“Impact of Information and Communication Technology (ICT) on Business Performance”

By

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DECLARATION

I hereby confirm that this thesis represents my research work to the best of my knowledge and that I have not used any other sources than those acknowledged. Any portion quoted from other sources is sufficiently referred to. This thesis has not been submitted to any other program at any other university.

Sharmin Nahar

15 January 2021

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I would like to dedicate this thesis to my deceased father, who had been my constant source of support throughout my life. I lost him during my Ph.D. journey. I wish he were here to see me complete my Ph.D.!

ABSTRACT

The performance of small and medium enterprises (SMEs) is of fundamental significance in emerging economies because of their contribution to economic development and growth. Amongst many factors that contribute to SME performance, different information and communication technology (ICT) resources are worth mentioning in this age of the 4th industrial revolution. However, debate persists in the literature on the real contribution of ICT to business performance. Of the two diametrically different schools of thought in the debate, one believes that ICT is still capable of contributing to business performance. On the other hand, the opposite school of thought believes that ICT is no longer effective at creating differentiation between firms in terms of business performance; it has already become a basic utility available to all firms. Hence, ICT tools have been categorised into general purpose technologies (GPTs) and enabling technologies (ETs) in this thesis to better understand this debate and, in turn, the separate contribution of these two types of ICT tools to business performance. In other words, this thesis intends to explain the role of GPT and ET-related ICT resources in business performance, especially in SMEs in an emerging economy, Bangladesh, where the empirical part of this research is examined. The ETs include less widely used, specialist tools. On the other hand, GPTs include widely used, simpler technologies. There are several interesting findings in this thesis that add new dimensions to existing knowledge. Firstly, that ETs add more value to SME performance compared to GPTs. Secondly, the results support that SMEs' ICT collaboration capabilities as a mediator influence the business value of ICT (BVICT) more than the direct effect in the case of ETs. Thirdly, different networking dimensions by SME owner-managers as a mediator have more influence on BVICT (in the case of GPTs) compared to the direct effect.

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LIST OF ACRONYMS

ACCA	Association of Chartered Certified Accountants
AI	Artificial Intelligence
B2B	Business-to-business
B2C	Business-to-consumer
BP	Business Performance
BPR	Business Process Reengineering
BVICT	Business Value of ICT
BVIT	Business Value of IT
CA	Competitive Advantage
CEO	Chief Executive Officer
CERI	Centre for Educational Research and Innovation
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CRM	Customer Relationship Management
DCV	Dynamic Capabilities View
DV	Dependent Variable
EBSCO	Elton B. Stephens Company
e-commerce	Electronic Commerce
EFA	Exploratory Factor Analysis
ERIC	Education Resources Information Center
ERP	Enterprise Resource Planning
ES	Enterprise Systems

ETs	Enabling Technologies
GDP	Gross Domestic Product
GPTs	General Purpose Technologies
ICT	Information and Communication Technology
IMIS	Integrated Management Information System
IMS	Information Management System
IRR	Internal Rate of Return
IOSs	Inter-Organizational Systems
IoT	Internet of things
IS	Information Systems
IT	Information Technology
ITU	International Telecommunications Union
IV	Independent Variable
JSTOR	Journal Storage
MIS	Management Information System
NNFI	Non-Normed Fit Index
OECD	Organisation for Economic Co-operation and Development
PC	Personal Computer
PEOU	Perceived Ease of Use
PsycINFO	Psychological Information Database
PU	Perceived Usefulness
RBV	Resource-Based View
RMSEA	Root Mean Square Error of Approximation

ROA	Return on Assets
ROI	Return on Investment
ROS	Return on Sales
SAP	Systems Applications and Products
SBA	Small Business Administration
SCA	Sustainable Competitive Advantage
SCCS	Supply Chain Communication Systems
SCM	Supply Chain Management
S.D.	Standard Deviation
SEM	Structural Equation Modelling
SMEs	Small and Medium Enterprises
SRMR	Standardized Root Mean Square Residual
US	United States
USA	United States of America
VIF	Variance Inflation Factor
VRIN	Valuable, Rare, Inimitable and Non-substitutable

CHAPTER 1: INTRODUCTION

1.1.OVERVIEW

Though the effect of information and communication technology (ICT hereafter) on business performance[1] is a well-researched area, there are still less-known aspects of this topic. The first less-known aspect is the heterogeneous impact of different categories of ICT tools on business performance, especially in small and medium enterprises (SMEs hereafter) (Bayo-Moriones, Billón and Lera-López, 2013) – in other words, whether advanced technologies (enabling technologies or ETs hereafter) impact business performance differently than widely used simpler technologies (general purpose technologies or GPTs hereafter). The former includes less widely used, specialist tools such as certain aspects of cloud computing[2], artificial intelligence (AI hereafter), enterprise systems[3] (ES hereafter), etc., while the latter includes widely used tools such as telephones, mobiles, basic computers, etc. This categorisation of ICT tools into GPTs and ETs is consistent with categorising the technologies according to their purpose, use, cost, and technological requirements (Bresnahan and Trajtenberg, 1995; Bresnahan, 2010; Lucchetti and Sterlacchini, 2004; Martin. 1993; Teece, 2018). Though prior research exists exploring either the

[1] Business performance, the performance of firms, and SME performance have been used interchangeably in this thesis.

[2] Cloud Computing fulfils the condition of still being considered as an ET for two reasons. Firstly, the possibility of inclusion of disruptive technologies such as new interactive services including but not limited to virtual reality, blockchain, serverless computing, AI, Internet of Things (IoT hereafter), dynamic configuration in Cloud Computing environments, and application programming interfaces in the Cloud Computing (Bursell, 2019; Samuels, 2018). Secondly, even standard Cloud Computing is not as widespread in emerging economies as in the developed economies, especially in SMEs (Li et al., 2019).

[3] Because of innovations such as Cloud-Based Enterprise Resource Planning (ERP hereafter) (Nguyen et al., 2019), enterprise systems (ES hereafter) can still be considered as an ET. Moreover, the prospect of integrating emerging technologies and features such as AI, the Internet of Things (IoT), predictive analytics, e-commerce tools, etc. to proactively manage disruption and improvement, such as predictive forecasting, inventory planning, and better last-mile delivery in ERP, also helps it (ERP) meet the requirement of being an ET (Kim, 2020).

relationship between GPT use and business performance (e.g. Castiglione and Infante, 2013; Clarke, Qiang and Xu, 2015; Koutroumpis, Leiponen and Thomas, 2020; Mujumdar, Carare and Chang, 2010; etc.) or the relationship between ET use and business performance (e.g. Bigliardi, Bottani and Casella, 2020; Siau and Tian, 2004; etc.), the existing literature does not include any research in which the separate impact of GPTs and ETs is explored in a single study[4]. So, a critical research gap[5] exists in this regard.

Second, ICT is a fluid, growing and dynamic concept (Choi, Kim and Kim, 2011). This dynamism of ICT continues because of the continuous addition of advanced tools under its umbrella. With the emergence of phenomenal technologies such as big data, artificial intelligence, cloud computing, etc., there is a growing need to explore the impact of these advanced technologies separately to the impact of simpler technologies such as mobile phones, computers, the internet, etc. This is consistent with the binary categorization of technologies based on the purpose of their use. Following this, simpler but widely-used traditional ICT tools such as telephones, mobile phones, computers, the internet and so on (Choi, Kim and Kim, 2011) can be defined as General Purpose Technologies (GPTs hereafter) (Bresnahan and Trajtenberg, 1995) and advanced, smart (Burton-Jones, 2014) but less widely-used ICT tools, such as big data, Artificial Intelligence, e-commerce, Cloud Computing, Enterprise Resource Planning (ERP), etc., can be defined as Enabling Technologies (ETs hereafter) (Teece, 2018). This distinction is critical, given that the use of each of the two technology types has different costs, training requirements and procedural

[4] The researcher did not find any such studies in her extensive literature review.

[5] Investment in ICT is a resource-intensive process (Bugamelli and Pagano, 2004). Hence, it is critical that the impact of both categories of ICT tools are examined in a single study to explore which tools are providing more return on investment for the organization. As resources are not unlimited in an organizational setting (Rasmussen, 2004), this enhanced understanding will help the owner-managers of firms to make an informed decision on which tools to invest in.

implications for the business, which may, in turn, affect firm performance.There is a difference in purpose between GPTs, and ETs that is significant when it comes to measuring their impact on business performance. For example, at present, GPTs (e.g. mobile phones) are used in a widespread and pervasive manner, and with a purpose of meeting basic (existential) ICT necessities (Agarwal and Audretsch, 2001) in firms all over the world, be it in developed or emerging economies (Çilan, Bolat and Coşkun, 2009). On the contrary, ETs (e.g. e-commerce[6]) are, by definition, used for a specific, relatively narrow purpose (Teece, 2018). This difference in the purpose of GPTs and ETs also has an impact on the mechanism or path through which different ICT tools affect entrepreneurial firms' business performance[7] (Aral and Weill, 2007). Hence, the second mechanism in the relationship between ICT use and business performance is whether the direct or indirect (via mediators) impact of ICT use has been considered[8]. The existing literature generally focuses on the direct effects of using ICT tools, whereas the indirect effects of the use of ICT tools are usually less studied (Popa, Soto-Acosta and Perez-Gonzalez, 2018). Existing

[6] With the growing use of augmented reality and other innovative characteristics, e-commerce meets the criteria of an enabling technology (Chandra and Kumar, 2018; Yim, Chu and Sauer, 2017). Furthermore, even the standard features of e-commerce, such as International Business-to-consumer (B2C hereafter), e-commerce is not as pervasive in the emerging economies as it is in developed economies (Zhu, Mou and Benyoucef, 2019). In some emerging economies such as South Asia, the overall status of logistics is not congenial to e-commerce development (Kathuria, 2019).

[7] Different ICT tools impact firm performance differently according to the purpose of their use in firms. Two enterprises with the same amount of ICT resources will therefore perform differently because they invest in different technology forms with different goals (Aral and Weill, 2007). Therefore, we conceptualise ICT as two distinct types of resources (e.g. GPTs and ETs), applied to achieve different management goals, and measure their relative impact on performance.

[8] Though many papers have reported a direct impact of ICT tools on firm performance (such as Falk and Hagsten, 2015; Hagsten and Kotnik, 2017; Lopez-Nicolas and Soto-Acosta, 2010; Luftman, Lyytinen and Zvi, 2017; Luo and Bu, 2016), several papers have reported the opposite results, i.e. that different ICT tools had no direct impact on firm performance. For instance, Wang, Tai and Wei (2006) found no direct impact of virtual integration of SCM on firm performance. Similarly, Ray, Muhanna and Barney (2005) did not find any direct effect on firm performance from the use of different ICT tools. Because of these mixed results, many researchers have applied an indirect effect model where the mediator has been used as the third construct in the relationship between ICT use and firm performance (Bhardwaj, 2000; Barua et al., 2004; Bhatt and Grover, 2005; Banker, Bardhan and Asdemir, 2006; Hulland, Wade and Antia, 2007; Fink and Neumann, 2009). In fact, more updated research is needed that takes into account both the direct and indirect impact of ICT tools on firm performance.

literature has examined a few specific mediators, such as organisational capabilities (in a meta-analysis by Liang, You and Liu, 2010), business process reengineering (BPR hereafter) (Bresnahan, Brynjolfsson and Hitt, 2002), and supply chain management (SCM) (Zhang, Pieter van Donk and van der Vaart, 2011) to explore this indirect effect model. However, very few existing studies have explored the mediating impact of ICT collaboration capabilities (for ET-business performance relationship in this research) and networking by the firm owners (for GPT-business performance relationship in this research) on the relationship between ICT use and business performance.

In contrast, there is evidence in the extant literature that ICT use[9] does have an impact on ICT capabilities (Davidson and Olfman, 2004; Neirotti, Raguseo and Paolucci, 2018) and networking (Li, He and Zhang, 2019; Zinnbauer, 2007). Existing literature also shows evidence of ICT capabilities (collaboration type) (Parida and Örtqvist, 2015) and networking (Sheng, Zhou and Li, 2011; Tajvidi and Karami, 2017) affecting business performance. However, very few studies in the existing literature have explored the mediating impact of ICT collaboration capabilities on the relationship between ET use and business performance and the mediating impact of networking by owner-managers [10] on the relationship between GPT use and business performance[11]. Furthermore, no prior studies have explored these in the SME context. So, a gap also exists in the literature in this area.

[9] ICT adoption and ICT use have been used interchangeably in this thesis.

[10] Firm founders, entrepreneurs, and owner-managers have been used interchangeably in this thesis.

[11] The researcher's extensive literature review on the topic shows that.

Third, many studies in the existing literature explored the direct effect of a few ICT tools on business performance. For instance, some studies only explored the impact of generic ICT on business performance without focusing much on specific ICT categories (e.g. Díaz-Chao et al., 2015; Polo Peñaet al., 2011; Parida and Örtqvist, 2015). On the other hand, some papers focused solely on the contribution of a particular ICT tool for business performance. For example, Colombo, Croce and Grilli (2013) and Bertschek, Cerquera and Klein (2013) focused on the impact of the Internet; Popa, Soto-Acosta and Perez-Gonzalez (2018) explored the contribution of e-business; Falk (2005) concentrated on the effect of ERP. Most of these papers investigated the direct effect of ICT on business performance. However, there are very few studies in the existing literature that have explored in combination the direct and indirect effect models of the relationship between ICT use (both ETs and GPTs) and business performance, especially in the SME context[12].

The fourth unknown mechanism is the unexplored contextual factors affecting the abovementioned relationship. According to Barnes (2012), the context in which technologies are used (for instance, who is using the technology) increases or decreases the functionality of that technology. Firm-level factors such as firm size and human capital (individual criteria, e.g. the gender of the human resources who use ICT in firms) are such contextual factors. The moderating impact of these firm-level factors on the abovementioned relationship has never been explored[13].

Six research objectives are explored in this thesis to address the abovementioned research gaps (further details on research objectives are given in section 1.5). The first research objective explores the direct impact of using ICT tools (both GPT and ET tools) on business performance. The second research objective examines how firm-level factors (such as firm size) and firm-level

[12] The researcher's extensive literature review on the topic shows that.
[13] The researcher's extensive literature review on the topic shows that.

human capital factors affect the direct link between ICT use (both GPT and ET tools) and business performance. The third research objective investigates how ICT collaboration capabilities mediate the indirect relationship between ET use and business performance. On the other hand, the fourth research objective explores how firm-level factors moderate the relationship between ICT collaboration capabilities and business performance. The fifth objective examines how entrepreneurs' networking mediates the indirect relationship between the use of communication-related ICT tools (a subset of GPTs) and business performance. Finally, the sixth objective investigates how firm-level factors moderate the relationship between networking by owner-managers and business performance.

