heterogeneous, reorganized and open environments. However, they do not provide a conceptual framework that can be used to explore the digital business ecosystem and outdated (traditional) economic and computational theories do not focus on the digital business ecosystem as a separate organizational form.

In the past literature, there are few ways to design and analyze digital business ecosystems. In this study, we chose to use Zachman Enterprise Architecture (ZF) as the basis for designing the DBE framework.

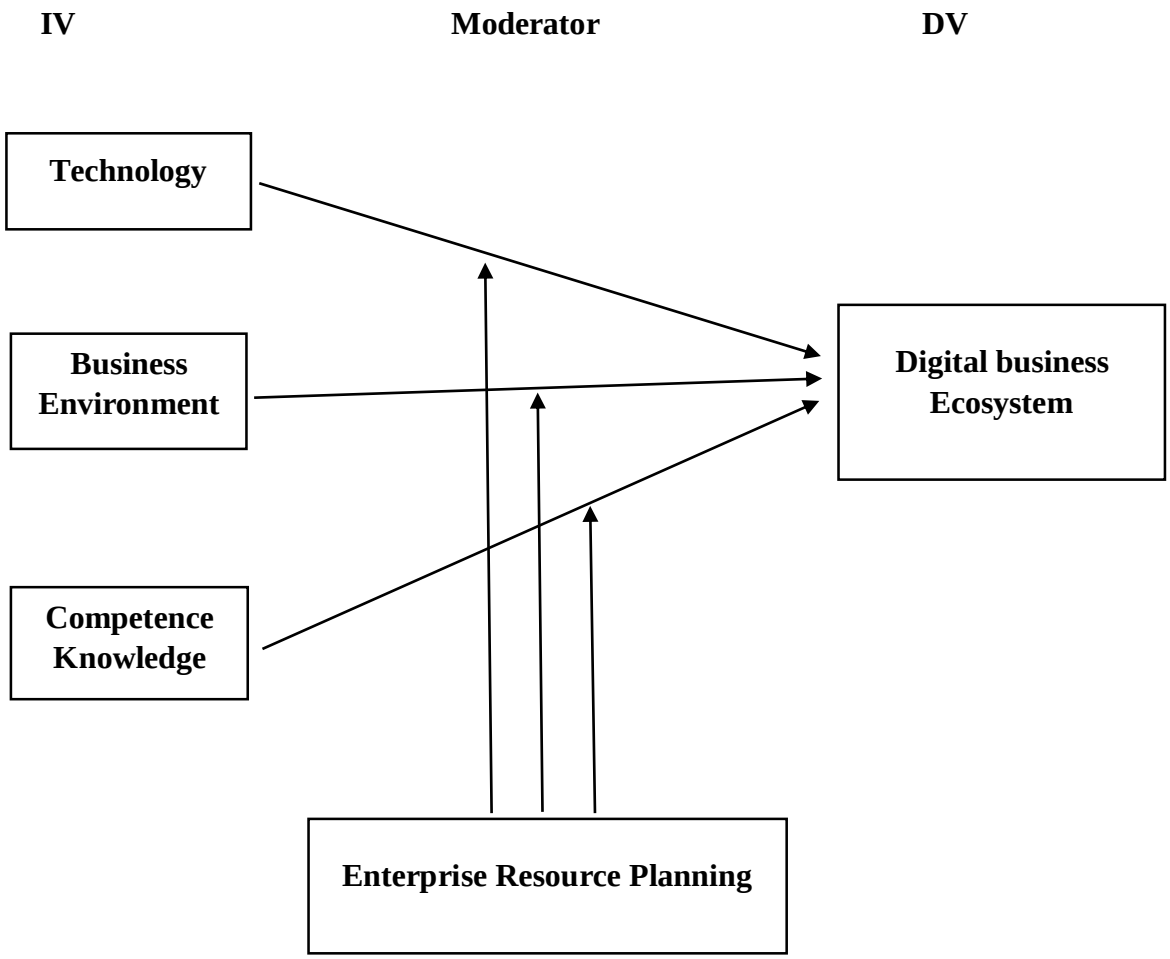
John Zachman released ZF in 1987, which is considered one of the pioneers in the field and is called the reference model. Recognizing ZF's criticism, Zachman's framework was chosen as the "initial" framework for the study, as much architectural design and development environments are still based on the ZF structure. Designing a DBE framework by using the ZF theory for this study.

According to the Theory:

According to Zachman	Why	What	How	Where	Who	When
Framework	Motivation	Data	Function	Network	People	Time
DBE Framework	Customer Value	Data Model	Process Model	Network Collaboration	People Capabilities	Network Value Competitiveness

2.12 Research Model

Figure 1: Research Model



2.13 Hypothesis

H1: There is a relationship between Technology and Digital Business Ecosystem.

H2: There is a relationship between Business Environment and Digital Business Ecosystem.

H3: There is a relationship between Competence Knowledge and Digital Business Ecosystem.

H4: Enterprise Resource planning moderates the relationship between Technology and digital business Ecosystem.

H5: Enterprise Resource planning moderates the relationship between Business Environment and digital business Ecosystem.

H6: Enterprise Resource planning moderates the relationship between Competence Knowledge and digital business Ecosystem.

CHAPTER 03

METHODOLOGY

3.1 Introduction

This chapter discusses the methodology techniques that are being used in this study. This study carries out quantitative research. It contains sampling, research design, data collection technique, and data analysis method, etc.

3.2 Research Design

According to Orodho 2013 research design is an important feature of research because it is a plan or a scheme that is used to create answers to study questions. In this study, an expressive survey design was used. This is because according to the research by Mugenda and Mugenda (2009), this technique helps collect data from the geographical area and from different subgroups of respondents that are required for this study.

3.2.1 Type of Study

This is a causal study where the "digital business ecosystem shows the impact on SMEs, moderating role of enterprise resource planning, relationships between technology, business environment, and competence knowledge, will be dignified on such basis as self-reported awareness linking respondents with regards to these variables. The research is quantitative where data collected from primary resources were analyzed.

3.2.2 Study Setting

This study based on a field study because participants i.e. employees of small and medium organizations had contacted on their job to fill the questionnaires in their normal work environment.

3.2.3 Time Horizon

The data was cross-sectional in nature and was collected over an estimated time of two to three months and to complete our study within a given time.

3.2.4 Research Interference

This research is based on field study and there is no research interference. The data collected in this study have cross-sectional data. Data was collected through an adopted questionnaire, almost 216 questionnaires were distributed. The reason for using the questionnaire as a survey is mainly in the past, and most studies use this technique for data collection and measurement. Also, because of its cost-effectiveness, it has the advantage of less interference from researchers, thus reducing possible deviations from respondents. This technology can help respondents easily answer questionnaires and let them take the time to make reasonable and thoughtful responses. Participants were assured of the privacy of their responses and confidentially so that the respondents would feel free in their responses.

3.2.5 Unit of Analysis

The unit of analysis for this research thesis is individual employees of IT companies (SME'S) based in Islamabad, Rawalpindi, Lahore, and Faisalabad.

3.3 Population and Sampling

Population and sampling technique is explained below for this study.

3.3.1 Population

The population is "the group of people, events or things of interest that the researcher wishes to investigate" (Sekaran, 2001). According to Mugenda and Mugenda (2009), the target population is the population from whom the findings or research generalized. This research was conducted from major cities of Pakistan. The target population of the

current study includes the IT companies (SME'S) employees of Islamabad, Rawalpindi, Lahore, and Faisalabad. The consent was solicited during for feedback under a non-random basis to diminish common biasness, before giving the data to respondents, all the significant and necessary information was dispersed, and 216 questionnaires were distributed to reasonable sample size in a form of personal interaction and the cover letter under proper research.

3.3.2 Sampling Techniques

This study based on a purposive sampling technique due to time limitations. The data was collected from employees of IT companies (SME'S) located in Islamabad/Rawalpindi, Faisalabad, and Lahore. The **SEM** (structural equation modeling) technique of SMART PLS is used in this research. This technique is used to analyze the structural relationships. The **SEM** technique is a combination of multiple regression analysis, factor analysis and it is used to analyze the structural relationship between latent variables and measured variables.

3.3.3 Sampling

Based on non-probability purposive sampling, an appropriate number of questionnaires based on the population size will be distributed among the IT companies (SME'S) employees of Islamabad, Lahore, Faisalabad, and Rawalpindi. This study utilized a quantitative method approach. The quantitative method is based on numbers. The advantage of the quantitative method is: First, the numbers are clear and accurate because the numbers are visualized to show meaning. (Waters 2008, 3-4). Second, the numbers can be used for calculations; (Waters 2008, 3-4). Although quantitative research method data is a number that is easy to understand but difficult to analyze.

(Waters 2008, 10). The total number of respondents is 216. Further purposive sampling relatively less time taking and incur fewer financial costs.

3.3.4 Sample Size

A sample is a representative subgroup or selection of a population that is observed or verified to obtain statistical data or material on the whole population (Saunders et al 2007; Lawrence, 2011). For determining the sample size this study used the formulae given by (Green 199). According to this formulae $N \geq 50+8(k)$, where k is the total number of independent variables of a study. The as large size of the sample is better and it avoids the possibility of non-response bias. According to Kline (2005), a sample size of less than 100 cases is considered small and untenable. Hence this study distributed 216 questionnaires for data analysis.

3.4 Response

Data was collected through a questionnaire. An equal number of respondents were taken from all organizations so that research can have equal input from all types of organizations. During population selection, it was analyzed that the minimum criteria of employment in these organizations is a graduation, which shows that all the respondents for this research are qualified enough to understand the English language and have no issues in interpreting and filling out the questionnaire. Therefore, the questionnaire does not need to be translated into the native language. The questionnaire was adopted without any change for this research.