To explore these abovementioned research objectives, a few mechanisms will be followed. The first mechanism that will be explored is the nature of the ICT adopted by a firm; in other words, whether it adopts GPTs (Bresnahan and Trajtenberg, 1995) or ETs (Teece, 2018). The distinction is critical given that the adoption of either has substantial cost, productivity, and procedural implications for the business, which may, in turn, affect performance. Existing literature shows no evidence of a study exploring the separate influence of GPT and ET use on entrepreneurial firms' business performance. So, this thesis addresses this critical research gap by studying the impact of each of these types of ICT tools on business performance. Moreover, by using an integrated framework to explore both the direct effect of different ICT tools on performance and their indirect effect through mediators like ICT collaboration capabilities and networking by owner-managers, this thesis adds to the literature on ICT use and business performance in firms, and strategic entrepreneurship [14] .The abovementioned contribution is pertinent to practitioners, including

[14] Since business performance is a crucial element of strategic entrepreneurship, this research also contributes to strategic entrepreneurship.

educators, policymakers, and researchers. In addition, this research has considered relevant contextual factors such as firm size and human capital attributes (such as reporting the gender[15] of the human capital of the firms who use ICT) to minimise mismeasurement when quantifying ICT tools' contribution to business performance. Furthermore, the empirical part of the study investigates SMEs in an emerging economy (Bangladesh), which is not a prevalent example in the existing literature.

In addition to these scholarly contributions, the findings of this thesis also have practical implications for the owner-managers of firms. For instance, the findings will help owner-managers make more informed decisions on which ICT tools to invest in accordance with the firm's requirements. If they want more collaboration within the organisation as well as with external stakeholders for smooth operations, supply chain management, etc., they should opt for ETs. On the other hand, if they want to network via communication, they should focus on GPTs (especially communication-oriented GPTs). Moreover, the findings of this thesis recommend that both ETs and GPTs should be used by firms to build ICT collaboration capabilities and to engage in networking in order to derive the maximum benefit of these tools to business performance.

Governments and other policymakers can also use the findings of this study to strengthen the infrastructure and policies underpinning ETs to spread the use of these technologies, as there is a scarcity of ET infrastructure in emerging economies like Bangladesh. Moreover, since gender has a considerable impact on the relationship between ICT use and business performance, government and firm-level policymakers should consider adopting a gendered approach towards this issue.

[15] The gender of the overall human capital who use ICT in firms was considered in the meta-analysis chapter as the gender of the entrepreneurs was not exclusively available in the primary studies, while the gender of the entrepreneur was considered in the empirical chapters.

The core constructs of this research are introduced next in this chapter and will be followed by the critical theories used in this research. Then, research questions will be presented, followed by the research model. Next, the structure of the thesis will be reported, followed by the research methodology (including research paradigm, research approach, and sampling and data). Finally, a conclusion for this chapter will be provided.

1.2.IMPACT OF ICT ON BUSINESS PERFORMANCE

Information and communication technology (ICT) is an extension of information technology (IT) that emphasizes the role of unified communications (James, 2011). In the existing literature, "ICT" has been defined in various ways, extending beyond software and hardware[16]. According to Cambridge Dictionary (2020), ICT indicates "the use of computers and other electronic equipment and systems to collect, store, use and send data electronically." This definition is in line with the definition of ICT provided by Sin Tan et al. (2009), who defined ICT as a broad concept that encompasses a wide range of tools and applications from essential technologies such as mobile telephony and the Internet to more complex and advanced technologies such as computer science and technologies, information systems, and ERP. These tools are used to save, operate, and transmit information such as content, voice, and image.

Empirical research suggests that ICT is considered a valuable resource that can lead to enhanced productivity and profitability (Chari, Devaraj and David, 2007; Luo and Bu, 2016; Santhanam and Hartono, 2003).

[16] It also includes communication tools.

A rapid and drastic improvement in ICT has occurred in recent years, influencing the growth of firms worldwide, including in emerging economies (Luo and Bu, 2016). A key feature of emerging economies is their recent transitions into becoming more market-friendly, accompanied by a comparatively rapid pace of economic growth (Hoskisson et al., 2000; Wright et al., 2005). Rising foreign direct investment, rapid economic development, and an explosion in consumer demand contribute to emerging market dynamism. The main contributor to a company's level of uncertainty is such environmental dynamism[17].

Also, comparatively weak institutional support such as information asymmetry, underdeveloped factor markets, weak systems of intellectual property rights, ineffective legal frameworks, and lack of regulation (Krammer, Strange and Lashitew, 2018; de Mendonça and Almeida, 2019) in the emerging economies lead to ineffective markets, and might even destabilise these markets (Meyer et al., 2009). Therefore, firms in emerging economies are likely to face greater instability compared with those in developed economies due to greater dynamism both in markets and institutional settings (Krammer, Strange and Lashitew, 2018; de Mendonça and Almeida, 2019). An inter-organisational or interpersonal network can serve as a substitute for weak formal institutions in emerging economies by catalysing collaboration and reciprocity (Luo and Bu, 2016). ICT plays a significant role in securing this collaboration. According to Amiri and Woodside (2017), ICT is positively associated with the macro-level economic growth of emerging countries.

[17] Fluctuations in customer preferences, and changes in technology and product demand, as well as the unpredictability of these changes, are characteristic of environmental dynamism (Jansen, Van Den Bosch and Volberda, 2006). Firms might be pushed to adopt different kinds of ICT tools based on environmental dynamism (Chang, Hughes and Hotho, 2011).

Parallel to the above pattern, investigation into ICT has recently started to move forward. Matthews (2007) argues that advancement can be observed in ICT usage by firms in emerging economies, with organisations progressing from GPTs to ETs[18].

1.2.1. Impact of general purpose technologies (GPTs) on business performance

Bresnahan and Trajtenberg (1995) introduced the idea of general purpose technologies (GPTs), which they identified by three characteristics: the ability to be widely used, the capability of continuous technical improvement, and catalysing complementary innovations in the sectors where they are applied. A considerable number of ICT tools show these three characteristics and can, therefore, be considered typical general purpose technologies (Jovanovic and Rosseau, 2005). These include fixed-line telephones, mobile phones, basic computer hardware and software, the Internet, and online social media. For example, with more than five billion global subscribers (GSMA, 2017), mobile telephony is one of the most widely used GPT tools ever. The use of mobile telephony, the Internet, and other GPTs decreases the cost of accessing information (Leff, 1984; Norton, 1992) and thus catalyses essential connectivity for firms. This additional connectivity allows firms to reach their customer base and participate in markets (Majumdar, Carare and Chang, 2010; Rochet and Tirole, 2006) to a greater extent. Furthermore, the use of GPTs can give firms better ways of interacting with suppliers. This increased correspondence and more far-reaching, timely information exchange[19] diminishes coordination and labour costs and catalyses improved decision making (Arvanitis and Loukis, 2009).

[18] It means that the organisations in emerging economies are also using ETs in recent times rather than only using GPTs.

[19] Here, timely information exchange among different stakeholders of firms is meant.

Opponents of GPTs argue that, since these GPTs are spread across all the firms in an economy (Bresnahan and Trajtenberg, 1995; Guerrieri and Padoan, 2007), they do not create any unique competitive advantage (CA hereafter) for a specific firm. In contrast, proponents of GPTs report that ICT as a GPT provides additional choices to improve the organisation of new distribution frameworks and interaction with suppliers (Arvanitis and Loukis, 2009). Furthermore, according to GPT proponents, GPTs offer firm-specific benefits, such as upgrading procedures, lowering capital requirements via optimum tool use, and reductions in inventories (Arvanitis and Loukis, 2009). Finally, these ICT tools are also argued to increase innovation and productivity by re-inventing processes and activities across various departments (Cardona, Kretschmer and Strobel, 2013; Majumdar, Carare and Chang, 2010) and by decreasing the costs associated with information access and market participation (Leff, 1984; Norton, 1992).

1.2.2. Impact of enabling technologies (ETs) on business performance

The term enabling technology (ET) was coined by Teece in 2018 in the strategy literature, stating that "enabling technologies (present but not well defined in the literature[20]), can be thought of as junior GPTs, meeting criteria of being capable of ongoing technical improvement; and enable complementary innovations in the application" (p. 1369). In other words, ETs are extensions of GPTs. ETs are similar to GPTs in terms of their capability for continuous technical improvement and the capacity to catalyse complementary innovations. However, ETs are different from GPTs in one criterion; that is, they are not as widely used (Teece, 2018). As per the above definition, several ICT tools fulfil the requirements to be considered ETs. For example, certain aspects of big

[20] Unlike the concept of GPTs, ETs are not yet well defined in the existing literature (Teece, 2018) since the concept of ETs has originated from the policy arena acknowledged predominantly as industrial policy targets (European Commission, 2017).

data, artificial intelligence (AI), cloud computing, machine learning, information management systems (IMS), customer relationship management (CRM) [21], and e-commerce [22] can be categorised as ET tools (Posada et al., 2015).

There is a positive relationship between the sophistication[23] of technology and the speed of a firm's growth[24] (Storey, 2016). Furthermore, Steiner and Solem (1988) found that the use of new or improved technology, which can include ETs, contributes to enhanced business performance. Since ETs are not widespread (Teece, 2018), they are still exclusive to a few firms within an economy. Moreover, complementary capabilities development in employees of the firm remains a precondition for the deployment and optimum utilisation of ETs (Ram, Corkindale and Wu, 2015). Consequently, competitors find it difficult to imitate ETs, since they need not only the technology infrastructure but also the human resources, technological know-how (Ram, Corkindale and Wu, 2015), and considerable investment (Lightfoot, Baines and Smart, 2011) to replicate the success of the ETs of a competing firm.

[21] The integration of advanced technologies and features such as AI, Channel-Less CRM, and Mobile CRM (Totah, 2020) still helps CRMs fulfil the conditions of being an ET.

[22] With the growing use of augmented reality and innovative characteristics in e-commerce, it meets the criteria of an enabling technology (Chandra and Kumar, 2018; Yim, Chu and Sauer, 2017). Furthermore, even the standard features of e-commerce such as International B2C e-commerce (the standard feature of International B2C e-commerce means buying goods by the customers from businesses beyond the national border) is not as pervasive in the emerging economies as they are in developed economies (Zhu, Mou and Benyoucef, 2019). In some emerging economies such as South Asia, the overall status of logistics is not congenial for e-commerce development (Kathuria, 2019).

[23] By the sophistication of ICT technology, the advancement of these tools is meant; i.e. adding features to ICT tools so that they become more user-friendly and help to create a more flexible organisational structure (Martin and Leurent, 2017).

[24] Firm growth and superior firm performance have been used interchangeably here.

1.3. USE OF ICT BY SMES IN EMERGING ECONOMIES

In many countries, SMEs are considered the backbone of the economy and frequently comprise more than 90 percent of all businesses (Poon and Swatman, 1999; Cull et al., 2006; Ozgulbas et al., 2006). This is especially true of emerging markets; according to Eunni, Brush and Kasuganti (2007), SMEs in emerging economies comprise an overwhelming percentage of all enterprises, employ 70-85 percent of the entire labour force and produce 40-50 percent of the GDP.

As per the logic of information processing (Tushman and Nadler, 1978), environmental uncertainty and interdependence increase the degree of uncertainty faced by firms, including SMEs. This, in turn, contributes to an increased demand for information processing (Luo and Bu, 2016). More significantly, business performance is correlated to how close the match is between demands for information processing and the ability of information processing technologies. Hence, SMEs are required to improve their data processing ability by forming very well coordinated organisational structures. Without suitably applied ICT instruments, it is not possible to implement either highly connected communication networks or adequate control and coordination mechanisms in firms (Tushman and Nadler, 1978). The firms' structure and coordination processes, enabled by ICT, catalyse the efficient sharing of information and the integration of knowledge within or across organisations (Luo and Bu, 2016).

Related literature also highlights other advantages of adopting ICT in terms of cost savings, improvements to operational performance, access to new business opportunities and market information, enhanced services to customers and suppliers, internationalisation, competitiveness, and, more broadly, productivity and growth (Barba-Sánchez et al., 2007; Fulantelli and Allegra, 2003; Ghobakhloo et al., 2011; Ongori and Migiro, 2013; Tan et al., 2010). The introduction of

ICT typically involves added costs (e.g. training of staff, licensing, upgrading of existing facilities, and organisational restructuring). According to Ghobakhloo et al. (2011) and Tan et al. (2010), these costs should be taken into account as a potential disadvantage when calculating the benefits of ICT uptake by a firm, especially in the context of SME. However, a number of authors[25] argue that despite these added costs, ICT has a positive impact on business performance in terms of improved responsiveness, better utilisation of existing resources, increased product or service reliability and availability, better product or service design, less manual supervision, streamlined supply chains, and improved client service. All these, in turn, contribute to reducing the firm's service delivery costs (Lightfoot, Baines and Smart, 2011).

Matthews (2007) argues that as SMEs grow, they use both GPTs and ETs. It is worth mentioning here that GPT-related ICT tools are mostly used for networking because they have features that are suitable for communication in SMEs (Aral and Weill, 2007; Baporikar, 2020). On the other hand, ET-related ICT tools are used to enhance organizational capabilities in SMEs (Neirotti, Raguseo and Paolucci, 2018).

1.4. THEORIES USED IN THE THESIS

Three theories, namely resource-based view (RBV), dynamic capabilities view (DCV), and social network theory, are applied in this research to analyse the relationship between ICT use and business performance and the associated mediating and moderating relationships. The resource-based view (RBV), along with the dynamic capabilities view (DCV), has been used as the

[25] These authors are proponents of ICT.

theoretical framework in chapter 3, and the social network theory has been used as the theoretical framework in chapter 4.

1.4.1. Resource-based view (RBV) and business performance

According to Barney (1991), Peteraf (1993), and Wernerfelt (1984), RBV has established itself as one of the most popular theories to explain business performance or, to be specific, the CA of firms. These authors considered strategic resources to be one of the foundations of CA. Further, they stated that each firm is different because it possesses unique sets of resources, including intangible resources, operational capabilities, proprietary rights, technological know-how, and tacit knowledge. To be considered strategic, resources should have value (adding to effectiveness and efficiency), rareness (uniqueness, not commonly possessed or readily gained), imperfect imitability (difficulty in reproduction) as well as imperfect mobility (characteristics of "sticky" resources). A resource with this combination of qualities is referred to as a VRIN (valuable, rare, inimitable, and non-substitutable) resource. A firm owns these VRIN resources to use and generate competitive advantages for the business by creating economic rent[26] (Barney, 1991; Wernerfelt, 1984).

Along with resources, capabilities have often been regarded as the fundamental construct in the RBV. According to Grant (1991) and Amit and Schoemaker (1993), while resources remain at the core of the RBV and considered inputs for firm processes, capabilities involve firm-level capacity for integrating, growing, and deploying value-creating tools. Makadok (2001) argued that capabilities are more invisible than resources because capabilities possess the characteristics of

[26] Economic rent means what businesses earn in excess of the capital employed (differential profit) (Peteraf, 1993). Economic rent, rent, superior business performance, improved business performance, and competitive advantage have been used interchangeably in this thesis.

"doing," whereas the resources possess the characteristics of "having." Consequently, resources are independent of capabilities and are, in fact, the basis of firms' capabilities (Grant, 1991; Amit and Schoemaker, 1993).

1.4.1.1. ETs as strategic resources and their impact on SME performance

ET-related ICT tools can be considered a strategic resource since they meet the conditions of the VRIN[27] framework. For example, ETs are still valuable and rare at the firm level (Seethamraju, 2015; Teece, 2018). ETs are also not imitable since the associated human resource expertise is a precondition to replicate their success (Ram, Corkindale and Wu, 2015), and capabilities at a human level will always be different in each organisation since each individual is unique (Nada and Kumar, 2016). Moreover, the combination of the ETs and the associated capabilities is non-substitutable for firms because the value they combinedly generate cannot be substituted by other resources[28] (Ruivo, Oliveira and Mestre, 2017). However, GPTs have become broadly used (Bresnahan and Trajtenberg, 1995; Guerrieri and Padoan, 2007), and they do not comply with the VRIN framework. Therefore, GPTs are not considered a strategic resource.

1.4.2. Dynamic capabilities and business performance

RBV examines the origins of firms' superior performance in a competitive environment, emphasizing the role of ownership of resource advantage and firm position (Rumelt, 1997). RBV, however, has been criticised for focusing too much on these static competitive advantages and overlooking external factors that influence the use of those resources, providing little attention to the development, integration, and release process of resources (Eisenhardt and Martin, 2000; Wade

[27] Not all ICT resources are valuable, rare, inimitable, and non-substitutable.

[28] For example, the combination of ERP and the workforce's associated capabilities in ERP work as such a strategic resource that cannot be substituted by other resources such as any GPTs.

and Hulland, 2004). Dynamic capabilities view (DCV), building on RBV, explains a company's resource bundles in a more nuanced manner and overcomes RBV's shortcomings when attempting to explain CA in volatile environments (Eisenhardt and Martin, 2000; Wade and Hulland, 2004; Teece et al., 1997). Teece et al. (1997) defined dynamic capabilities as the "firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments" (p. 516).

1.4.2.1. Mediating impact of dynamic capabilities

Recent studies exploring the mediating effect of dynamic capabilities reinforce Barney's (1986) emphasis on the importance of strategic resources as critical elements of firm competitiveness. Wu (2007) reported that dynamic capabilities could act as intermediaries between resource and performance variables. In other words, dynamic capabilities act as a catalyst, transforming resources into superior performance. By design, strategic resources have features that help dynamic capabilities to form competitive combinations from these resources to enhance firms' performance. For instance, by integrating different expertise and know-how, firms can innovate a new product and gain a more significant return if the developed product is successful. This is in line with the findings of Jiang, Tao and Santoro (2010), who reported that to improve performance, organisations reconfigure resources and gain knowledge via managing alliances. Lin and Wu (2014) also echoed the above findings, suggesting that a firm gains the expertise to develop advanced technologies and enhance its performance by learning from cooperative alliances (Lin and Wu, 2014).

1.4.2.2. ICT collaboration capabilities as a mediator in the ET use and SME performance relationship

By aligning business-IT expertise through the use of ETs, SMEs facilitate cooperation between the functional departments and establish a supportive work environment (Luftman et al., 1999; Gold-Bernstein and Ruh, 2004). As a result, cross-functional teams become preferred ways of working, and departmental boundaries and interests weaken, while organisational growth and prosperity become the core interest of staff (Rick and Benbasat, 2000; Vad Baunsgaard and Clegg, 2013). Connecting employees and integrating the workforce and business operations in this way can have a bonding across the SME, which, in turn, has a positive effect on the firm's performance.

1.4.3. Social network theory

Within the disciplines of management and organisation, the number of studies associated with social networks is increasing exponentially (Borgatti and Foster, 2003). Among the vast array of topics found within these studies, one of particular importance is the effect of ICT on different aspects of a network such as communications patterns (Burkhardt and Brass, 1990), structures in groups (Kane and Alavi, 2007), organisational teaching (Kane and Alavi, 2007) and knowledge management (Alavi and Kane, 2005; Huang and DeSanctis, 2005; McKeen and Smith, 2007). This shows IS (ICT) research has the potential to contribute to the social network paradigm[29] despite IS's late arrival to the social network field (Boland et al., 2006).

[29] Although the term "social network" was coined as early as 1954 by Barnes, the first use of this term in the IS field came as late as in 1988, by Wellman, with the notion of "computer-supported collaborative work". Considerable work was done on "social network" in the IS field in the 1990s, including by Burkhardt and Brass (1990) on the impact of electronic communications on communications patterns and structures in groups, and by Zack and McKenney (1995) on the impact of computer-supported communications. In the last 20 years, research has begun to appear in specific areas such as information management (Alavi and Kane, 2005; Huang and DeSanctis, 2005; Smith and McKeen, 2007) and organisational teaching (Kane and Alavi, 2007) in the IS field.

Since ICT tools remain a critical construct of this thesis, the fourth chapter is grounded in social network theory, which measures social relations via "nodes" and "ties." Individual actors within the networks are defined as "nodes," and the associations among the actors are known as "ties" (Borgatti et al., 2009; Curran, Graham and Temple, 2010). A social network, in its purest form, is a map of all relevant ties among the studied nodes (Neergaard et al., 2005). Social network theory explores the network structure, which consists of network size, centrality, density (extent of contact among the nodes), activity, and virtual intimacy of ties [30](Prajapati and Biswas, 2011; Sullivan and Marval, 2011). It is also possible to use social network theory to determine individual actors' social capital (Curran, Graham and Temple, 2010).

1.4.3.1. Impact of GPTs on networking

In this thesis, three elements of networking of the owner-managers of SMEs have been considered: network size[31], frequency of network use[32], and centrality characteristics[33]. Communication-related GPT instruments catalyse these three elements of networks among firms and offer firms the opportunity to expand these networks (Bauer, Grether and Leach, 2002; Mansell, 1999; Sigala,

[30] This indicates the closeness of ties on virtual (online) platforms or tie-strength in virtual communities (Mathews et al., 1998). Muncer et al. (2000a, 2000b) defined the "tie" on virtual platforms simply as having at least one post between two participants. They measured tie-strength in virtual communities by the number and frequency of posts on each strand. Paolillo (2001) stated that the context of the texts, use of informal "language" (i.e. "u" when writing "you"), and spelling are measures of intimacy on online platforms. Adamic and Adar (2003) further suggested that having mutual friends on a social platform is an indicator of the virtual intimacy of ties.

[31] Network size indicates the number of actors an individual is linked to (Seibert, Kraimer and Liden, 2001).

[32] It indicates the entrepreneur's frequency of using networks. It is also known as network density and frequency of contacts in network literature (Krackhardt, 1990; Nelson, 1989).

[33] This indicates the ability to access (or control) resources via both direct and indirect connections in a network.

2007; White and Daniel, 2004). Thus, the use of GPTs as a communication tool might improve SMEs' networking in a variety of ways. This can be analysed from two different viewpoints.

First, the literature primarily focuses on SMEs' marketing goals in terms of the use of these tools. With these tools, SMEs can reach out to a broader audience[34] (Michaelidou et al., 2011); they are able to show the latest details to current customers whilst simultaneously bringing in new customers[35] (Barashi, 2012). These tools also help SMEs gain exposure among existing and prospective customers and stay in touch[36] with them (Kahar et al., 2012) via increased interaction (Stockdale et al., 2012). Additionally, SMEs may use these resources to connect with vendors and recognise potential distribution channel partners[37] (Shih, 2009).

Second, these GPTs have an essential role in promoting cooperation between SMEs. SMEs possess minimal resources and are, therefore, reliant on the resources and expertise of others (Mäläskä, Saraniemi and Tähtinen, 2011). GPTs can boost effective content and knowledge sharing amid trading partners, and thereby increase cooperation (Swani et al., 2014). SME owner-managers utilize the centrality characteristics in the network to promote this inter-firm cooperation.

1.4.3.2. Impact of networking on business performance

A considerable number of academics have recognised the importance of networking as a tool for firms' advancement and growth. For example, Johannisson and Nilsson (1989) emphasised the

[34] It indicates a larger network size.

[35] It indicates a larger network size.

[36] SME entrepreneurs do this via frequent use of their networks.

[37] Thus, SME entrepreneurs utilize the centrality characteristics in a network.

significance of networks in a firm's growth, while Granovetter (1973, 1985) suggested that personal networks or organisational social partnerships remain vital to firms' success. Different aspects of networking contribute to business performance in different ways. For example, according to network-related literature, there is a strong relationship between network size and business success (Hansen, 1995). Similarly, frequent and close contact (networking) with external and internal stakeholders is another critical feature of assessing company success (Littler, Leverick and Bruce, 1995). It is also noted in the existing literature that the centrality of the network is essential to bridge the difference in connectivity and also to allow for the sharing of information at minimal cost (Powell et al., 1999; Surin and Ab Wahab, 2013). Acquiring a central position in the social network will also boost the probability of firms' improved performance (Sparrowe et al., 2001).

1.5. RESEARCH OBJECTIVES

These concepts will be explored through the following research objectives:

1) To explore the direct impact of the use of (a) simpler ICT tools (GPTs) and (b) advanced ICT tools (ETs) on business performance.
2) To explore how firm-level factors (such as size and firm-level human capital) affect (moderate) the direct link between ICT (both GPTs and ETs) and business performance.
3) To explore how ICT collaboration capabilities can mediate the relationship between advanced ICT tools (ETs) and business performance.
4) To explore how firm-level factors impact on (moderate) the relationship between ICT collaboration capabilities and business performance.
5) To explore the indirect impact of simpler communication-related ICT tools (a subset of GPTs) on business performance via the mediator: networking by the owner-managers.

6) To explore the moderating impact of firm-level factors on the relationship between GPT use and different aspects of networking by the owner-managers.

1.6. RESEARCH QUESTIONS

This research intends to explore the following research questions:

1) What is the direct impact of the use of (a) simpler ICT tools (GPTs) and (b) advanced ICT tools (ETs) on business performance?
2) How do firm-level factors (such as size and firm-level human capital) affect (moderate) the direct link between ICT (both GPTs and ETs) and business performance?
3) How can ICT collaboration capabilities mediate the relationship between advanced ICT tools (ETs) and business performance?
4) How do firm-level factors impact on (moderate) the relationship between ICT collaboration capabilities and business performance?
5) What is the indirect impact of simpler communication-related ICT tools (a subset of GPTs) on business performance via the mediator: networking by the owner-managers?
6) What is the moderating impact of firm-level factors on the relationship between GPT use and different networking aspects by the owner-managers?

Based on the above discussion, the research model of this thesis is depicted in Figure 1.1.

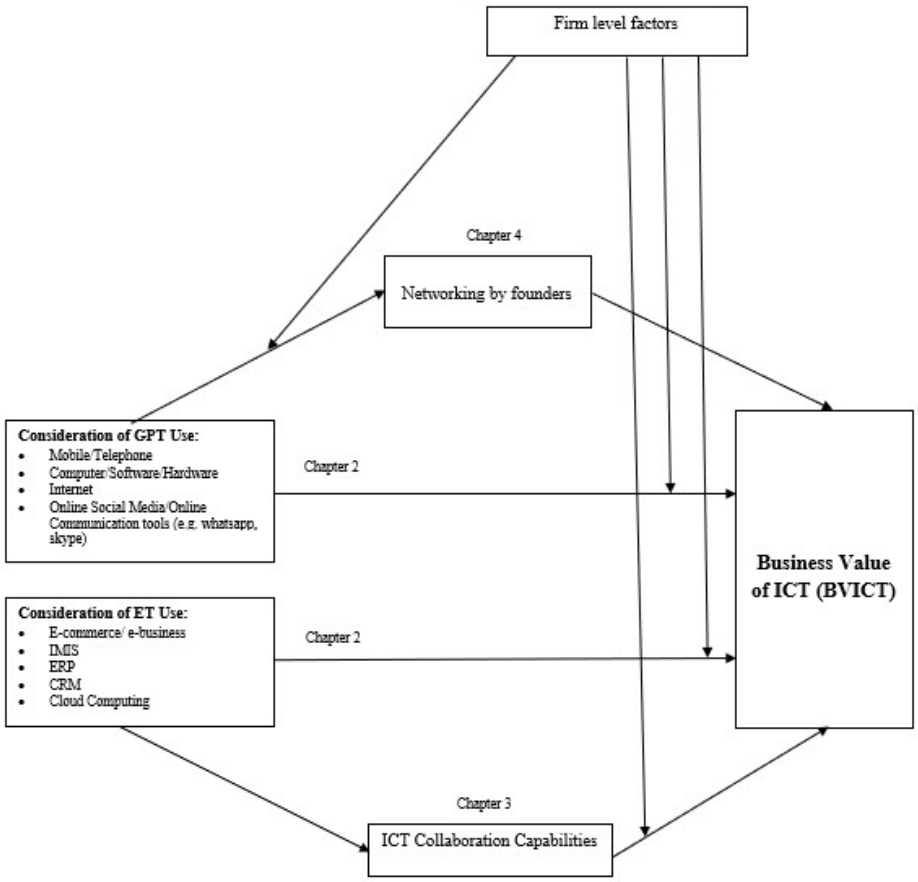

Figure 1.1: Research model for the thesis

1.7. STRUCTURE OF THE THESIS

Chapter 1 provides an introduction and overview of the thesis. Specifically, it includes the research background, theories, methodology applied in the thesis, and a summary of the overall structure. The chapter also includes the research objectives and the significance of the research.