Data was collected from the employees of IT companies (SMEs) that are located in Lahore, Faisalabad, Islamabad, and Rawalpindi, these companies are selected from the list that is given by the SMEDA. A total number of companies were 20 that were

considered for data collection. The average of employees from each company was 10 to whom questionnaires were given for filling.

3.5 Scales and Measurements

To fulfill the requirement of this study and data collection, the responses were collected from the respondents through questionnaires. The questionnaires were taken from the previous study and were self-reported and developed by different scholars. There is no need to translate items in Urdu or another language because it's the easy and official language of Pakistan. The study was used hypothesis testing to conclude the influence of technology, competence knowledge and business environment under the moderating effect of the digital business ecosystem. The questionnaires consist of demographic variables such are respondent profile (gender, age, qualification, etc.).

All the variables in this have been measured on a 5 point Likert scale ranging from Strongly Disagreed=1 to strongly agree=5.

3.6 Independent Variables

There were three independent variables in this study and that is technology, business environment and competence knowledge.

3.6.1 Measures of Technology

I used a scale of 07-item, developed by Lewis *e*t.al (1995) to measure the technology based on 5 point scale (Strongly Disagreed=1 to strongly agree=5). Sample of item was "Information systems/technology plan incorporates central"; "distributed and desktop domains"; "Planning process for information systems and technology incorporates end users"; "Users support distributed information technology facilities".

3.6.2 Measures of Business Environment

I used a scale of 04-item, developed by Michel *e*t.al (2006) to measure the business environment based on 5 point scale (Strongly Disagreed=1 to strongly agree=5). Sample of item was "To what extent do the plans conform to good project management practice?"; "How sound is the work on cost estimates and contingency?"

3.6.3 Measures of Competence Knowledge

I used a scale of 03-item, developed by Kollmann *e*t.al (2009) to measure the competence knowledge based on 5 point scale (Strongly Disagreed=1 to strongly agree=5). Sample of item was "How would you rate your business management knowledge, i.e., your knowledge about business principles and operations, strategic management, finance, marketing, and customer management?"; "How would you rate your entrepreneurial competence, i.e., your capability to recognize and envision new business opportunities?"; "How would you rate your interpersonal competence, i.e., your capability to communicate effectively, to motivate and influence others?"

3.7 Dependent Variable

There was only one independent variable and that is digital business ecosystem.

3.7.1 Measures of Digital Business Ecosystem

I used a scale of 14-item, developed by Kari Korpella *e*t.al (2013) to measure the digital business ecosystem based on 5 point scale (Strongly Disagreed=1 to strongly agree=5). Sample of item was "Our B2B integration plan will support the company's strategy goals and enable the emergence of new strategies"; "Managers are collecting and sharing real-time business information to increase efficiency and cut non-value work"; "We have a compact graphical drawing of the IT structure of our enterprise to help the discussions and development".

3.8 Moderator Variable

There was only one moderator used in this study and that is enterprise resource planning.

3.8.1 Measures of Digital Business Ecosystem

I used a scale of 06-item, developed by Gattiker *e*t.al (2005) to measure the digital business ecosystem based on 5 point scale (Strongly Disagreed=1 to strongly agree=5). Sample of item was "The information from the enterprise resource planning system has numerous accuracy problems that make it difficult for employees to do their jobs"; "The information that the enterprise resource planning system provides to employees in this plant is accurate"; "The data plant employees receive from the enterprise resource planning system is true".

3.9 Instrumentation

Contents and layout for data collection were prepared based on the literature review considering the structural nature of the study. All most measurement items were based on the research of renowned researchers in their studies which makes survey questionnaires more valid and reliable. The study questionnaire consists of six demographics like age, gender, marital status, experience, designation, and qualification. Furthermore, the research items consist of 34 questions to provide a database for the study. All the measures are reliable and validated. The study model describes research and analyzes this model in the cultural settings of Pakistan.

3.10 Control Variables

All the demographics was controlled by applying the ONE WAY ANOVA test.

3.11 Data Collection Procedure

An introductory letter was issued by the Pakistan Institute of Development Economics (PIDE) to facilitate the researcher to get permission for research. The researcher visited the IT companies to make preparations for data collection. Subsequent distribution of research questionnaires to respondents in the sample for self-loading was followed.

3.12 Data Analysis

Correlation and regression Analysis by Smart PLS would be used for variations and correlations independent and dependent variables if any. We used PLS, it ensures factor certainty by directly estimating potential variable scores, which is determined by introducing a flexible residual covariance structure, and most importantly, robust prediction of hierarchical models. (Wetzels, Odekerken-Schröder, & van Oppen, 2009) .By using the software Smart PLS (Version 3) (Ringle, Wende, & Becker, 2015), we applied 1000 replicated nonparametric bootstraps and a path weighting ecosystem for an internal approximation to calculate the level of significance. (Hair, Tomas, Hult, Ringle, & Sarstedt, 2013).

CHAPTER 04

RESULTS AND ANALYSIS

4.1 Introduction

In this chapter multiple analysis are run. The data are collected from the 216 respondent's and interpret through using SPSS and SMART PLS software. These analyses are One Way ANOVA, normality of data demographics of sample, correlation analysis, reliability analysis, multiple regression analysis like moderation regression analysis.

To control the variation in project success, One Way Anova test was performed on the basis of demographic variables used in the study.

Table 4.1 One Way ANOVA

Demographics	**Digital Business Ecosystem**	
	f statistics	**p value**
Gender	.164	.685
Age	2.128	.078
Marital Status	7.271	.008
Qualification	1.412	.240
Experience	1.682	.155
Designation	4.710	.001

Table 4.1 shows the one way ANOVA impact of demographics variable on the dependent variable. These variables are controlled when the P value less than .05. So, we controlled the demographics variable during the regression analysis, and if the P-value is more than .05 then we can say that the result is insignificant and there is no

need to control these variables for regression analysis. The value of marital status and designation is less than .05 so we can say that the result is significant because my respondents were categorized more in these two variations.

Table 4.2 Normality of Data

Research Variable	Skewness	Kurtosis
Age	0.678	0.258
Gender	1.378	-0.101
Experience	1.094	1.509
Qualification	0.421	-0.971
Designation	-0.100	-1.098
Marital Status	0.225	-1.968

The table 4.2 shows the normality of data. In this table normality's of demographics were checked in a skewed form. The value of kurtosis lies between -3 to +3 and the value of skewness lies between -2 to +2. So, there is normality of data in all the values.

4.2 Demographics of Sample

Through questionnaires there are 216 respondent's responses received in this study which is described by characteristics based on demographics variable such are as gender, marital status, education, working situation, age of respondents, level of income. The further detail is as following one by one in the table.

Table 4.3 Gender of respondents

	Frequency	Percent	Valid Percent	Cumulative Percent
Male	169	78.2	78.2	78.2
Female	47	21.8	21.8	100.0
Total	216	100.0	100.0	

This table shows that the 169 male and 47 females out of this sample size the percentage of male is 78.2% and female percentage is 21.8%. The target respondents were managers, developers, software engineers and project assistant of IT companies. The data were collected from Lahore, Faisalabad and Islamabad.

Table 4.4 Marital Status of respondents

	Frequency	Percent	Valid Percent	Cumulative Percent
Married	120	55.6	55.6	55.6
Un Married	96	44.4	44.4	100.0
Total	216	100.0	100.0	

This table shows the marital status in which 55.6 % are married and 44.4 % are un married out of the total sample. This table shows that 120 respondents are married and 96 are un married.

Table 4.5 Qualification

	Frequency	Percent	Valid Percent	Cumulative Percent
Bachelors	86	39.8	39.8	1.0
Master	71	32.9	32.9	72.7
M.Phil./MS	54	25.0	25.0	97.7
Doctoral	5	2.3	2.3	100.0
Total	216	100.0	100.0	

The table shows the result of education of respondent's there are bachelors 86 (39.8%), masters 71 (32.9%) M.Phil./MS 54 (25.0%) and doctoral 5 (2.3%).

Table 4.6 Experience

	Frequency	Percent	Valid Percent	Cumulative Percent
Less than 1 year	40	18.5	18.5	18.5
1-4 years	121	56.0	56.0	74.5
5-8 years	36	16.7	16.7	91.2
9-12 years	12	5.6	5.6	96.8
13 and above	7	3.2	3.2	100.0
Total	216	100.0	100.0	

According to this table the experience of the respondents, Less than 1 year 18.5 %, 1-4 years 56.0 %, 5-8 years 16.7 %, 9-12 years 5.6 %, 13 and above 3.2 % of the sample.

Table 4.7Age of respondents

	Frequency	Percent	Valid Percent	Cumulative Percent
21-25 years	31	14.4	14.4	14.4
26-30 years	102	47.2	47.2	61.6
31-35 years	55	25.5	25.5	87.0
36-40 years	21	9.7	9.7	96.8
41 and above	7	3.2	3.2	100.0
Total	216	100.0	100.0	

Above table shows that the age of respondents, 21-25 years is 14.4 %, 26-30 years is 47.2 %, 18-25 is 44.3 %, 31-35 years 25.5 %, 36-40 years is 9.7 %, 41 and above 3.2 % of the sample.

Table 4.8 Designation

	Frequency	Percent	Valid Percent	Cumulative Percent
Managers	29	13.4	13.4	13.4
HR Management	47	21.8	21.8	35.2
Software Engineer	49	22.7	22.7	57.9
Developer	55	25.5	25.5	83.3
Project Assistant	36	16.7	16.7	100.0
Total	216	100.0	100.0	

The table shows the designation of the respondents, Managers 13.4 %, HR Management 21.8 %, Software Engineer 22.7 %, Developer 25.5 %, and Project Assistant 16.7 %.

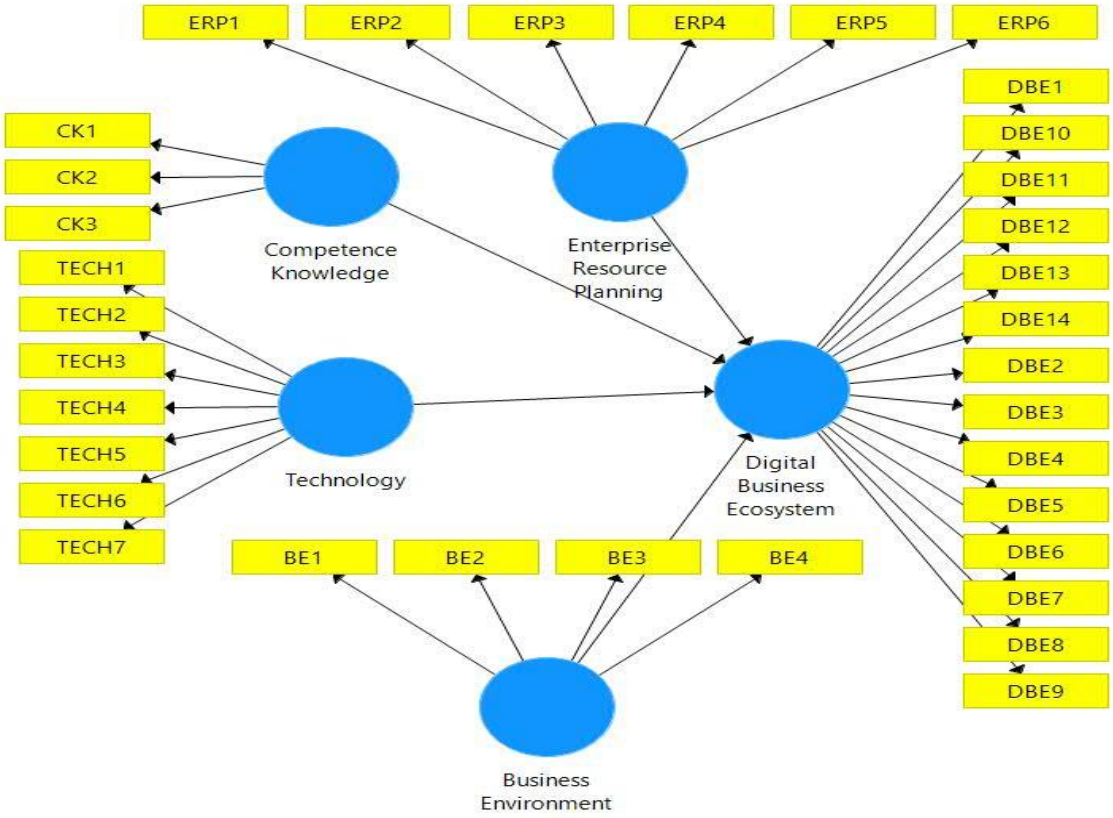
4.3 Confirmatory Factor Analysis (CFA) Analysis

Testing the measurement model or outer model using Smart PLS approached. CFA assess reliability and validity of the models construct. In this analysis consist of different type of analysis with in CFA such as reliability, convergent validity and

discriminant validity. Convergent reliability consist of three further categories like, factor loading, composite reliability (CR) and average variance extracted (AVE).

Figure 4.1:

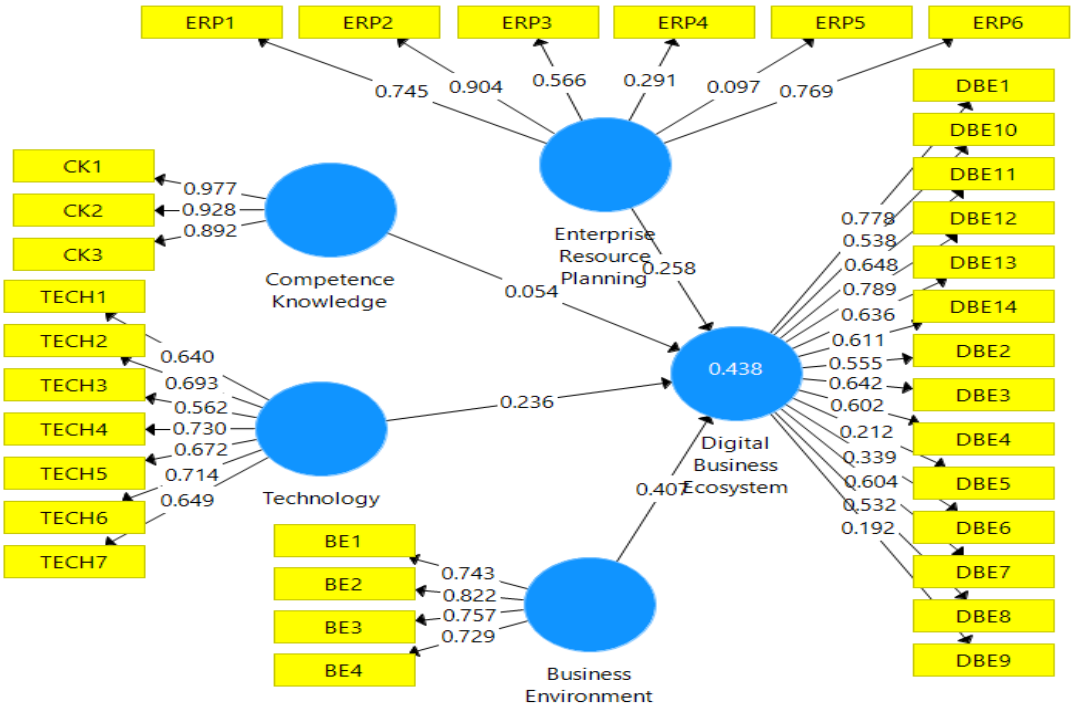
Figure 2: CFA



4.3.1 CFA 1st Level

Factor loading should be greater than **0.6** in most cases but can be less if the scale is well proven. Apply the PLS Logarithm factor for calculating the factor loading.

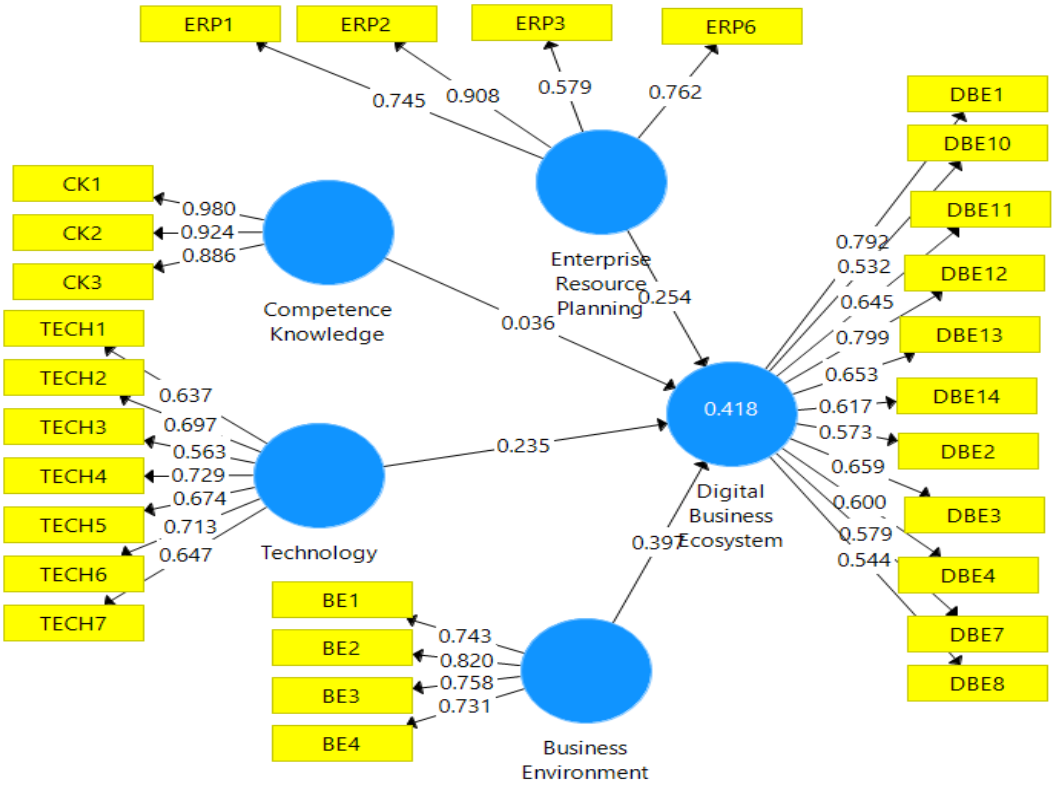
Figure 3: CFA 1



4.3.2 CFA 2nd Level

Delete the item which has less value and repeated from calculate PLS factors. After deleted the less value the remaining items were used in further analysis.

Figure 4: CFA 2



Above figure show the constructs of each variable with factor loading. Factor loading should be greater than **0.6** in most cases, but in less than if the scale is well proven.