Chapter 2 explores the direct impact of the use of both simpler ICT tools (GPTs) and advanced ICT tools (ETs) on business performance (Research objective 1a and 1b). It also explores the moderating impact of firm-level factors on the direct relationship of ICT tools (both GPTs and

ETs) on business performance (Research objective 2). By reviewing 104 studies with 270,847 overall observations, this chapter meta-analytically integrates outcomes from more than two decades of research on how firm-level factors affect the relationship between ICT use and business performance.

Chapter 3 examines the direct (Research objective 1b) and indirect (Research objective 3) impact of advanced ICT tools (ETs) on business performance via the ICT collaboration capabilities mediator drawing on the resource-based view (RBV) and dynamic capabilities view (DCV). RBV has been used since it has a strong reputation for explaining why some enterprises consistently outperform others (Barney and Clark, 2007). DCV has been used to explain the same (superior performance of some firms over others) in the context of dynamic markets (Helfat and Peteraf, 2003). Both these theories assert that strategic resources and dynamic capabilities enable firms to achieve CA in the form of superior performance (Barney and Clark, 2007; Lin and Wu, 2014; Wu et al., 2006; Wernerfelt, 1984). ETs are such strategic resources (valuable, rare, inimitable, and non-substitutable or VRIN resources), and ICT Collaboration Capability is a dynamic capability. Since ETs (independent variable), ICT collaboration capability (mediator), and business performance[38] (Dependent Variable) are essential elements of this chapter, RBV and DCV have been used as theoretical frameworks. This chapter also explores the moderating impact of firm-level factors on the relationship between ICT collaboration capabilities and business performance (Research objective 4). The topics mentioned above have been analysed from SMEs' context in an emerging economy[39] like Bangladesh.

[38] The outcome of the meta-analysis on ICT use and firm performance relationship shows that SME is an exciting group for further exploration. Hence, the empirical research of this thesis is conducted on SMEs.

[39] An emerging market economy is a developing nation's economy becoming more connected to global markets. Countries known as emerging market economies are those with some, although not all, characteristics belonging to a

Chapter 4 examines the direct (Research objective 1a) and indirect (Research objective 5) effects[40] of essential[41] ICT tools (GPTs) on business performance. The networking of owner-managers is one of the core elements (mediator) in this chapter, explaining one of the mechanisms through which the use of GPTs impacts SME performance apart from the direct relationship between these constructs. Different aspects of networking are being explored in this thesis, such as network size, frequency of network use, and centrality characteristics. Social networking theory has been used as the theoretical framework as all these aspects of networking can be explained by this theory. This chapter also explores the moderating impact of firm-level factors on the relationship between these GPT tools' use and networking by owner-managers (Research objective 6). Like chapter 3, this chapter's topics have been analysed in SMEs' context in an emerging economy like Bangladesh.

The overall conclusion of the thesis has been presented in chapter 5. Conclusions for every research objective have been incorporated in this section. The implications of the research and scope for further research have been articulated in this chapter. No new data have been incorporated into this chapter. Moreover, facts and interpretations have been differentiated.

1.8. RESEARCH METHODOLOGY

Research design is comprised of two key approaches: quantitative and qualitative. The quantitative method stresses "fixed measurements, hypothesis testing, and a much less protracted form of

developed economy (Chappelow, 2019). With around 7.3 percent economic growth in 2019 (one of the fastest across the globe), Bangladesh is gradually transitioning to a low-middle-income economy from a low-income one. Bangladesh is increasingly connected to the global market with this astounding growth (Robinson, 2018). All these criteria help Bangladesh qualify as an emerging economy.

[40] The effect, impact, and influence have been used interchangeably in this thesis.

[41] Simpler ICT tools, essential ICT tools, more familiar ICT tools, widely used ICT tools, basic ICT tools, and GPT related ICT tools have been used interchangeably in this thesis.

fieldwork involvement" (Bryman, 1984: 78). As per Johnson and Christensen (2012), the qualitative approach relies on a non-numeric set of data that facilitates the development of new hypotheses and theories. Bryman (1984), along these lines, stated that it is less scientific, and it tests decisions based on the researcher's understanding of the situation. Another approach is the mixed method, which combines quantitative and qualitative methods. This approach is frequently used to compensate for the limitations and capitalise on the strengths of both the quantitative and qualitative approaches (Bryman, 1984).

The quantitative approach was adopted for this thesis, for the most part, to allow the researcher to collect data to achieve the aims of this thesis. Furthermore, a questionnaire was used for easy analysis of the respondents' answers. The selection of the quantitative approach also provided a logical structure to this thesis, which involves the use of theories, hypotheses, questionnaire, data collections, empirical outcomes, and findings. These are in line with the quantitative analysis method recognised by Bryman and Bell (2007).

This quantitative thesis is descriptive and analytical, and it involves a cross-sectional survey. According to Bryman and Bell (2007), a survey is an effective means of data collection for descriptive and analytical studies because it allows classifying the relationships between variables. Simultaneous data collection from a large variety of participants is possible through the survey method. Data collection through several rounds of cross-sectional surveys (longitudinal data collection) with standardised definitions can provide a useful indication of trends (Bonita, Beaglehole and Kjellström, 2006).

However, some interviews were conducted to explore research objectives 3 to 4 more in-depth. Therefore, though this research is predominantly a quantitative one, it can be considered mixed-method research to some extent, considering the interviews.

1.9. SAMPLING AND DATA

A meta-analysis was conducted to fulfil the 1st and 2nd research objectives. The meta-analysis is based on prior empirical studies where independent variables were related to the use of ICT in the firm, and dependent variables were indicators of firms' performance. An extensive investigation was carried out to collect studies published before November 2018 in established databases such as EBSCO (Business Source Elite), ABI or INFORM, EconLit, PsycINFO, JSTOR Databases, ERIC (Expanded Academic Index), Wilson Business Abstracts, and Science Direct. In this investigation, various keywords related to ICT and business performance were applied. By the end of the search (before November 2018), a total of 533 studies had been collected and reviewed, and after considering all the collected studies, 104 studies were included in the database, with each study representative of an independent sample. Consequently, a solid empirical base (N= 270847) was obtained for conducting a meta-analysis (Brinckmann, Grichnik and Kapsa, 2010; Read, Song and Smit, 2009).

The necessary data was collected through field surveys for the 3rd to 6th research objectives (for chapters 3 and 4). The focus was on SMEs working in two different cities in Bangladesh: Dhaka (the capital city of Bangladesh and the business and administrative hub in the country) and Khulna (a comparatively smaller city than the capital yet the third largest in Bangladesh). The sample includes for-profit firms with a maximum of 250 employees (SMEs) as of September 2018. The definition in terms of the number of employees in SMEs varies in different countries (OECD,

2005). For instance, firms with up to 500 employees are defined as SMEs in the USA (US SBA, 2013).

However, the Central Bank of Bangladesh (2011) defined SMEs as firms with up to 250 employees, which is consistent with Taylor and Banks (1992) and Cardon and Kirk (2015). The sample was stratified by gender of the owner-managers (50% males and 50% females), city (the samples are equally distributed between the cities of Dhaka and Khulna), firm size (fewer than 250 employees), and industry type (13 industry types listed in the SME foundation directory in Bangladesh). The sampling data was collected from the Chambers of Commerce and Industries' registers of both cities.

A semi-structured questionnaire consisting of mostly close-ended questions was developed. In June 2018, 350 SMEs were contacted and the founders were invited to participate in the research. Two reminders were sent two and four weeks after the initial contact. Three hundred and fifty printed versions of the questionnaires were distributed to the respondents upon their initial consent to participate in the survey. After a stipulated period set by the researcher, 302 face-to-face surveys with the vital informant person (founders or the owner-managers[42] of the SMEs) in each SME were conducted between August and October 2018, reflecting an 86.29% valid response rate. The requirement of "informed consent" was tackled by taking approval from the participants. Moreover, the four fundamental ethical standards; "no harm to participants, no lack of informed consent, no invasion of privacy and no deception" (Diener and Crandall, 1978, as cited in Bryman and Bell, 2007:132) were applied.

[42] In case the founders have left the firms, the majority shareholder or the active working owner has been chosen for the survey.

Both procedural (ex-ante) and statistical (ex-post) controls were adopted to tackle the issue of Common method bias (CMB hereafter) which is a challenge to data collected through survey questionnaire (Kock, Berbekova and Assaf, 2021). CMB can occur when both the independent and dependent variables are measured within one survey, using the same (i.e., a common) response method (e.g., ordinal scales)" (Kock, Berbekova and Assaf, 2021, p.1). The dependent variable (DV) (yearly revenue of SMEs) in both chapter 3 and 4 (empirical parts) are continuous. On the other hand, independent variables (IV) (ET use in Chapter 3 and GPT use in chapter 4) are nominal. So, as per this survey design (Procedural Control), the research did not use the same response method. This is one of the procedural controls (ex-ante) adopted to minimise CMB in this research.

Other procedural (ex-ante) controls adopted to prevent CMB included Methodological Separation, which means "Diversifying survey scale formats to collect the IV and DV; separating the measures of IV and DV proximally" (Kock, Berbekova and Assaf, 2021, p.3). As mentioned earlier, the IV and DV consisted of different kinds of variables (thus fulfilling the condition of "Diversifying survey scale formats to collect the IV and DV"). Moreover. the IV and DV had been separated proximally by putting the IV and DV-related questions distantly[43] in the survey questionnaire (Viswanathan and Kayande, 2012).

Psychological Separation, another procedural (ex-ante) control, was used to prevent CMB by concealing the researcher's interest in the IV and DV and hiding the relationship between them (IV and DV) (Kock, Berbekova and Assaf, 2021; Podsakoff et al., 2012).

CMB is very common in self-administered questionnaires ((Kock, Berbekova and Assaf, 2021). However, the data collection of this research did not involve a self-administered questionnaire.

[43] By presenting IV and DV in different parts of the survey.

The researcher, along with two other enumerators, were involved in collecting data from the respondents. The respondents themselves did not fill out the questions in the questionnaire. This is another procedural (ex-ante) control that was adopted to prevent CMB.

Because utilising statistical (ex-post) controls only afterward may not be sufficient, it was critical to include procedural (ex-ante) controls in the very early stages of the questionnaire design. To prevent common method bias, Baumgartner and Weijters (2012) recommended acknowledging that high motivations can also be a source of it and actively participating in pilot testing. Similarly, the findings of Pace's study (2010) emphasise the importance of a well-designed questionnaire. All of these were followed to combat Common method bias.

Statistical controls are the second type of control for common method bias, after procedural controls. These statistical techniques are used after data collection is complete (ex-post) and are designed to detect but not avoid potential common method bias. Ex-post controls are recommended regardless of whether procedural (ex-ante) controls are used. The most extensively used methodology for detecting common method bias is Harman's single factor (sometimes known as the one factor) test (Fuller et al., 2016; Podsakoff et al., 2003). To detect common method bias, this test uses exploratory or confirmatory factor analysis. According to Harman's exploratory factor analysis test, CMB exists if the unrotated solution (with all measured items included) generates one factor that accounts for more than 50% of the variance (Fuller et al., 2016). This was not the case in this research as a one-factor model of the un-rotated solution explained only 19.55 % of the variance.

For chapter 3, the whole sample was also split into two groups by gender. Then, regression analyses were run on both the subgroups (males and females) to explore the impact of ET use on

both these groups' business performance and how ICT collaboration capabilities mediate the relationship between ET use and business performance in both these groups. Six owner-managers (three males and three females) were also interviewed to explore more deeply how the use of ICT tools has affected their overall business performance.

1.10. CONCLUSION

This chapter presented the context (background) of this thesis. It also provided an overview of this thesis' research methodology. The initial literature review around the research topic helped articulate the research gap (the key aspects which have not been examined yet). This chapter has also outlined the primary research model and the objectives of the thesis. The significance of the research has also been discussed. Moreover, the structure of the whole thesis has been outlined.

CHAPTER 2: A META-ANALYSIS INVESTIGATING THE RELATIONSHIP BETWEEN ICT AND BUSINESS PERFORMANCE

2.1. INTRODUCTION

Whether ICT is still a game-changer globally is critical to know in this age of the fourth industrial revolution. A spontaneous "yes" would probably be the most popular response to this question. The reason for this is that ICT—which includes any technologies that facilitate the creation, collection, dissemination, consumption, and storage of information (Von Braun and Torero, 2006)—has become ubiquitous in personal space across the globe. For instance, it is hard to imagine everyday life without mobile phones and Internet connections. While ICT's contribution to personal life can be answered straightforwardly, its contribution to firm-level business success cannot be spontaneously answered. A significant volume of research within the business and management domain has been dedicated to exploring the true nature of this linkage between ICT and business performance (Chen et al., 2016; Díaz-Chao et al., 2015; Higón, 2011; Lopez-Nicolas and Soto-Acosta, 2010; Luo and Bu, 2016; Martínez et al., 2010; Popa, Soto-Acosta and Perez-Gonzalez, 2018).

Contrary to what might be expected, the findings of these studies are quite disparate. They range from a negative relationship between ICT and business performance (Bauer, Dehning and Stratopoulos, 2012; Malhotra, Gosain and Sawy, 2005; Ray, Muhanna and Barney, 2005), to no relationship at all (Venkatraman and Zaheer, 1990), to a contingent positive one (Tippins and Sohi, 2003; Wu et al., 2006), as well as a direct positive one (Falk and Hagsten, 2015; Hagsten and Kotnik, 2017; Lopez-Nicolas and Soto-Acosta, 2010; Luftman, Lyytinen and Zvi, 2017; Luo and Bu, 2016). These findings leave the question open concerning the exact role of ICT in a firm, its

contribution to performance, and precisely which contingent factors determine the extent to which ICT contributes to business performance.