Table 4.9 Reporting CFA

Convergent Validity

Constructs	Items	Cronbach's alpha	Factor Loading	Composite Reliability	Average Variance Extracted
Technology	TECH 1		0.637		
	TECH 2		0.697		
	TECH 3		0.563		
	TECH 4	0.791	0.729	0.848	0.446
	TECH 5		0.674		
	TECH 6		0.713		
	TECH 7		0.647		
Business Environment	BE1		0.743		
	BE2	0.762	0.820	0.848	0.583
	BE3		0.758		
	BE4		0.731		
Competence Knowledge	CK1		0.980		
	CK2	0.935	0.924	0.951	0.866
	CK3		0.886		

The above table **4.9** shows the Confirmatory Factory Analysis. In this table the Cronbach's alpha shows the consistency of variables, the value of Cronbach's alpha should be greater than **0.6**. The reliability of data shows the internal consistency of variables, the value of Reliability should be greater than **0.6**. Average Variance Extracted (AVE) used to measure the errors in data, its value should be **0.5** or above but if the value of Average Variance Extracted (AVE) is less than **0.5** and the value of the Reliability of data is greater than **0.6** than Average Variance Extracted (AVE) is valid and acceptable.

Table 4.10 Discriminant Validity

	BE	CK	DBE	ERP	TECH
Business Environment	0.764				
Competence Knowledge	0.079	0.931			
Digital Business Ecosystem	0.546	0.102	0.641		
Enterprise Resource Planning	0.140	-0.008	0.347	0.757	
Technology	0.471	0.156	0.468	0.158	0.668

The discriminant validity leads to better construct validity and also called vertical collinearity. The discriminant validity shows the level to which the items are differentiated among the constructs. Diagonal values show the discriminant validity and must be greater than other values in the table.

4.4 Reliability Analysis

For analyzing the reliability (consistency) of all variables the data must check the reliability for this in 1978.

Table 4.11 Reliability of Data

Name of Variable	Reliability	No of Items
Business Environment	0.848	4
Competence Knowledge	0.951	3
Digital Business Ecosystem	0.883	14
Enterprise Resource Planning	0.840	6
Technology	0.848	7

The table shows the reliability analysis results in which five variables of **216** samples are containing **34** items. According to the above table results, all variables show

reliability and said to be acceptable because according to Cronbach's alpha value all are greater than **0.7.** Whereas business environment scale having reliability **0.848** and number of items are **4,** competence knowledge scale having reliability **0.951** and items are **3,** another variable is digital business ecosystem having reliability **0.883** and items are **14**, enterprise resource planning scale having reliability **0.840** and number of items are **6** and the reliability of technology scale having **0.848** and items are **7.**

4.5 Correlation Analysis

To find the relation among different variables, correlation analysis is widely used in the research. It's a figure which shows the strength of relation among variables as well as it indicates the degree of relation among the two variables. The values of correlation analysis are recorded in the range of -1 to +1, if **(0)** is the value or ®, it means that there is no relationship among the variables and if the value of ® is positive, it shows that the increase in one variable will result in the increase of value of other variable or it result in positive change. While if the value of ® is negative then it shows that if there is an increase in one variable it will result in decrease in the value of other variable.

For checking the Correlation analysis is run to see that how the variables are statistically direction, strength and significantly correlated with each other. The results are mentioned below table

Table 4.12 Correlation Analysis

Variables.	1	2	3	4	5
1.TECH	1				
2. BE	.466**	1			
3. CK	.204**	.009	1		
4. ERP	.061	.141*	-.064	1	
5. DBE	.465**	.583**	.030	.353**	1

N=216,*p<0.05, **p<0.01.

The above table show the correlation among the variables and that variables are Technology **(TECH),** Business Environment **(BE),** Competence Knowledge **(CK),** Enterprise Resource Planning **(ERP)** and Digital Business Ecosystem **(DBE).**

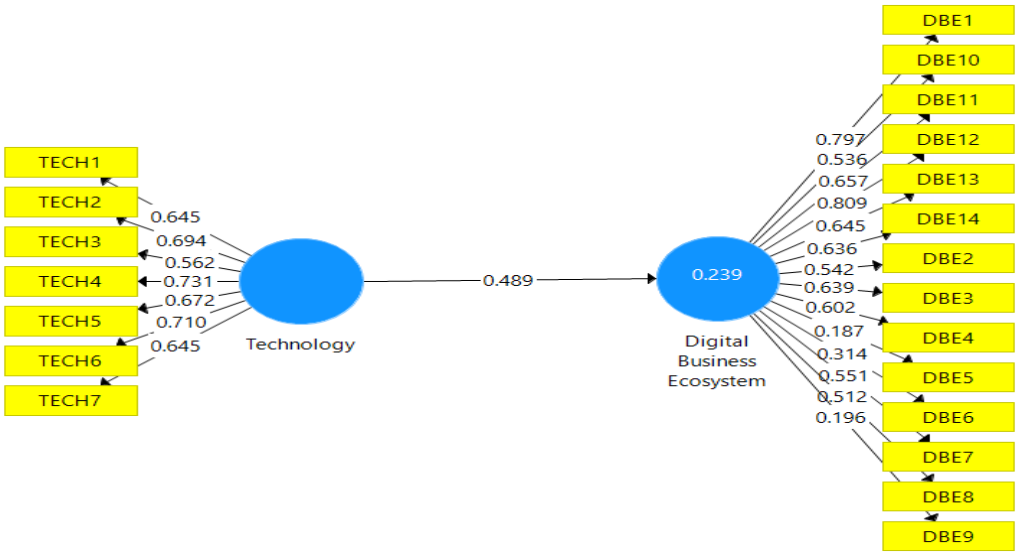
. Correlation is significant at the **0.01 level (2-tailes).

*. Correlation is significant at the **0.05** level (2-tailed).

Technology and Business Environment having positively significant correlation between them **(r= .466** p< .000).** Technology is positively correlated with Competence Knowledge at **(r= .204** p<.000).** Moreover, Technology is significant correlation with Enterprise Resource Planning at **(r= .061 p< .000).** Technology having highly positive significant correlation with Digital Business Ecosystem **(r= .465** p< .000).** Now the business environment is positively correlation with competence knowledge at **(r= -.009 p<.000)** and with Enterprise resource planning is positively correlated at **(r= .141* p< .000)** and positive correlation with Digital Business Ecosystem at **(r= .583** p<.000).** Competence Knowledge is negative correlated with Enterprise resource planning **(r= -.064 p<.000),** and positive correlated with Digital Business Ecosystem at **(r= .030 p<.000).** The last correlation is positive between Enterprise resource planning and Digital Business Ecosystem is **(r= .353** p<.000).** All variables are positively significant correlated with each other at **0.01** levels with sample size **N=216** which are developed hypothesized model.

4.6 Direct Effect of IV 1-DV

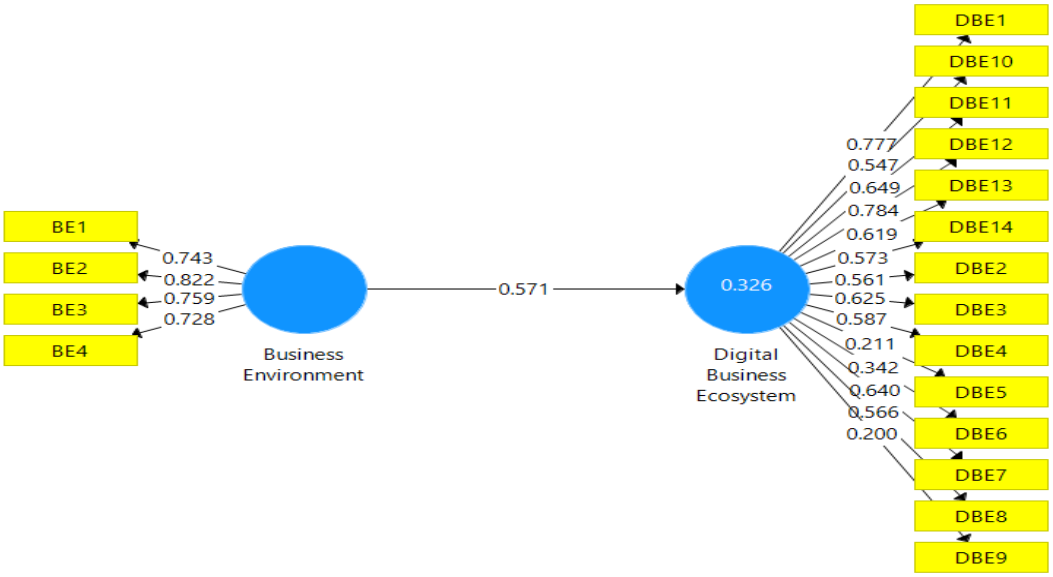
Figure 5: Effect of IV 1 on DV



Above diagram shows the direct effect of IV 1 on DV, after applying the factor loading the regression analysis of each IV on DV is appear and we have beta **(β)** value **0.489** and R square **(R^2)** value **0.239**.

4.7 Direct Effect of IV 2-DV

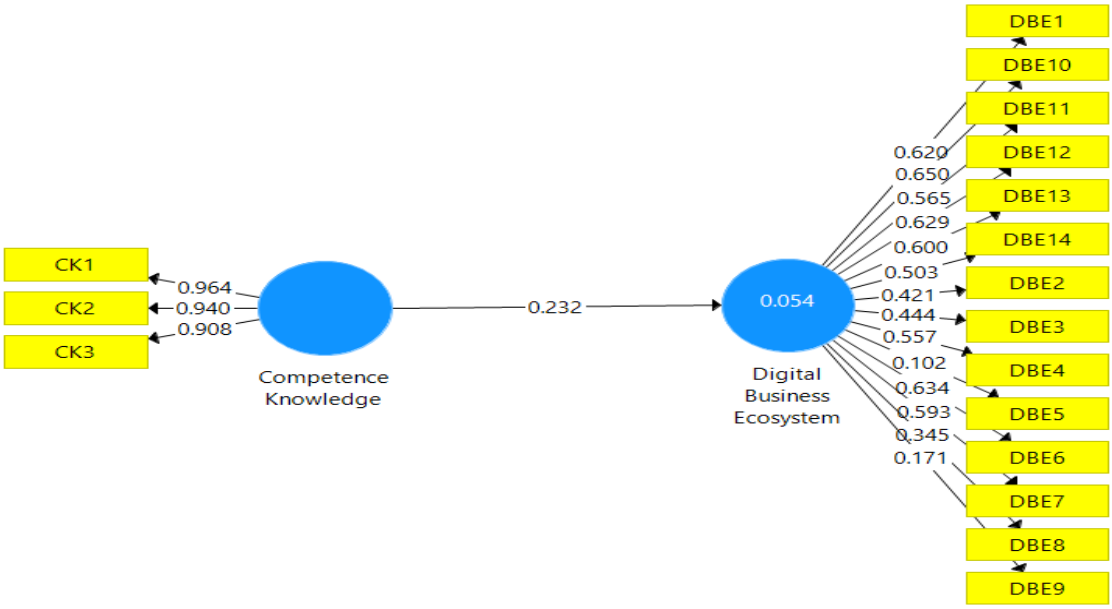
Figure 6: Effect of IV 2 on DV



Above diagram shows the direct effect of IV 2 on DV, after applying the factor loading the regression analysis of each IV on DV is appear and we have beta **(β)** value **0.571** and R square **(R^2)** value **0.326**.

4.8 Direct Effect of IV 3-DV

Figure 7: Effect of IV 3 on DV



Above diagram shows the direct effect of IV 3 on DV, after applying the factor loading the regression analysis of each IV on DV is appear and we have beta **(β)** value **0.232** and R square **(R^2)** value **0.054**.

4.9 Regression Analysis

In regression analysis to check the variables in which proposed model. Regression analysis include the multiple regression, moderation and mediation regression analysis. The regression analysis results are below in following.

Table 4.13 Reporting of PLS Regression

	Direct Effects of IV on DV			
	Beta	**R Square**	**Adjusted R**	**P Value**
Technology	0.489	0.239	0.407	0.592
Business Environment	0.571	0.326		0.000
Competence Knowledge	0.232	0.054		0.003

Table 4.13 shows the Direct Effects of IV on DV, where Beta **(β)** shows one unit change in DV due to the IV. R square **($R^{2)}$** shows the total change in DV due to the IV. Adjusted R square **(ΔR^2)** shows the actual change in DV due to IV. The value of **β** shows the highest effect of IV on DV and in above table, **Business Environment (IV)** shows the highest effect on **Digital Business Ecosystem (DV)** as its value 0.571 is greater than other values of **β**.

4.10 Moderation Analysis

Following diagrams show the moderation analysis which explained association among the variables.

4.11 Moderation Effect of IV 1

Figure 8: Moderation on IV 1

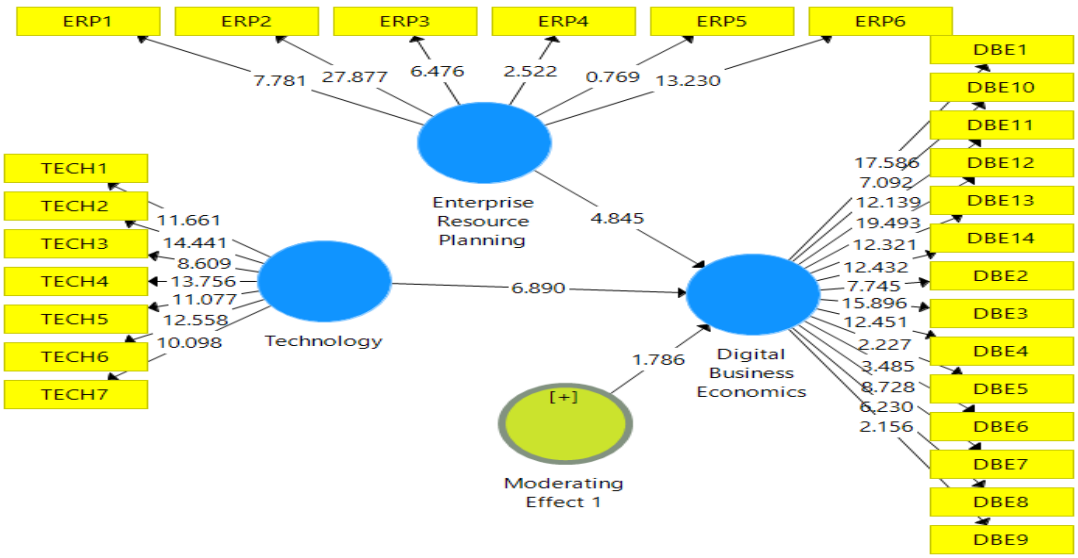


Table 4.14 Moderation Analysis of IV 1

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Enterprise Resource Planning -> Digital Business Economics	0.288	0.301	0.059	4.845	0.000
Technology_ -> Digital Business Economics	0.411	0.420	0.060	6.890	0.000
Moderating Effect 1> Digital Business Economics	-0.106	-0.082	0.059	1.786	0.075

The above table show the moderation effect of independent variable on dependent variable i.e. Technology effect on Digital Business Ecosystem. This result shows that the indirect effect of technology on digital business ecosystem with moderator effect of Enterprise resource planning is not accepted because the value of **p** is greater than 0.05 **(p=0.075)**.So here we reject this hypothesis.

4.12 Moderation Effect of IV 2

Figure 9: Moderation on IV 2

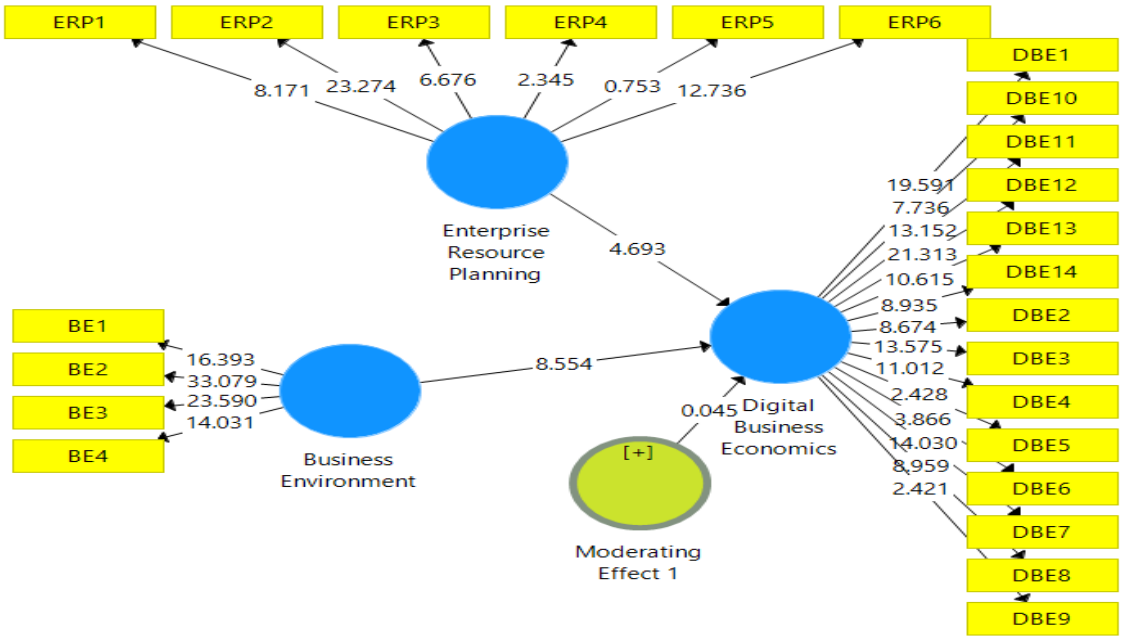


Table 4.15 Moderation Analysis of IV 2

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Business Environment -> Digital Business Economics	0.526	0.528	0.061	8.554	0.000
Enterprise Resource Planning -> Digital Business Economics	0.275	0.284	0.059	4.693	0.000
Moderating Effect 1 -> Digital Business Economics	-0.003	0.009	0.076	0.045	0.964

The above table show the moderation effect of independent variable on dependent variable i.e. Business Environment effect on Digital Business Ecosystem. This result shows that the indirect effect of Business Environment on digital business ecosystem with moderator effect of Enterprise resource planning is not accepted because the value of **p** is greater than 0.05 **(p=0.964).** So here we reject this hypothesis.