As reflected in the findings of these studies, debate persists in the field of ICT on the real contribution of ICT at the firm level. Two diametrically different schools of opinion can be found. Following the theories by Porter and Millar (1985, 2001), one school believes that ICT is still capable of creating CA for firms. A different school believes that ICT has already become a basic utility available to all firms and has therefore lost its effectiveness for creating differentiation between firms (Schubert and Leimstoll, 2007). Carr provided momentum to the later school of opinion by publishing scholarly works with titles such as "IT Doesn't Matter" (Carr, 2003) and "Does IT Matter?" (Carr, 2004). Hence, a meta-analysis is required to synthesise the existing literature to enhance our understanding of the relationship between ICT and business performance scientifically in the face of the abovementioned debate.

Furthermore, the underlying mechanisms linking ICT use and business performance are still open to debate. Anecdotal evidence indicates that several factors influence the way ICT use[44] translates into performance outcomes. Among these factors, the type of ICT tools being used, how these are being used[45] (Bharadwaj, 2000), as well as firm-level factors such as firm size, human capital attributes (Gallego, Gutiérrez and Lee, 2015) are worth mentioning. Given the literature's breadth and the diversity of the findings, an updated synthesis[46] of the literature is necessary, which can

[44] As mentioned in the Introduction Chapter, ICT adoption and ICT use have been used interchangeably in this thesis.

[45] For instance, redesigning firms' operations to exploit firms' ICT infrastructure optimally and make ICT tools part of the organizational routine.

[46] Since ICT is a fluid concept and many new tools are added under the umbrella of ICT regularly, an updated synthesis of ICT tools' contribution to firm performance is required.

identify some of the possible causal mechanisms that underpin the relationship and provide detailed directions for future researchers in exploring these, both from theoretical and empirical perspectives. This chapter provides an up-to-date analytical meta-review of the extant literature on ICT and business performance links; it also explores two fundamental mechanisms and interactions between them that may affect this relationship.

The first mechanism this chapter intends to examine is the type of ICT tools adopted by a firm, whether these are essential ICT tools (GPTs) or advanced ICT tools (ETs[47]). With the emergence of unique technologies such as big data, artificial intelligence, and cloud computing, there is a growing need to explore the impact of these advanced technologies separately from simpler, more familiar, and widely used technologies. This approach is consistent with the binary categorisation of technologies based on the purpose of their use or their functionality (Bresnahan, 2010; Lucchetti and Sterlacchini, 2004; Teece, 2018).

The second mechanism explored here focuses on how firm-level factors such as firm size and human capital attributes impact the first mechanism. This second mechanism is critical, as prior research has established that firm-level factors complement ICT adoption (Gallego, Gutiérrez and Lee, 2015) and ICT payoff in firms (Arvanitis and Loukis, 2009; Gupta and George, 2016).

By uncovering these abovementioned two fundamental mechanisms (i.e. types of ICT tools and firm-level factors) through which ICT use impacts business performance, this meta-analysis contributes to the IS, IT, ICT, and business management literature. It does so by integrating different outcomes of two decades of research on the relationship between ICT and business

[47] GPTs are used for simple, traditional, and basic tasks in organizations, while ETs are used for specialized and sophisticated tasks in organizations. Though GPTs are indispensable organizational resources, firms are growingly adopting ETs. According to Matthews (2007), this can be considered an advancement in firms' ICT usage.

performance. By applying a set of systematic and quantitative tools to integrate outcomes of prior research, a meta-analysis—which is referred to as an "analysis of analyses" (Hunter, Schmidt and Jackson, 1982)—gains statistical power by pooling several studies conducted across the world, including those with small sample sizes. Thus, this meta-analysis in itself is valuable for the resultant synthesis of the literature, aiding a deep understanding[48] of the relationship between ICT tools' use and business performance. Though some previous meta-analyses examined the relationship between IT and business performance from different angles, none of these comparatively analysed the impact of ETs and GPTs on business performance.

Moreover, none of these meta-analyses explored communication technologies besides information technologies (IT). For example, Liang, You and Liu (2010) aggregated 42 primary studies to investigate the impact of IT and other firm resources on business performance. Lim et al. (2011) and Ada, Sharman and Balkundi (2012) examined the impact of IT investment on business performance. Furthermore, Kohli and Devaraj (2003) and Sabherwal and Jeyaraj (2015) investigated the impact of structural variables on the business value of IT (IT payoff at the firm level). However, some aspects of the business value of information technology (BVIT[49] hereafter) are still unexplored, requiring immediate attention. For example, the moderating impact of many firm-level factors has never been explored in the context of the business value of ICT (BVICT hereafter) in a meta-analysis. In particular, factors such as firm size and human capital have not been explicitly considered mechanisms linking ICT use with business performance in any prior

[48] This deep understanding also includes "the universality" of the relationship between ICT tools' use and firm performance. Since a meta-analysis uses primary studies conducted worldwide, a meta-analysis's outcomes provide a more generalisable result on the examined topic.

[49] Business Value of IT (BVIT), Business Value of ICT (BVICT), and Impact of ICT use on firm performance (ICT use-firm performance relationship) have been used interchangeably in this thesis.

meta-analyses, and nor in many empirical papers for that matter. By addressing this research gap, this chapter provides key theoretical insights for future studies. It also combines the IT side with the communications side and thus, can provide a more holistic view of the ICT performance link, unlike previous (meta) studies which have only looked at one or the other (Ada, Sharman and Balkundi, 2012; Kohli and Devaraj, 2003; Liang et al., 2010). The theoretical insights that emerge from the meta-analysis provide essential directions for future research and have significant managerial implications in developing and utilizing ICT-oriented resources and capabilities in firms.

The rest of the chapter is organised in the following way. The existing literature on ICT use and business performance has been reviewed to integrate independent variables (the use of GPTs and ETs), a dependent variable (BVICT), and moderator variables (firm-level factors such as firm size and human capital-related factors) used in various studies to construct the research model in the Literature review and research framework section of this thesis. Then, the inclusion criteria, coding, and analysis method applied in this meta-analysis are listed in the Research methodology section. Next, the outcomes from the meta-analysis are presented in the Results section. Finally, the meta-analysis' findings, suggestions for future research, and the limitations of this chapter are presented in the Discussion and Conclusion section.

2.2. LITERATURE REVIEW AND RESEARCH FRAMEWORK

2.2.1. Prior research on the impact of ICT on business performance (business value)

As discussed in the introduction to this chapter, existing literature reports different results concerning ICT payoff at the firm level, from negative, to zero, to contingent positive, and direct

positive. What is apparent is that ICT's effect on business performance is not definite and straightforward.

2.2.2. Prior research on the impact of ICT use on business performance (business value)

Prior research has attempted to explain BVIT or BVICT by exploring different facets of IT or ICT[50] and their impact on business performance (Sabherwal and Jeyaraj, 2015). These diverse facets include IT investment, IT adoption, IT capability, and IT alignment (Abebe, 2014; Ahmad, Bakar and Ahmad, 2019; Bharadwaj, 2000; Brynjolfsson and Hitt, 1993; Campbell, 2012; Chae, Koh and Prybutok, 2014; Ilmudeen, Bao, Alharbi, 2019; Kim, Xiang and Lee, 2009; Liang, You and Liu, 2010; Liu et al., 2013; Mithas, Ramasubbu and Sambamurthy, 2011; Mithas and Rust, 2016; Rogers, 2003; Sabherwal and Chan, 2001).

Several types of research exist in several streams capturing these various aspects of BVIT. Though each paper addresses a similar research question, each has its own theoretical and empirical perspective. Consequently, an ambiguity has appeared because of a lack of integration of divergent approaches in different studies. Empirical research shows that ICT can improve firms' profitability (Santhanam and Harton, 2003) and can enhance the flexibility of firms' operations by catalysing organisation-specific resources in the case of international diversification (Chari, Devaraj and David, 2007; Martínez Sánchez and Pérez, 2005).

However, not all studies reported a clear payoff from IT or ICT. One reason for this could be that most of the previous meta-analyses on this topic considered IT investment, whereas according to Devaraj and Kohli (2003), the driver of IT payoff is not investment in IT, but rather the actual

[50] In this section, IT and ICT are used interchangeably.

usage of the individual technologies. “ICT use” can indicate diverse facets of use, such as the extent of ICT use in firm transactions, ICT use in specific firm activities, and the proportion of the firm’s employees using ICT (Wang, Li and Li, 2013). Blurton (2002) defined ICT use as the use of different ICT tools and resources to create, disseminate, communicate, store, and manage information. According to Vilaseca-Requena, Torrent-Sellens and Jiménez-Zarco (2007), firms that use ICT, in general, work well in the market and can deliver differentiated products or services. Ollo-Lopez and Aramendia-Muneta (2012) found that ICT use seemingly has a positive and long-term impact on productivity directly or indirectly based on the firm’s industry.

A stream of the literature shows that BVICT differs depending on which different ICT tools (GPTs and ETs) are employed and their level of use (Bayo-Moriones, Billon and Lera-Lopez, 2013; Liang, You and Liu, 2010). It also differs according to the purpose of using these different ICT tools at the firm level (Bresnahan, 2010; Lucchetti and Sterlacchini, 2004; Teece, 2018).

2.2.3. Impact of the use of ETs vs. GPTs on business performance (business value)

According to Rosenberg and Trajtenberg (2004), one of the criteria of GPTs is general applicability, which has been interpreted by a stream of literature as not providing any unique benefits[51] for firms. Moreover, the usual benefits brought about by GPTs are not enough for today’s firms and their stakeholders since they expect technologies to provide more than before. These expectations include catalysing more innovations, increasing customer engagement, improving revenue growth, and enhancing profitability. Achieving all these targets simultaneously from GPTs has become troublesome for many organisations. The ICT tools categorised as enabling

[51] The use of GPTs is so widespread that their benefits are available to most firms nowadays.

technologies offer a comprehensive way to address the abovementioned expectations (Maine and Garnsey, 2006). Moreover, ETs provide unique benefits or values for firms, such as rendering new business opportunities, providing a continuous foundation of organisational strategies and business models (Gibson, Rosen and Stucker, 2015). No GPT can substitute for these. Furthermore, by providing improved responsiveness and better utilisation of existing resources, ETs impact business performance in terms of increased product or service reliability and availability, better product or service design, less manual supervision, a streamlined supply chain, and improved client service. All these, in turn, contribute to lessening the service delivery costs of a firm (Lightfoot, Baines and Smart, 2011). Therefore, it is posited:

> **H1:** Studies that consider ET use as an independent variable find larger effect size[52] (BVICT[53]) than studies that consider GPT use.

2.2.4. Impact of firm-level factors on the ICT-business performance relationship

Current literature on technological transition recognises that a complementary relationship exists between the adoption and usage of ICT and different firm-specific factors (Bayo and Lera, 2007; Bocquet et al., 2007; Fabiani et al., 2005; Gallego, Gutiérrez and Lee, 2015; Giuri et al., 2008; Hollenstein, 2004; Lucchetti and Sterlacchini, 2004). In their seminal paper, Milgrom and Roberts (1990) reported that complementary firm-specific operational and organisational factors act as

[52] Effect size and BVICT have been used interchangeably in the hypotheses in this chapter.

[53] It is worth mentioning that we are, in no way, undermining the contribution of GPTs to the firm performance by proposing this hypothesis. We acknowledge that GPT related ICT tools often become existential necessities for firms worldwide. Here we are only indicating that the effect size is larger when only the impact of ETs is measured rather than only GPTs. We do not indicate that the firms of primary studies where the impact of ETs are captured are exclusively using ETs and disregarding GPTs. A firm can use different ICT tools, and researchers will not capture the impact of all of them; rather, they will only capture what is relevant for their studies.

determinants of the firm-level adoption of new IT resources. Human capital attributes, structural characteristics of firms, internal organisational structure, level of innovation, the characteristics of the industrial environment, competitive environment, strategic commitment, and required competencies are some examples of such firm-specific factors (Gallego, Gutiérrez and Lee, 2015; Kowtha and Choon, 2001). Among these factors, firms' structural characteristics and human capital factors are especially relevant for this meta-analysis since their impact on the ICT-business performance relationship has not been studied in any previous meta-analyses.

2.2.4.1. Impact of structural characteristics of firms on ICT-business performance relationship

One of the most commonly tested structural characteristics in the ICT adoption and use literature is firm size. Older literature on this subject indicates that the size of the business has a positive effect on the adoption of ICT, suggesting that larger enterprises can invest more money and resources for ICT adoption than smaller ones (Cohen and Levin, 1989; Geroski, 2000; Premkumar and Roberts, 1999). On the other hand, recent studies show that more SMEs are adopting ICT and making better use of it (Hollenstein, 2004[54]; Lucchetti and Sterlacchini, 2004; Schubert and Leimstoll, 2007; Bayo-Moriones and Lera-López, 2007; Albar and Hoque, 2019) and the resultant positive impact on performance (Morikawa, 2004; Schubert and Leimstoll, 2007). One argument for this increasing adoption and utilisation of ICT in SMEs is that ICT helps SMEs to survive and compete by making market information and knowledge more accessible; developing closer working relationships with value chain partners; reaching new local, regional or global clients;

[54] Hollenstein (2004) indicated that a firm's size is typically positively correlated with early and heavy use of ICT only up to a level of around 200 employees. For certain basic ICT components, such as the Internet, he found that medium-sized firms are even more heavy users than large firms.

gaining IT capabilities to contribute to business transformation; decreasing costs; as well as improving decision making, business-related communication, overall flexibility, responsiveness, productivity and efficiency (Ashrafi and Mutraza, 2008; Balocco et al., 2009; Chacko and Harris, 2006; Fu et al., 2001; Mbuyisa and Leonard, 2017; Schware, 2003; Torero and von Braun, 2006; Vidgen et al., 2004). Another argument is that some ICT tools enable smaller firms to compete with larger ones in terms of delivering superior performance (Bayo-Moriones and Lera-López, 2007). This can be explained by the fact that SMEs are more flexible and can adjust to a changing environment faster than larger firms (Goode and Stevens, 2000; Lai et al., 2016). Therefore, SMEs can adopt these ICT tools faster and tend to use them optimally[55]. Hence, the benefits of using ICT tools are more evident in SMEs and that too, in a shorter period. Despite having mixed evidence on the impact of firm size on the ICT use and business performance relationship in the theoretical and empirical literature, recent studies show more reliable evidence favouring ICT bringing about better performance in SMEs than in larger firms. Hence, it is posited:

> **H2:** Firm size impacts the ICT (both GPTs and ETs) use and business performance relationship (aka BVICT) in such a way that the use of ICT tools results in a larger effect size in the case of SMEs compared to non-SMEs.