4.13 Moderation Effect of IV 3

Figure 10: Moderation on IV 3

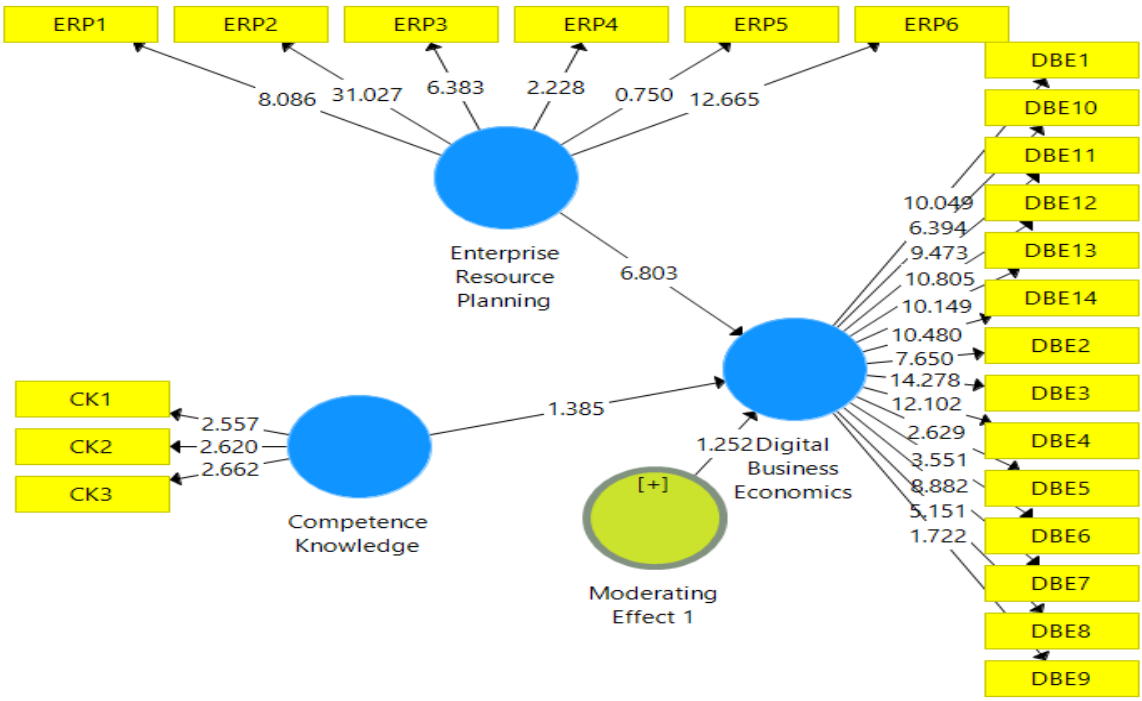


Table 4.16 Moderation Analysis of IV 3

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Competence Knowledge -> Digital Business Economics	0.128	0.126	0.093	1.385	0.167
Enterprise Resource Planning -> Digital Business Economics	0.381	0.413	0.056	6.803	0.000
Moderating Effect 1 -> Digital Business Economics	-0.092	-0.085	0.073	1.252	0.211

The above table show the moderation effect of independent variable on dependent variable i.e. Competence Knowledge effect on Digital Business Ecosystem. This result shows that the indirect effect of Competence Knowledge on digital business ecosystem with moderator effect of Enterprise resource planning is not accepted because the value of **p** is greater than 0.05 **(p=0.211).** So here we reject this hypothesis.

Table 4.17 Summary of Hypothesis Acceptance / Rejection

Hypothesis	Statements	Results
H1	Technology would be negatively associated to Digital Business Ecosystem.	**Rejected**
H2	Business Environment would be positively associated to Digital Business Ecosystem.	**Accepted**
H3	Competence Knowledge would be positively associated to Digital Business Ecosystem.	**Accepted**
H4	Enterprise Resource Planning would be moderate the negative correlation to Technology and Digital business Ecosystem**.**	**Rejected**
H5	Enterprise Resource Planning would be moderate the negative correlation to Business Environment and Digital business Ecosystem**.**	**Rejected**
H6	Enterprise Resource Planning would be moderate the negative correlation to Competence Knowledge and Digital business Ecosystem**.**	**Rejected**

CHAPTER 05

DISCUSSION, CONCLUSION AND DIRECTION FOR FUTURE RESEARCH

5.1 Discussion

Findings of the six hypothesis are formulated in this study, all the hypothesis were tested against the variables i.e. Enterprise Resource Planning as moderator among independent variables and dependent variable. In the above study, three independent variables have been taken i.e. Business Environment, Competence Knowledge and Technology while the dependent variable was the Digital Business Ecosystem.

In hypothesis 1, technology will positively influence the digital business ecosystem. The digital business ecosystem brings in existence in communication technologies it helps SMEs to achieve the goals and new challenges in the world (COM 2004). The digital business ecosystem provides a digital platform in the business and this study proves that the correlation exists in the technology and digital business ecosystem.

In hypothesis 2, the business environment would be positively correlated with the digital business ecosystem. The business ecosystem provides a supporting representation to the business, this describes the business environment more interacting. Increased connectivity and with the introduction of the internet the digital business ecosystem make evolution in the business world (F.Nachira.2002). In 1993 Moore compare the business environment with the ecological system.

In hypothesis 3, there would be a negative relation relationship between competence knowledge and the digital business ecosystem, because the knowledge about innovations and challenges faced by the SMEs not achieved. There is an inverse

relationship between them. Digital business ecosystem decrease with the cultural perspective of Pakistan.

In hypothesis 4, it was proposed that there would be no moderation exist between technology and the digital business ecosystem, it is because the enterprise resource planning was not competing in the SME industry. ERP is a kind of software that is used in the business for managing the day to day activities, while the DBE specially designed to provide the services more effectively and more efficiently. Both have no utilizes in the SMEs to compete at peak levels.

In hypothesis 5, it was proposed that there would be no moderation between the business environment and the digital business ecosystem because the moderation effect of enterprise resource planning has no impact on the business. Digital business ecosystem based on new technologies and provide a platform on internet sources and this platform has no integration in Pakistan.

In hypothesis 6, it was proposed that no moderation exists between competence knowledge and the digital business ecosystem. Enterprise resource planning would not be moderated due to the lack of use of this software in the business world. Development in the ICT happened with the new threads for the SMEs.

5.2 Direction for Future Research

Future studies should further examine other possible contextual and individual moderators such as ERP support the technology, competence knowledge, business environment and digital business ecosystem and its outcome relationships. This study make some important contributions. We explored correlations among technology, business environment and digital business ecosystem. Organizations must develop the new strategies and models for business that maximize the effectiveness and innovations

in the world of digitalization and also identify the transformation requirements for digital business ecosystem which can be used for innovation, development and foundation for business.

Further investigations will be conducted through the use of quantitative methods and expanding populations and involving new business areas. This extension will open up new and interesting ideas to better understand this occurrence.

The DBE provide a distributed open source environment that can support the spontaneous development and integration of software services, components, and applications. We believe there is much that can be gained from the complex and distributed software technology that DBE will require in design principles and theoretical models from the natural and biological sciences. Thus self-organization theories and algorithms from evolutionary calculations are crucial. The idea is to create software through the DBE that can be adapted to the media, not the other way around. In this way, the research will provide SMEs with a new cost-effective technology standard for achieving business results through the innovative use of ICT, reducing their time on the market and facilitating the expansion of their business networks.

5.3 Conclusion

This research give us a comprehensive literature review on ERP, DBE, CK, BE and TECH in SMEs. This study not only desires the need of DBE for Pakistan SMEs, it also provides a framework along with organization plan for Pakistan SMEs. This research is preferred to provide the basic plan to initiate DBE in Pakistan. The correlation among ecosystems defined in the study is expected to provide it a good start in Pakistan. Moreover, it can be supposed that a Digital Business Ecosystem is not founded on ICT only, but also on entrepreneurial spirit, knowledge and collaboration. Furthermore, its

structure gives itself to strengthening these positive features, donating to larger market competence and provincial growth. Even if in a later period DBE becomes a long-lasting feature in Pakistan as a self-organizing and self-sustaining system, at the start, its application needs a clear general method, involving the provincial manufacturing sector.

The proposed DBE environment is promoting knowledge sharing and collaboration and hopefully prove it to be a successful innovation model. DBE try to solve out the problem in the digital world of technology with perspective of Pakistan.

This study also show the implementation of ERP on SMEs and we find critical implementation of ERP on SMEs. Our methodology provide the insightful details about the factors, which have not been provide by any other study, with the perspective of Pakistan. The results of the study show that the introduction of modern IT solutions can expressively enhance the business chances of SMEs by using the moderation effect of ERP on DBE. Possible solutions for the SME's and the possibilities should be identified directly to be considered in the DBE.

REFERENCES

Adom, P. K. (2015). Asymmetric impacts of the determinants of energy intensity in Nigeria. *Energy Economics*, *49*, 570-580.

Agrawal, N., Akbani, R., Aksoy, B. A., Ally, A., Arachchi, H., Asa, S. L., ... & Behera, M. (2014). Integrated genomic characterization of papillary thyroid carcinoma. *Cell*, *159*(3), 676-690.

Al-Swidi, A., Mohammed Rafiul Huque, S., Haroon Hafeez, M., & Noor Mohd Shariff, M. (2014). The role of subjective norms in theory of planned behavior in the context of organic food consumption. *British Food Journal*, *116*(10), 1561-1580.

Arora, N., Dar, M. I., Hinderhofer, A., Pellet, N., Schreiber, F., Zakeeruddin, S. M., & Grätzel, M. (2017). Perovskite solar cells with CuSCN hole extraction layers yield stabilized efficiencies greater than 20%. *Science*, *358*(6364), 768-771.

Barry, M., Dundon, T., & Wilkinson, A. (2018). Employee voice: conceptualisations, meanings, limitations and possible integration. In *The Routledge Companion to Employment Relations* (pp. 251-265). Routledge.

Bharati, P., & Chaudhury, A. (2015). Current status of technology adoption: Micro, small and medium manufacturing firms in Boston. *Bharati, P. and Chaudhury, A.(2006),"Current Status of Technology Adoption: Micro, Small and Medium Manufacturing Firms in Boston", Communications of the ACM*, *49*(10), 88-93.