Nonetheless, SMEs' moderating impact on ICT use and business performance is not homogenous (Lopez-Nicolas and Soto-Acosta, 2010; Popa, Soto-Acosta and Perez-Gonzalez, 2018; Trigueros-Preciado, Pérez-González and Solana-González, 2013). Depending on the ICT tools, this impact varies. There is evidence in the existing literature that SMEs intensively use essential ICT tools (GPTs) such as the Internet more than the ETs (Hollenstein, 2004). Empirical evidence shows that

[55] Since SMEs usually suffer from resource constraint, any resources they invest in are in general optimally used in SMEs (Johnston, Wade and McClean, 2007; Woschke, Haase and Kratzer, 2017).

SMEs use different levels of GPTs before they proceed to more advanced ICT tools or ETs. For instance, SMEs use communication-related ICT tools (GPTs) such as fixed-line or mobile phone at the first stage of ICT use to establish excellent communication with their stakeholders. They also use essential information technologies (GPTs) such as PCs or laptops with necessary software and hardware in the second stage and enhanced communication-related ICT tools (GPTs) such as email, Internet browsing, file sharing, and voice over Internet protocol in the third stage. Most SMEs find up to the third stage to be enough[56] for their operational requirements and do not move to the fourth stage (Pérez Uribe, Ocampo-Guzman and Salcedo-Perez, 2019). Fewer SMEs[57] progress to the fourth stage of adopting advanced ICT tools (ETs) such as ERP, CRM, and big data tools (Pérez Uribe, Ocampo-Guzman and Salcedo-Perez, 2019; Vadim, 2007). One reason for the lower adoption rate of ETs is the precondition of considerable investment and complementary skill development to effectively adopt and use these technologies (Lightfoot, Baines and Smart, 2011; Ram, Corkindale and Wu, 2015). This is not always feasible for SMEs since resource scarcity is a common problem for most (Johnston, Wade and McClean, 2007; Woschke, Haase and Kratzer, 2017). However, when SMEs do adopt more advanced technologies like ETs, it brings about many benefits, including direct financial benefits and superior innovation performance (Hassan, Tretiakov and Whiddett, 2017; Popa, Soto-Acosta and Perez-Gonzalez, 2018; Sánchez-Rodríguez, Martínez-Lorente and Hemsworth, 2019). For example, an information system (IS) for the whole organisation (e.g. Management information system; MIS hereafter) contributes to enhancing operational performance, including decreasing production lead time;

[56] For example, it is enough for SMEs in the service industry, such as tourism, to use GPTs up to the 3rd stage (Pérez Uribe, Ocampo-Guzman & Salcedo-Perez, 2019).

[57] For example, SMEs in the manufacturing industry may progress to the 4th stage.

improving flexibility, forecasting and resource planning; saving costs; and enhancing coordination among stakeholders[58] both inside and outside the firm (Basu et al., 2018; Zhou, 2016). Moreover, it impacts the profitability of the firms (Chan and Chong, 2012). Another ET, cloud computing, brings about unique benefits to SMEs. These benefits include a positive impact on non-financial performance (such as flexibility, quality, operational performance, and productivity) and financial performance (Garrison, Wakefield and Kim, 2015; Ooi et al., 2018). The use of ETs also creates different ICT capabilities in SMEs, such as e-procurement capabilities and other core capabilities (Ooi et al., 2018; Sánchez-Rodríguez, Martínez-Lorente and Hemsworth, 2019). All these are unique benefits that cannot be replaced by the benefits brought about by the GPT related ICT tools. Therefore, it is posited:

> **H3:** Firm size (when considering SMEs only) moderates BVICT in such a way that the use of ET tools results in a larger effect size (BVICT) than GPTs.

2.2.4.2. Impact of firm-level human capital factors on ICT-business performance relationship

The firm-level human capital (e.g. individual traits, knowledge, and skills of employees) impacts ICT adoption at firms. Level of education, skills, knowledge, and experience are some of these factors (Bayo-Moriones and Lera-Lopez, 2007; Bresnahan, Brynjolfsson and Hitt, 2002; Florin, Lubatkin and Schulze, 2003; Jutla et al., 2002; Lucchetti and Sterlacchini, 2004; Terjesen, Sealy and Singh, 2009; Unger et al., 2011). According to Mahama and Maharajan (2017), gender is

[58] Organisational IS enhances coordination among different stakeholders such as employees, suppliers, and customers inside and outside the firm.

another human capital factor[59], one that also has an impact on other human capital factors (Terjesen, Sealy and Singh, 2009). However, this is not adequately explored in the existing literature. For instance, the impact of the gender of human resources on their ability to use ICT at the firm level is not sufficiently researched.

Some evidence-based research in the past may have been fundamentally flawed because of the failure to report both males and females in the study design and analysis (Holdcroft, 2007). Findings for one gender (males) are misleadingly portrayed as representative of both the genders (both males and females) in those studies. This results in reporting bias. Compared to the past, recent studies are increasingly incorporating both genders in the sample (Holdcroft, 2007) and, consequently, capturing both genders' perspectives in the research. One reason for this could be the increasing global trend of a gender-diverse workforce, which is an outcome of the steady growth of women's participation in the workforce (Brush, 1992; Minitti, Arenius and Langowitz, 2005; Hughes et al., 2012) compared to the predominantly male-dominated workforce of the past. Likewise, many empirical studies have captured the impact of this inclusion of both genders (in the sample[60]) on business performance. Among this research, though a small number of studies has reported no impact (Reguera-Alvarado, de Fuentes and Laffarga, 2017) and a negative impact (Kilic, 2015), the majority of the studies have reported a positive impact of reporting both genders on business performance[61] in terms of more significant sales revenue, higher profits, greater

[59] Though there is a stream of literature that does not consider gender as a human capital factor.

[60] The inclusion of both the genders in the sample and 'gender reporting' have been used interchangeably in this thesis.

[61] Reporting both the genders or taking both genders as the survey participants tend to be correlated with positive firm performance in those studies.

market share, and more customers (Carter et al., 2010; Herring, 2009; Hunt, Layton and Prince, 2015).

In terms of specific ICT tools, GPT-related tools still hold a crucial role in addressing the information and communication needs of many people, including women (Basu and Fernald, 2007), even after the introduction of ETs. GPTs fulfil these needs by bringing about a massive change in the depth, vastness, and ease of ICT use. For example, these tools (GPT-related ICT tools) have made worldwide communication and information sharing cheaper, convenient, more widespread, and more innovative by providing instant messaging, email services, video call features, and more (Biagi, 2013; Corrado, Haskel and Jona-Lasinio, 2017). The abovementioned characteristics of GPT-related ICT tools help address gender equality (Chen, 2004; UN, 2005). For example, phones, computers, the Internet, and social media help women to build online communities and access different online networks, which in turn help to connect them with local and global markets for communication, networking, and collaboration, on a scale wider than before. For example, in many places worldwide, female artisans connect to the global market by using the Internet (Maier and Nair-Reichert, 2007). Thus, these GPTs help female entrepreneurs and employees to avoid the long-established dependence on male-dominated and exploitative market structures such as “middle-men” (Agu, 2013; Mbo’o-Tchouawou and Colverson, 2014). Moreover, these GPT-related ICT tools work to further empower women by building ICT-related capabilities, resulting in greater efficiency at the firm level. All these positively impact business performance (Guerrieri and Padoan, 2007).

Similarly, the impact of reporting both the genders in the sample on ET adoption has been receiving growing attention in the academic world (Awad and Ragowsky, 2008; Shaouf, Lü and Li, 2016; Sun et al., 2010). Studies on this topic have reported a lower likelihood of women

adopting and using these ET-related ICT tools compared to men (Bray, 2007; Li, Glass and Records, 2008). One reason for this could be lower confidence in using these sophisticated technologies (Li, Glass and Records, 2008). A stream of previous literature also shows that perceived ease of use (PEOU hereafter) remains more critical for women in adopting technology, whereas perceived usefulness (PU hereafter) is more significant for men (Awad and Ragowsky, 2008; Terzis and Economides, 2011). From the above literature review, it can be said that since most of the time, women perceive these technologies as challenging to use, they tend to adopt and use them less than men. Therefore, enabling technologies have less impact on business performance in the case of the female workforce (both workers and owners). Therefore, it is posited:

> **H4:** Consideration of both the genders in the sample of primary studies results in a larger effect size in the case of GPT use compared to ET use.

Based on the above literature review, the research model of this chapter is depicted in Figure 2.1.

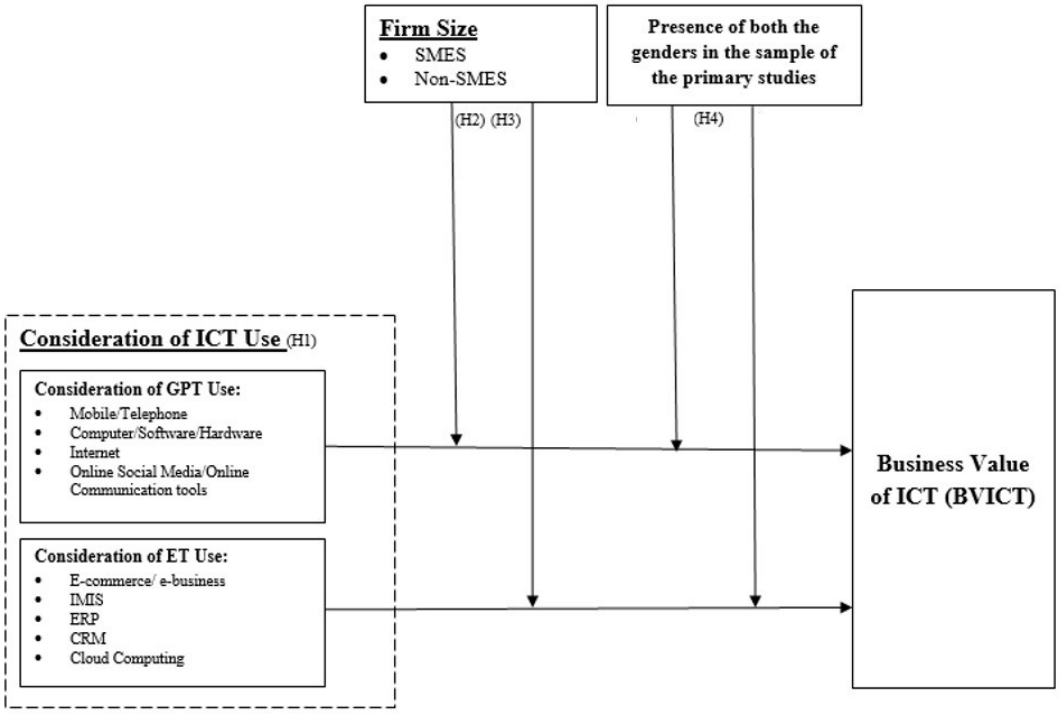

Figure 2.1: Research model for meta-analysis

2.3.RESEARCH METHODOLOGY

The proposed hypotheses and models in this chapter were tested by applying a meta-analysis approach. Meta-analysis is defined as a set of techniques to analyse coefficients found in earlier empirical research (Sabherwal, Jeyaraj and Chowa, 2006). The researchers can integrate outcomes from prior studies by utilising these techniques, and consequently, they can draw conclusive findings. This meta-analysis is based on prior empirical studies where independent variables were related to the use of ICT tools in the firm, and dependent variables were indicators of the business value of ICT use (business performance).

2.3.1. Literature search and selection strategy

An extensive investigation to collect studies published before November 2018 (to be specific, from 1998 to before November 2018) was carried out in established databases such as Business Source Elite (EBSCO), ABI or INFORM, EconLit, PsycINFO, JSTOR Databases, Expanded Academic Index (ERIC), Wilson Business Abstracts and Science Direct. Various keywords related to ICT use and business performance were applied in the literature search. To be specific, various words synonymous with business performance such as performance, business value, business payoff, profit, growth, Return on Equity (ROE hereafter), Return on Investment (ROI hereafter), Return on Assets (ROA hereafter), and Internal Rate of Return (IRR subsequently) were used[62]. Words synonymous with ICT, such as IT, and IS were also used to search for primary studies on the topic[63]. Additionally, keywords related to the use of specific ICT tools, such as the use of mobile phone, telephone, basic computer, laptop, software, hardware, the Internet, broadband, social media, e-commerce, ERP, integrated management information system (IMIS hereafter), CRM, cloud computing, big data, and AI were used in the literature search. The specific keywords used in this case are provided in Appendix A.

A manual search was then conducted in related journals such as:

Management Science, Journal of Management Information Systems, Technovation, Technological Forecasting and Social Change, Journal of World Business, Entrepreneurship Theory and Practice, *Journal of Business Research*, *Strategic Management Journal*, *Journal of Business*

[62] This was done following previous meta-analyses by Saeed, Yousafzai and Engelen (2014), Kohli and Devaraj (2003), and Sabherwal and Jeyaraj (2015) that used these keywords to search for business performance related literature.

[63] This was done following previous meta-analyses (e.g. Kohli and Devaraj, 2003; Polák, 2017; Sabherwal and Jeyaraj, 2015) that used these synonyms to search for ICT related literature.

Venturing, *Academy of Management Journal*, *Journal of Small Business Management*, *Entrepreneurship and Regional Development*, *Administrative Science Quarterly, etc.* Next, the reference lists of the shortlisted studies were explored to obtain more relevant papers.

2.3.2. Decision rules for inclusion of studies in the meta-analysis

The accompanying inclusion criteria were followed to develop the scope of this meta-analysis:

i. The studies had to have an explicit focus on examining the association between ICT use and performance in firms as the key research question.
ii. Qualitative research was not considered[64]. The studies had to be quantitative and empirical as well as providing information regarding the relationship between ICT use and business performance.
iii. To be incorporated into the meta-regression, the studies needed to report the Pearson correlation coefficient for the predefined relationship[65].

2.3.3. Calculation and analysis of effect size

At the end of the search (at the beginning of November 2018), 533 studies were collected and reviewed. After considering all collected studies (based on the protocol set in section 3.2), 104 studies were finally obtained in the database (the list of these 104 primary studies is provided in Appendix B), with each study being representative of an independent sample. Consequently, a

[64] The Pearson product-moment correlation coefficient (r) is the most broadly applied measurement in the shortlisted primary studies. Hence, the primary studies with other applied measurements were not selected to avoid discrepancy. This is consistent with the meta-analysis by Saeed, Yousafzai and Engelen (2014) that used a similar inclusion criterion.