Bingi, P., Sharma, M. K., & Godla, J. K. (1999). Critical issues affecting an ERP implementation. *IS Management*, *16*(3), 7-14.

Cecez-Kecmanovic, D., Galliers, R. D., Henfridsson, O., Newell, S., & Vidgen, R. (2014). The sociomateriality of information systems: current status, future directions. *Mis Quarterly*, *38*(3), 809-830.

Chang, E., & West, M. (2006, December). Digital Ecosystems A Next Generation of the Collaborative Environment. In *iiWAS*(pp. 3-24).

Da Cruz, S. M. S., Campos, M. L. M., Pires, P. F., & Campos, L. M. (2004, July). Monitoring e-business Web services usage through a log based architecture. In *Web Services, 2004. Proceedings. IEEE International Conference on* (pp. 61-69). IEEE.

Davenport, T. H. (1998). Putting the enterprise into the enterprise system. *Harvard business review*, *76*(4).

Delina, R., Tkac, M., & Janke, F. (2012). Trust building electronic services as a crucial self-regulation feature of Digital Business Ecosystems. *Journal of Systems Integration*, *3*(2), 29-38.

Dini, P., & Nicolai, A. (2003). DBE-The digital business ecosystem. *Project summary, for download under www. digital-ecosystems. org*.

Duchnowski, P., Lum, D., Krause, J. C., Sexton, M., Bratakos, M., & Braida, L. D. (2010). DEVELOPMENT OF SPEECHREADING SUPPLEMENTS BASED ON AUTOMATIC SPEECH RECOGNITION1. *Cued Speech and Cued Language Development for Deaf and Hard of Hearing Children*, 467.

Fichman, R. G., Dos Santos, B. L., & Zheng, Z. E. (2014). Digital innovation as a fundamental and powerful concept in the information systems curriculum. *MIS quarterly*, *38*(2).

Frosch, R. A., & Gallopoulos, N. E. (1989). Strategies for manufacturing. *Scientific American*, *261*(3), 144-153.

Fukuyama, T., Jow, C. K., & Cheung, M. (1995). 2-and 4-Nitrobenzenesulfonamides: Exceptionally versatile means for preparation of secondary amines and protection of amines. *Tetrahedron Letters*, *36*(36), 6373-6374.

Galateanu, E., & Avasilcai, S. (2016). Framing the Competitive Behaviors of Niche Players: the Electric Vehicle Business Ecosystem Perspective. *Procedia-Social and Behavioral Sciences*, *221*, 342-351.

Gap, G. G. (2017). World economic forum. *Cologny/Geneva*.

Guest, D. E. (2011). Human resource management and performance: still searching for some answers. *Human resource management journal*, *21*(1), 3-13.

Henfridsson, O., & Lind, M. (2014). Information systems strategizing, organizational sub-communities, and the emergence of a sustainability strategy. *The Journal of Strategic Information Systems*, *23*(1), 11-28.

Hung, Y. J., Hsieh, C. H., Chen, Y. J., Pei, D., Kuo, S. W., Shen, D. C., ... & Chen, Y. C. (2007). Insulin sensitivity, proinflammatory markers and adiponectin in young males with different subtypes of depressive disorder. *Clinical endocrinology*, *67*(5), 784-789.

Hyder, S., & Lussier, R. N. (2016). Why businesses succeed or fail: a study on small businesses in Pakistan. *Journal of Entrepreneurship in Emerging Economies*, *8*(1), 82-100.

Iansiti, M., & Levien, R. (2004). Strategy as ecology. *Harvard business review*, *82*(3), 68-81.

Jacobs, F. R., & Bendoly, E. (2003). Enterprise resource planning: developments and directions for operations management research. *European Journal of Operational Research*, *146*(2), 233-240.

Kauffman, J. B., Beschta, R. L., Otting, N., & Lytjen, D. (1997). An ecological perspective of riparian and stream restoration in the western United States. *Fisheries*, *22*(5), 12-24.

Khalil, M. A. T., Dominic, P., Durai, D., Hassan, M. F., & Mushtaq, A. (2011). An in depth analysis of ecosystems & blueprint of digital business ecosystem (DBE) framework for Malaysian SMEs. *Computer Science Journal*, *1*(1), 65-78.

Korpela, K., Kuusiholma, U., Taipale, O., & Hallikas, J. (2013, January). A framework for exploring digital business ecosystems. In *System Sciences (HICSS), 2013 46th Hawaii International Conference on* (pp. 3838-3847). IEEE.

Kothari, C. R. (2004). *Research methodology: Methods and techniques*. New Age International.

Lenkenhoff, K., Wilkens, U., Zheng, M., Süße, T., Kuhlenkötter, B., & Ming, X. (2018). Key challenges of digital business ecosystem development and how to cope with them. *Procedia CIRP*, *73*, 167-172.

Markus, M. L., & Loebbecke, C. (2013). Commoditized digital processes and business community platforms: new opportunities and challenges for digital business strategies. *Mis Quarterly*, *37*(2), 649-653.

Mattila, M. (2004). Contested decisions: Empirical analysis of voting in the European Union Council of Ministers. *European Journal of Political Research*, *43*(1), 29-50.

Mithas, S., Tafti, A., & Mitchell, W. (2013). How a Firm's Competitive Environment and Digital Strategic Posture Influence Digital Business Strategy. *Mis Quarterly*, *37*(2).

Mithas, S., Tafti, A., & Mitchell, W. (2013). How a Firm's Competitive Environment and Digital Strategic Posture Influence Digital Business Strategy. *Mis Quarterly*, *37*(2).

Mithas, S., Tafti, A., & Mitchell, W. (2013). How a Firm's Competitive Environment and Digital Strategic Posture Influence Digital Business Strategy. *Mis Quarterly*, *37*(2).

Moore, J. F. (1993). Predators and prey: a new ecology of competition. *Harvard business review*, *71*(3), 75-86.

Moore, J. F. (1998). The rise of a new corporate form. *Washington Quarterly*, *21*(1), 167-181.

Muchiri, J. M., Odilla, G. A., Kathuri, N. J., & Kiriungi, L. (2013). Agriculture Teachers‟ Perception of Secondary School Agriculture: A Case of Meru Central District, Kenya. *Middle-East Journal of Scientific Research*, *17*(4), 534-538.

Mugenda, O. M. (1999). *Research methods: Quantitative and qualitative approaches*. African Centre for Technology Studies.

Muscatello, J. R., Small, M. H., & Chen, I. J. (2003). Implementing enterprise resource planning (ERP) systems in small and midsize manufacturing firms. *International Journal of Operations & Production Management*, *23*(8), 850-871.

Mytelka, L., & Farinelli, F. (2000). Local clusters, innovation systems and sustained competitiveness. *UNU/INTECH Discussion Paper*, (2005).

Nachira, F., Dini, P., & Nicolai, A. (2007). A network of digital business ecosystems for Europe: roots, processes and perspectives. *European Commission, Bruxelles, Introductory Paper*.

Nachira, F., Nicolai, A., Dini, P., Le Louarn, M., & Leon, L. R. (2007). Digital business ecosystems.

Nah, F. F. H., & Delgado, S. (2006). Critical success factors for enterprise resource planning implementation and upgrade. *Journal of Computer Information Systems*, *46*(5), 99-113.

Olson, D. M., Dinerstein, E., Wikramanayake, E. D., Burgess, N. D., Powell, G. V., Underwood, E. C., ... & Loucks, C. J. (2001). Terrestrial Ecoregions of the World: A New Map of Life on EarthA new global map of terrestrial ecoregions provides an innovative tool for conserving biodiversity. *BioScience*, *51*(11), 933-938.

Pegram, M. D., Konecny, G. E., O'callaghan, C., Beryt, M., Pietras, R., & Slamon, D. J. (2004). Rational combinations of trastuzumab with chemotherapeutic drugs used in the treatment of breast cancer. *Journal of the National Cancer Institute*, *96*(10), 739-749.

Peltoniemi, M., & Vuori, E. (2004, September). Business ecosystem as the new approach to complex adaptive business environments. In *Proceedings of eBusiness research forum* (Vol. 2, pp. 267-281).

Peltoniemi, M., & Vuori, E. (2004, September). Business ecosystem as the new approach to complex adaptive business environments. In *Proceedings of eBusiness research forum* (Vol. 2, pp. 267-281).

Piccinini, E., Hanelt, A., Gregory, R., & Kolbe, L. (2015). Transforming industrial business: the impact of digital transformation on automotive organizations.

Piccinini, E., Hanelt, A., Gregory, R., & Kolbe, L. (2015). Transforming industrial business: the impact of digital transformation on automotive organizations.

Pitti, R. M., Marsters, S. A., Ruppert, S., Donahue, C. J., Moore, A., & Ashkenazi, A. (1996). Induction of apoptosis by Apo-2 ligand, a new member of the tumor necrosis factor cytokine family. *Journal of Biological Chemistry*, *271*(22), 12687-12690.

Priem, R. L., Butler, J. E., & Li, S. (2013). Toward reimagining strategy research: retrospection and prospection on the 2011 AMR decade award article. *Academy of Management Review*, *38*(4), 471-489.

Priem, R. L., Butler, J. E., & Li, S. (2013). Toward reimagining strategy research: retrospection and prospection on the 2011 AMR decade award article. *Academy of Management Review*, *38*(4), 471-489.

Razavi, A. R., Krause, P. J., & Strømmen-Bakhtiar, A. (2010, April). From business ecosystems towards digital business ecosystems. In *Digital Ecosystems and Technologies (DEST), 2010 4th IEEE International Conference on* (pp. 290-295). IEEE.