[65] This was done following the meta-analysis by Saeed, Yousafzai and Engelen (2014) that used a similar inclusion criterion.

solid empirical base (N = 270847) for conducting a meta-analysis was obtained (Brinckmann, Grichnik, and Kapsa, 2010; Read, Song, and Smit, 2009). Sample sizes ranged from 8 (Devaraj and Kohli, 2000) to 100,000 (Hagsten and Kotnik, 2017), and effect sizes ranged from r = -0.81 (Bauer, Dehning and Stratopoulos, 2012) to r = 0.897 (Matlala, Shambare and Lebambo, 2014). Since bivariate meta-analysis has often faced a great deal of criticism for being insufficient at evaluating multivariate relationships, both bivariate analysis and meta-regression were conducted. To validate the hypotheses of this chapter, the following rules were followed:

A hypothesis is supported when both bivariate and the meta-regression investigations accomplish acceptance. A hypothesis is partly supported if either the bivariate analysis or meta-regression analysis supports it[66].

2.3.4. Variable coding

A coding manual was created to extract the necessary data from the chosen primary studies and reduce coding mistakes (Lipsey and Wilson, 2001; Stock, 1994). The coding manual was updated when required. Following Sabherwal and Jeyaraj (2015), the strategy of two coders independently coding the same set of studies (five randomly selected primary studies) for three rounds was applied to ensure consistency across the codes. Any disagreement was resolved with discussion. If required, a third individual was involved in resolving the disagreement. It is worth mentioning that agreement among the coders increased in each round. The coded variables include the use of different ICT tools, control for industry vs. no control for industry, performance scope (profitability, growth, and other performance measures), publication bias (quality of publication),

[66] This was done following the meta-analysis by Saeed, Yousafzai and Engelen (2014) that used a similar protocol.

firm size (SMEs and Non-SMEs), gender reporting, and development context of the primary studies (whether the primary study is based on a developed or emerging economy).

The variables have been coded in the following way:

Variable type	Variable name	Variable definition	Code
Independent variable: Use of GPTs	Use of general purpose technologies (GPTs)	Use of GPTs include[67]: • Use of mobile phone or telephony, • Use of basic computer or software or hardware, • Use of the Internet or broadband or social media or Internet communication tools like WhatsApp, Viber, Skype, own website.	1
	Non-use of general purpose technologies (GPTs)		0
Independent variable: Use of ETs	Use of enabling technologies (ETs)	Use of ETs include[68]: • Use of e-commerce or e-business, • Use of ERP or CRM. • Use of integrated information management systems or other information tools. • Use of cloud computing.	1
	Non-use of enabling technologies (ETs)		0
Dependent Variable: ICT use and business performance relationship	Business Value of ICT (BVICT) (Sabherwal and Jeyaraj, 2015) / ICT payoff (Kohli and Devaraj, 2003)	Effect size (Pearson correlation coefficient) of ICT use and business performance of the primary studies (Saeed, Yousafzai and Engelen 2014).	Continuous Variable
Moderator variable: SMEs (firm Size)	Firms having fewer than 500 employees (OECD, 2005)	SMEs No.	0
		SMEs Yes.	1
Moderator variable: Gender Reporting (Presence of both males and females in the sample)	Gender not reported	If the primary studies did not mention the number of both genders (men and women) in the sample.	0
	Gender reported	If the primary studies mentioned the number of both genders (men and women) in the sample.	1

[67] The abovementioned ICT tools were categorised as GPTs following Bresnahan and Trajtenberg (1995), Jovanovic and Rosseau (2005), and Bayo-Moriones, Billon and Lera-Lopez (2013).

[68] The abovementioned ICT tools were categorised as ETs following Teece (2018).

Control Variable: Industry control (Sabherwal and Jeyaraj, 2015)	Not controlled for industry	"No control for the industry" was put when all observations in the data came from the same industry or if they came from different industries, but there is no industry category among the independent variables of the study.	0
	Controlled for industry	When the primary study was controlled for industry (Brinckmann, Grichnik and Kapsa, 2010).	1
Control Variable: Sample Size (Sabherwal and Jeyaraj, 2015)	The sample size of the primary studies	The sample size of the primary studies was also controlled for in the meta-regression analysis.	Continuous Variable
Control Variable: Type of ICT	Different types of ICT tools the primary studies are based on[69]	Mobile or Telephone,	0
		Basic computer or software or hardware,	1
		Internet or broadband or social media or internet communication tools like WhatsApp, Viber,	2
		e-commerce or e-business,	3
		ERP tool or IMIS (integrated information management system) or Other information management tools or CRM or cloud computing,	4
		A combination of ICT tools.	5
Control Variable: Development status of the country (Sabherwal and Jeyaraj, 2015)	Emerging economy or not	If emerging economy.	1
		If not.	0
Control variable: Use of Firms' Performance Measures (Firms' Growth vs other Performance Measures)	Use of Firms' Growth Performance Measures (Saeed, Yousafzai and Engelen 2014)	Firms' Growth performance measures include: • Sales growth (Messersmith and Wales, 2013), • Employment growth (Hermann, Kessler and Fink, 2010), • Business growth (Anderson and Eshima, 2013; Antoncic, 2006), • Growth in revenue (Griffith, Noble and Chen, 2006), • Growth in cash flow (Griffith, Noble and Chen, 2006), • Growth in return on sales (ROS hereafter) (Gabrielsson, 2007), • Growth in profit (Zahra and Garvis, 2000), • Growth in net income (Miller and Toulouse, 1986), • Domestic and export market expansion (Chowdhury, 2006), • International sales growth (Ripollés, Blesa and Monferrer, 2012), • Productivity growth (Luo and Bu, 2016).	1
	Non-use of Firms' Growth Performance Measures		0

[69] This was applied following a similar control variable used in the meta-analysis by Sabherwal and Jeyaraj (2015).

	Use of Firms' Profitability Performance Measure (Sabherwal and Jeyaraj, 2015)	Firms' Profitability performance measures include: • ROS (Zahra, Hayton and Salvato, 2004), • Profitability (Antoncic, 2006; Ward, 2016), • ROA (Andersén, 2010; Andersén and Samuelsson, 2016), • Cash flow (Renko, Carsrud and Brannback, 2009), • IRR (Chowdhury, 2006), • ROI (Miller and Toulouse, 1986), • Sale per employee (Walter, Auer and Ritter, 2006).	1
	Non-use of Firms' Profitability Performance Measure		0
	Use of Firms' Other Performance Measures[70]	Firms' other performance measures include: • Overall business performance or success (Barrett and Weinstein, 1998; De Clercq, Dimov and Thongpapanl, 2010; Covin and Slevin, 1989; Lopez-Nicolas and Soto-Acosta, 2010; Steinfield *et al.*, 2012; Wiklund and Shepherd, 2003), • Competitiveness (Cuevas-Vargas *et al.*,2015), • Positive organizational changes (Giuri, Torrisi and Zinovyeva, 2008), • Value addition (Osei-Bryson and Ko, 2004; Saeed, Hwang and Grover, 2002), • Customer satisfaction (Ranganathan, Dhaliwal and Teo, 2004; Devaraj and Kohli, 2000; Ray, Muhanna and Barney, 2005), • Market share (Byrd and Davidson, 2003; Sircar, Turnbow and Bordoloi, 2000).	1
	Non-use of Firms' Other Performance Measures		0
Control variable: Publication bias/ Study quality [71](Polák, 2017; Saeed, Yousafzai and Engelen, 2014)	Measured by Impact Factor	The "publication bias" issue was considered by including both published and unpublished studies. The impact factor (reported from Thomson Reuters Ranking and SJR Ranking) of the publication outlets of primary studies was used in the meta-regression analysis. Unpublished studies were considered as having zero impact factor in the meta-regression analysis.	In the Bivariate Analysis, 1. Unpublished studies coded as 0

[70] This was applied following a similar control variable used in the meta-analysis by Sabherwal and Jeyaraj (2015).

[71] Publication bias, Study quality, Non-published studies vs. Published studies, and Impact Factor have been used interchangeably in this thesis to indicate this control variable.

		In the bivariate analysis, we categorized the primary studies in the following two categories: 1. Studies published in an outlet with an impact factor (Published studies). 2. Studies not published in an outlet with an impact factor (Unpublished studies).	2. Published studies coded as 1.

Table 2.1: Variables, definitions, and coding

2.3.5. Meta-analytic procedures

As mentioned earlier, the Pearson product-moment correlation coefficient for each study representing the ICT use and business performance relationship was collected. Two different methods are available in the meta-analysis process to combine study-related estimates (Hedges and Olkin, 1985; Hedges and Vevea, 1998). One of them is the fixed effects model, which assumes that there is no heterogeneity among previous studies' outcomes. This model also assumes that collected effect sizes are corrected only to address sampling errors. In other words, according to the fixed effects model, sampling error is solely responsible for creating variability in effect sizes. In contrast, the random effect model infers that randomly distributed other factors (Kisamore and Brannick, 2008) and sampling error are responsible for creating variability in effect sizes. Hence, the random effect model was adopted and the effect sizes for all these factors (i. e. sampling errors and other factors) were corrected.

Another reason the random effect model was adopted to calculate the mean correlations (Schmidt, Oh and Hayes, 2009) is because it renders comparatively more realistic evaluations related to average effect sizes, permits researchers to make generalisations made for a population of studies, and hints about the variability in actual effect sizes across different studies (Raudenbush, 2009). Since the confidence intervals of the mean effect size in the random effect model are more significant than in fixed effect models, it can also be used for comparatively under-studied relationships (Overton, 1998). Consequently, the random effect model remains a more conservative method compared to the fixed effect model. Furthermore, the random effect model is not impacted by the type I bias in the significance test related to mean effect sizes and moderator variables because of its larger confidence intervals.

Lipsey and Wilson (2001) were followed to correct effect sizes. Sampling errors, measurement errors, and a value $\hat{v}$, which indicates variability related to other sources that are assumed to be

distributed randomly in the selected studies, were considered. Also, a 95% confidence interval (CI) was computed around the estimated population correlation. The heterogeneity, moderator-related effects, and statistical tests of significance were calculated based on the sizes of the weighted effects of sample size (Schmidt and Hunter, 2014; Unger et al., 2011).

Both bivariate analysis and meta-regression were adopted in this meta-analysis to explain the source of heterogeneity. One of the differences between these two methods is that the bivariate analysis, which is used for subgroup analysis, has the categorical source while the sources related to meta-regression are continuous (Schmidt and Hunter, 2014). Meta-regression has some benefits over bivariate analysis. For example, the bivariate analysis only considers the influence of one independent variable on a dependent variable, whereas meta-regression takes into account the impact of other variables in calculating the relationship between an independent and dependent variable. As a result, bivariate meta-analysis has often faced a great deal of criticism for not being sufficient in evaluating relationships that are multivariate (Saeed, Yousafzai and Engelen, 2014). Moreover, in bivariate analysis, it is possible to measure one moderator at any given point in time, or two with hierarchical sub-grouping (Schmidt and Hunter, 2014), whereas a high number of moderators can be included in meta-regression (Schmidt and Hunter, 2014).

For the bivariate analysis in this chapter, all variables were dichotomised and divided into mutually exclusive groups based on the underlying hypothesis to test the hypothesised associations between variables and effect sizes (Lipsey and Wilson, 2001) (See Table 2.3). Subgroup analysis was conducted by fundamentally running two or more meta-analyses for several subgroups to see whether the subgroups contrast in mean effect size (Schmidt and Hunter, 2014). On the other hand, in the meta-regression, sample-size weighted effect sizes

were used following the work of Hunter and Schmidt (2004), Saeed, Yousafzai and Engelen (2014), and Unger et al. (2011). Table 2.4 reports these sample-size weighted effect sizes.

The meta-analytic process followed, and meta-analytic decisions examined in this chapter are presented in chronological order in Figure 2.2.

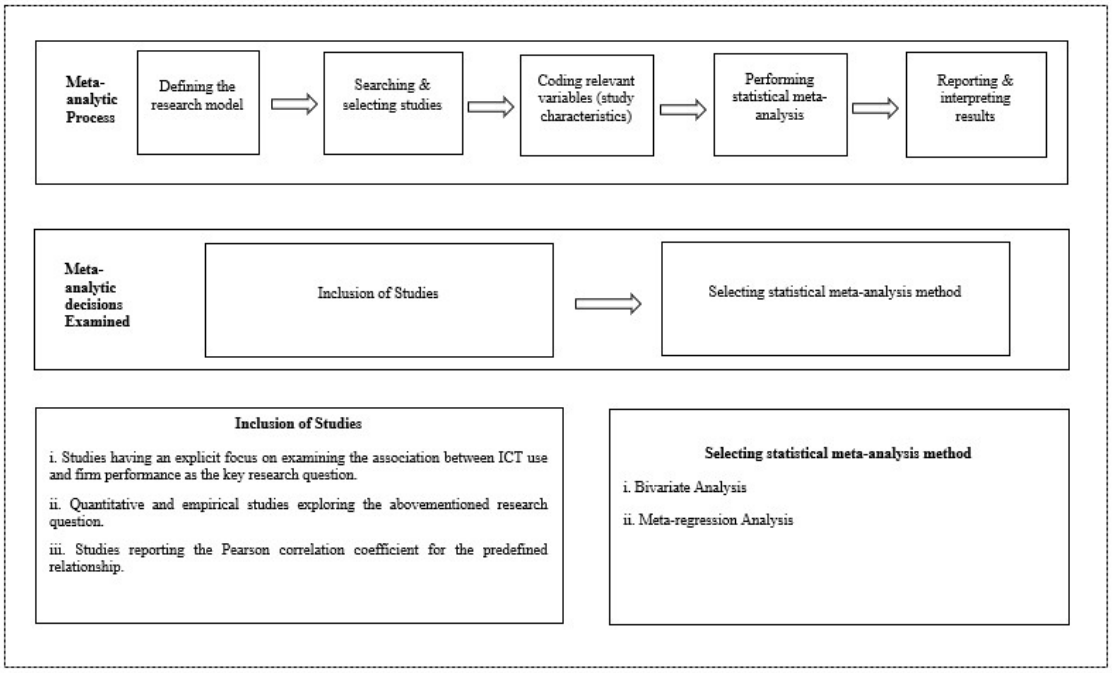

Figure 2.2: Meta-analytic process and meta-analytic decisions examined (adapted from Ada, Sharman and Balkundi (2012))

2.4. RESULTS

Both bivariate and meta-regression analyses have supported H1, H2, and H3. Conversely, since H4 is supported in meta-regression but not supported in the bivariate analysis, it is partly supported. Details are given in Table 2.2. Also, the bivariate analysis's detailed results are given in Section 2.4.1, while the meta-regression results are in Section 2.4.