Razavi, A. R., Krause, P. J., & Strømmen-Bakhtiar, A. (2010, April). From business ecosystems towards digital business ecosystems. In *Digital Ecosystems and Technologies (DEST), 2010 4th IEEE International Conference on* (pp. 290-295). IEEE.

Saha, S., Chadha, M., Al Mamun, A., Rahman, M., Sturm-Ramirez, K., Chittaganpitch, M., ... & Pangesti, K. N. A. (2014). Influenza seasonality and vaccination timing in tropical and subtropical areas of southern and south-eastern Asia. *Bulletin of the World Health Organization*, *92*, 318-330.

Saunders, M., Lewis, P., & Thornhill, A. (2007). Research methods. *Business Students*.

Saunila, M., Pekkola, S., & Ukko, J. (2014). The relationship between innovation capability and performance: The moderating effect of measurement. *International Journal of Productivity and Performance Management*, *63*(2), 234-249.

Snider, B., da Silveira, G. J., & Balakrishnan, J. (2009). ERP implementation at SMEs: analysis of five Canadian cases. *International Journal of Operations & Production Management*, *29*(1), 4-29.

Strømmen-Bakhtiar, A., & Razavi, A. (2008). Emerging Problems in the Digital Business Ecosystem. In *The 2nd International OPAALS Conference on Digital Ecosystems*.

Strømmen-Bakhtiar, A., & Razavi, A. (2008). Emerging Problems in the Digital Business Ecosystem. In *The 2nd International OPAALS Conference on Digital Ecosystems*.

Suleman, A., Bokhari, I. H., Zakaria, N., & Mohamad, A. B. (2018). State of Internationalization: Issues and challenges for SMEs in Pakistan. *Paradigms, 12*(2), 191-196.

Tsatsou, P., Elaluf-Calderwood, S., & Liebenau, J. (2010). Towards a taxonomy for regulatory issues in a digital business ecosystem in the EU. *Journal of Information Technology, 25*(3), 288-307.

Umble, E. J., Haft, R. R., & Umble, M. M. (2003). Enterprise resource planning: Implementation procedures and critical success factors. *European journal of operational research, 146*(2), 241-257.

Valkokari, K. (2015). Business, innovation, and knowledge ecosystems: how they differ and how to survive and thrive within them. *Technology Innovation Management Review, 5*(8).

Venkatraman, N. (1994). IT-enabled business transformation: from automation to business scope redefinition. *Sloan management review, 35*, 73-73.

Waters, P., & Vincent, A. (2008). Detection of anti-aquaporin-4 antibodies in neuromyelitis optica: current status of the assays. *The International MS Journal, 15*(3), 99-106.

Weber, P. S., Madsen-Bouterse, S. A., Rosa, G. J., Sipkovsky, S., Ren, X., Almeida, P. E., & Burton, J. L. (2017). Analysis of the bovine neutrophil transcriptome during glucocorticoid treatment. *Physiological Genomics*.

Wetzels, M., Odekerken-Schröder, G., & Van Oppen, C. (2009). Using PLS path modeling for assessing hierarchical construct models: Guidelines and empirical illustration. *MIS quarterly*, 177-195

Yoo, Y. (2010). Computing in everyday life: A call for research on experiential computing. *MIS quarterly*, 213-231.

Zafar, A., & Mustafa, S. (2017). SMEs and its role in economic and socio-economic development of Pakistan. *International Journal of Academic Research in Accounting, Finance and Management Sciences, 6*(4).

APPENDIX

Questionnaire

Survey On "An In Depth Analysis of Digital Business Ecosystem with Moderating Effect of Enterprise Resource planning. A Case Study of Pakistan SMEs"

Dear Respondent!

I am a student of M.Phil. Business Economics at Pakistan Institute of Development Economics, Islamabad. I am carrying out a research on "An In Depth Analysis of Digital Business Ecosystem with Moderating Effect of Enterprise Resource planning. A Case Study of Pakistan SME's". The questionnaire will be used for research which is a part of my study. The aim of this questionnaire is to find out relationship between ERP and DBE in SMEs sector of Pakistan. It should not take more than 10 minutes to fill the questionnaire as all of questions just need to tick proper or suitable answer. These questions show your experiences in your current job and organization.

Your answer will be kept strictly confidential and will only be used for research purposes. Your name will not be mentioned anywhere on the document so kindly give a neutral and fair opinion to make research successful. I requested you to fill this questionnaire. Your collaboration is highly appreciated.

If you need findings of this research please send a request to nayabjavaid92@gmail.com.

Thanks once again for your time and cooperation.

Nayab Javaid.
M.Phil. Scholar.

Please tick the appropriate answer or fill in the box.

Demographic

1. What is your designation?	
2. How long you have been employed in this organization (Years)?	

3. What is your highest qualification?

Bachelors	1
Masters	2
M.Phil./MS	3
Doctoral	4

4. What is your marital status?

Married	1
Un-married	2

5. What is your Gender?

Male	1
Female	2

6. What is your age?	

Technology:

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1: Information systems/technology plan incorporates central, distributed and desktop domains.	1	2	3	4	5
2: Planning process for information systems and technology incorporates end users.	1	2	3	4	5
3: Users support distributed information technology facilities.	1	2	3	4	5
4: Plan for corporate-wide information systems and technology.	1	2	3	4	5
5: Formal support for end-user computing.	1	2	3	4	5
6: Training programs for end-users.	1	2	3	4	5
7: Information systems/technology plan reflects business goals.	1	2	3	4	5

Business Environment:

	Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
1: To what extent do the plans conform to good project management practice?	1	2	3	4	5
2: How sound is the work on cost estimates and contingency?	1	2	3	4	5
3: Are there effective quality assurance processes planned for the program?	1	2	3	4	5
4: Are there effective processes in place for decision-making and escalation of issues to allow timely and sound resolution?	1	2	3	4	5

Competence Knowledge:

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1: How would you rate your business management knowledge, i.e., your knowledge about business principles and operations, strategic management, finance, marketing, and customer management?	1	2	3	4	5
2: How would you rate your entrepreneurial competence, i.e., your capability to recognize and envision new business opportunities?	1	2	3	4	5
3: How would you rate your interpersonal competence, i.e., your capability to communicate effectively, to motivate and influence others?	1	2	3	4	5

Enterprise Resource Planning:

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1: The information from the enterprise resource planning system has numerous accuracy problems that make it difficult for employees to do their jobs.	1	2	3	4	5
2: The information that the enterprise resource planning system provides to employees in this plant is accurate.	1	2	3	4	5
3: The data plant employees receive from the enterprise resource planning system is true.	1	2	3	4	5
4: The enterprise resource planning data that plant employees (planners, supervisors, etc.) use or would like to use are accurate enough for their purposes.	1	2	3	4	5
5: It is difficult for plant employees to do their jobs effectively because some of the data they need is missing from the enterprise resource planning system.	1	2	3	4	5
6: The data accessible from the enterprise resource planning system lacks critical information that would be useful to plant employees.	1	2	3	4	5

Digital Business Ecosystem:

	Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
1: Our B2B integration plan will support the company's strategy goals and enable the emergence of new strategies.	1	2	3	4	5
2: Managers are collecting and sharing real-time business information to increase efficiency and cut non-value work.	1	2	3	4	5
3: Management have actively participated in B2B integration planning and they have nominated the process owner to all major processes.	1	2	3	4	5
4: Management measure the supply chain performance against the company's performance measures such as delivery accuracy, error-free.	1	2	3	4	5
5: We have a compact graphical drawing of the IT structure of our enterprise to help the discussions and development.	1	2	3	4	5
6: The IT structure tells where the information is located, where it is collected and where it is distributed.	1	2	3	4	5
7: The IT structures tells in which business location the process integration will be implemented.	1	2	3	4	5
8: The IT structure describe the core user groups internally and within the network.	1	2	3	4	5
9: The IT structure includes the key responsible person for each module.	1	2	3	4	5
10: Or company's IT budget can be presented according to the IT structure.	1	2	3	4	5
11: The usage of industry standard has made it possible to integrate the supply chain.	1	2	3	4	5
12: We have agreed to usage of standard in our integration and we have reached our target benefits faster.	1	2	3	4	5
13: We know which services of our customers and suppliers are ready for integration.	1	2	3	4	5
14: We have experts available for implementing.	1	2	3	4	5

LIST OF SMES

The following are IT companies located in different cities of Pakistan from where the researcher gets the data.

Sr. No	Companies	location
1	Innovative Tech Solutions	Lahore
2	I2C IT Company	Lahore
3	Systems	Lahore
4	Innovative Company	Lahore
5	Acube IT Solutions	Lahore
6	JSOFT.PK IT Company	Lahore
7	Pak developers Pvt. Ltd	Lahore
8	Micro Comm Computers	Faisalabad
9	Digital Soft	Faisalabad
10	Smartan Solver Software	Faisalabad
11	Itech Solutions	Faisalabad
12	Smi Soft Tech	Faisalabad
13	Sysdigi IT Consultants	Faisalabad
14	JAXAT Pvt. Ltd	Islamabad/Rawalpindi
15	Mangolab Company	Islamabad/Rawalpindi
16	Discretelogix Pvt. Ltd	Islamabad/Rawalpindi
17	Synergy IT Company	Islamabad/Rawalpindi
18	Dera IT Solutions	Islamabad/Rawalpindi
19	DatumSquare IT Services Pvt. Ltd	Islamabad/Rawalpindi
20	E Patronus IT Solutions	Islamabad/Rawalpindi