Hypothesis	Supported in …		Conclusion for hypothesis
	Bivariate analysis	***Meta-regression***	
H1: Studies that consider ET use as an independent variable find higher effect size (BVICT) than studies that use GPT use.	**Yes** (Impact of ET use on BVICT is: 0.522***) and (Impact of GPT use on BVICT is: 0.403***)	**Yes** (Impact of ET use on BVICT is: 0.474***) and (Impact of GPT use on BVICT is: -0.391***)'	Supported
H2: Firm size impacts the ICT (both GPTs and ETs) use and business performance relationship (aka BVICT) in such a way that the use of ICT tools results in a larger effect size in the case of SMEs compared to non-SMEs	**Yes** (Impact of SMEs on BVICT is: 0.458***) and (Impact of Non-SMEs on BVICT is: 0.423***)	**Yes** (Impact of SMEs on BVICT is: 0.508***) and (Impact of Non-SMEs on BVICT is: -0.508***)	Supported
H3: Firm size (when considering SMEs only) moderates the BVICT in such a way that the use of ET tools results in larger effect size (BVICT) than GPTs.	**Yes** (Impact of ET use on BVICT in SMEs is: 0.534***) and (Impact of GPT use on BVICT in SMEs is: 0.430***)	**Yes** (Impact of ET use on BVICT in SMEs is: 0.584**) and (Impact of GPT use on BVICT in SMEs is: 0.523**)	Supported
H4: Consideration of both the genders in the sample of primary studies results in a larger effect size in the case of GPT use compared to ET use.	**No** (Impact of gender reporting on BVICT is 0.518*** in case of GPTs) and	**Yes** (Impact of gender reporting on BVICT is 0.956*** in case of GPTs) and	Partly Supported

	(Impact of gender reporting on BVICT is 0.672** in case of ETs)	(Impact of gender reporting on BVICT is -0.797*** in case of ETs)

*** p<0.01, ** p<0.05, * p<0.1

Table 2.2: Outcomes of hypotheses test

2.4.1. Bivariate analysis

Firstly, a bivariate analysis was completed (details are given in Table 2.3). In terms of GPT and ET categories, a comparatively larger mean effect size was found for studies with ET tools ($\bar{r}_c$[72] = 0.522, k[73] = 34) compared to GPT tools ($\bar{r}_c$ = 0.403, k = 70). The considerable Q-measurement for GPT use (21186.653, df = 69; $p < 0.001$) indicates variability across the effect sizes. Though Q-measurement for ET use (883.225, df = 33; $p < 0.001$) is smaller than for GPT use, it is still large enough to indicate variability across the effect sizes. Hence, the existence of theoretically relevant moderators becomes likely (Schmidt and Hunter, 2014). In other words, it supports the argument that relevant moderators and contextual factors impact the ICT (both GPT and ET) use and the BVICT relationship.

Regarding the firm size, positive outcomes were obtained for both SMEs ($\bar{r}_c$ = 0.458, k = 54) as well as non-SMEs ($\bar{r}_c$ = 0.423, k = 50). For SMEs, a relatively larger mean effect size was obtained for studies with use of ET tools ($\bar{r}_c$ = 0.534, k = 16) compared to those studies with use of GPT tools ($\bar{r}_c$ = 0.430, k = 38).

Concerning the presence of both genders in the sample of primary studies, a larger mean effect size was found for studies reporting both genders in the sample ($\bar{r}_c$ = 0.518, k = 18) than those studies not reporting both genders ($\bar{r}_c$ = 0.364, k = 52) in case of GPT tools. Similarly, for ET tools, a relatively larger mean effect size was obtained for studies with the presence of both genders in the sample[74]($\bar{r}_c$ = 0.672, k = 3) compared to those studies without the presence of gender ($\bar{r}_c$ = 0.507, k = 31).

[72] $\bar{r}_c$ indicates reliability corrected random-effect effect size.

[73] "k" represents the number of primary studies that include the concerned variable or construct.

[74] As mentioned earlier, 'Presence of both genders in sample' and 'Gender reporting' are used interchangeably in this thesis.

In terms of control variable industry, a relatively larger mean effect size was found for studies with no control for industry ($\bar{r}_c$ = 0.502, k = 51) than for those studies with control for industry ($\bar{r}_c$ = 0.387, k = 53). Bivariate results further reported a relatively larger effect size for studies using other performance measures ($\bar{r}_c$ = 0.486, k = 72) compared to those studies with business growth performance measures ($\bar{r}_c$ = 0.396, k = 11) and studies with business profitability performance measures (r = 0.325, k = 21). For study quality (published in an outlet with or without impact factor), positive outcomes were obtained both for studies with low quality[75] ($\bar{r}_c$ = 0.563, k = 40) and studies with high quality[76] ($\bar{r}_c$ = 0.370, k = 64). Then, development context of the primary studies shows that positive outcomes were obtained for both emerging economy/economies ($\bar{r}_c$ = 0.518, k = 58) and developed economy/economies ($\bar{r}_c$ = 0.349, k = 46). In terms of control variable ICT type, a comparatively larger mean effect size was found for studies with mobile or telephony (r = 0.787, k = 5) followed by those studies with e-commerce or e-business (r = 0.565, k = 10), ERP or IMIS or CRM or cloud computing (r = 0.494, k = 24), computers or hardware or software (r =0.431,k=8), Internet or broadband or social media or internet communication tools like WhatsApp, Viber, Skype, own website (r = 0.381, k = 11) and a combination of ICT tools or overall ICT (r = 0.363, k = 46) respectively.

[75] Not published in an outlet with Impact Factor.

[76] Published in an outlet with Impact Factor.

	K	N	Mean ES (Random)	95% CI (Random)	Q	P value (Random)
(H1) ICT use→ BVICT						
Use of GPTs → BVICT	70	149486	0.403	0.303 to 0.504	21186.653	0.000
Use of ETs → BVICT	34	121361	0.522	0.464 to 0.580	883.225	0.000
(H2) Firm size→ BVICT						
SMEs→ BVICT	54	153898	0.458	0.409 to 0.507	2492.531	0.000
Non-SMEs→ BVICT	50	116949	0.423	0.281 to 0.564	20289.792	0.000
(H3) SMEs→ BVICT						
SMEs using GPTs→ GPTs-business performance relationship	38	42508	0.430	0.363 to 0.496	1351.935	0.000
SMEs using ETs→ ETs-business performance relationship	16	111390	0.534	0.438 to 0.629	674.989	0.000
(H4) Presence of gender in sample→ GPTs-business performance relationship						
Presence of gender in sample→ GPTs-business performance relationship	18	24423	0.518	0.319 to 0.716	2852.978	0.000
Absence of gender→ GPTs-business performance relationship	52	125063	0.364	0.245 to 0.482	16738.791	0.000
(H4) Presence of gender→ ETs-business performance relationship						
Presence of gender→ ETs-business performance relationship	3	7739	0.672	0.065 to 1.280	127.982	0.030
Absence of gender→ ETs-business performance relationship	31	113622	0.507	0.457 to 0.558	363.477	0.000
Controls						
Industry						
No control for industry	51	21876	0.502	0.421 to 0.584	1526.507	0.000
Control for industry	53	248971	0.387	0.292 to 0.481	22127.972	0.000
Performance Measure						
Firm profitability	21	114660	0.325	-0.018 to 0.667	16881.771	0.063
Firm growth	11	14640	0.396	0.255 to 0.537	488.885	0.000
Other performance measure	72	141547	0.486	0.428 to 0.544	6251.067	0.000
Study quality (published in an outlet with or without impact)						
Low quality (not published in an outlet with impact Factor)	40	31529	0.563	0.487 to 0.639	1228.824	0.000
High quality (published in an outlet with impact Factor)	64	239318	0.370	0.282 to 0.459	22234.004	0.000
Development context of the primary studies						
Primary studies based on emerging economy or economies	58	89601	0.518	0.457 to 0 .579	2259.879	0.000

Primary studies based on developed economy or economies	46	181246	0.349	0.229 to 0.469	20307.778	0.000
Types of ICT						
Use of Mobile or Telephone→ BVICT	5	866	0.787	0.464 to 1.111	76.841	0.000
Use of Computer or software or hardware →BVICT	8	13673	0.431	0.173 to 0.689	232.036	0.001
Use of Internet or Broadband or Social Media or Internet communication tools→	11	70660	0.381	0.297 to 0.464	283.067	0.000
Use of e-commerce or e-business→ BVICT	10	117052	0.565	0.467 to 0.663	618.799	0.000
Use of ERP tool or IMIS (integrated information management systems) or other information tools or CRM or cloud computing→ BVICT	24	4309	0.494	0.398 to 0.591	214.434	0.000
Use of a combination of ICT tools→ BVICT	46	64287	0.363	0.204 to 0.522	16848.688	0.000

Table 2.3: Bivariate analysis output

2.4.2. Meta-regression outcomes

Next, the meta-regression process was carried out (details are given in Table 2.4), which allows every contingency variable's relative explanatory power to be explored considering other variables (Saeed, Yousafzai and Engelen, 2014).

The meta-regression results suggest that the use of GPT tools has a negative but statistically significant (β = -0.391, $p < 0.01$) influence on the ICT use-business performance relationship (BVICT). Conversely, the use of ET tools reported a positive and statistically significant (β = 0.474, $p < 0.01$) influence on the BVICT. So, the meta-regression results accept that the studies that consider ET use as an independent variable report higher BVICT than studies that do not (such as studies that consider GPT use as an independent variable).

The regression results further suggest that in case of SMEs, BVICT is larger (β = 0.508, $p < 0.01$) than non-SMEs (β = -0.508, $p < 0.01$). So, it is supported by the meta-regression results that ICT tools add more to business performance in the case of SMEs compared to non-SMEs.

For SMEs, a relatively larger impact on BVICT was found in studies that focus on ET tools (β = 0.584, $p < 0.05$) than in studies focusing on GPT tools (β = 0.523, $p < 0.05$). It is mentionable that both these impacts are statistically significant. Hence, meta-regression outcomes validate that firm size (SMEs) moderates the BVICT in such a way that the use of ET tools adds more to business performance than GPTs in SMEs.

Also, the results indicate that gender reporting (β = 0.956, $p < 0.01$) significantly and positively moderates the GPT use and BVICT relationship. Conversely, gender reporting (β = -0.797, $p < 0.01$) significantly but negatively moderates that relationship in the case of the use of ET tools.

Therefore, the meta-regression results validate the hypothesis that the consideration of both the genders in the sample of primary studies results in a larger effect size in the case of GPT use compared to ET use.

Among the control variables, the development context of the primary studies shows that if the primary studies are based on an emerging economy or economies, the impact on BVICT is negative but statistically significant. Then, the BVICT showed a negative and statistically non-significant impact if controlled for industry (β = -0.166, n.s.). Similarly, the publication quality in the form of impact factors of journals (β = -0.026, n.s.) and the profitability performance measure (β = -0.045, n.s.) affected BVICT in a negative and statistically non-significant way. On the other hand, the growth performance measure (β = 0.775, p <0.01) and Types of ICT tools (β = 0.059, p <0.05) affected BVICT in a positive and statistically significant way. Likewise, the sample size (β = 3.50e-06, p <0.05) affected BVICT in a small positive and statistically significant way.

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
	BVICT	BVICT	BVICT	BVICT	BVICT	BVICT
Industry	-0.166	-0.136	0.082	0.044	0.107	-0.105
	(0.145)	(0.137)	(0.122)	(0.122)	(0.126)	(0.126)
Sample Size	3.50e-06**	3.73e-06**	1.74e-06	4.10e-06**	2.15e-06	4.53e-06***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Performance Measure (Profitability)	-0.045	-0.215*	-0.357***	-0.533***	-0.355***	-0.516***
	(0.121)	(0.124)	(0.108)	(0.138)	(0.109)	(0.106)
Performance Measure (Growth)	0.775***	0.634***	0.277*	0.065	0.252*	0.169
	(0.156)	(0.153)	(0.143)	(0.176)	(0.147)	(0.136)
Impact factor	-0.026	0.009	0.069***	0.094***	0.064**	0.034

	(0.027)	(0.028)	(0.026)	(0.028)	(0.026)	(0.025)
Emerging economy	-0.399***	-0.135	0.138	0.157	0.170	0.215**
	(0.092)	(0.115)	(0.108)	(0.106)	(0.115)	(0.106)
Type of ICT	0.059**	0.082***	0.085***	0.074***	0.081***	0.083***
	(0.026)	(0.026)	(0.022)	(0.022)	(0.023)	(0.021)
Use of only GPT		**-0.391****	-0.338***	-0.549***	-0.393***	-0.688***
		(0.110)	(0.094)	(0.140)	(0.116)	(0.126)
Use of only ET		**0.474****	0.327***	-0.022	0.336***	0.522***
		(0.132)	(0.116)	(0.184)	(0.124)	(0.130)
SMEs			**0.508****	0.386***	0.484***	0.391***
			(0.084)	(0.102)	(0.089)	(0.084)
Non-SMEs			**-0.508****	-0.386***	-0.484***	-0.391***
			(0.084)	(0.102)	(0.089)	(0.084)
Use of GPT X SME				**0.523****		
				(0.259)		
Use of ET X SME				**0.584****		
				(0.241)		
Presence of Gender					0.103	-0.431**
					(0.126)	(0.169)
Use of GPT X Presence of Gender						**0.956****
						(0.220)
Use of ET X Presence of Gender						**-0.797****
						(0.236)
Constant	0.282*	0.233*	-0.289*	-0.200	-0.304**	-0.004
	(0.147)	(0.139)	(0.147)	(0.151)	(0.148)	(0.152)

Observations	104	104	104	104	104	104
R-squared	0.418	0.486	0.631	0.646	0.633	0.696
Adjusted R-squared	0.375	0.442	0.595	0.608	0.594	0.659
Change in Adjusted R-squared (compared to model 1)		0.067	0.22	0.233	0.219	0.284

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 2.4: Meta-regression output

2.5. DISCUSSION AND CONCLUSION

2.5.1. Main findings

Several studies have been conducted to assess BVICT (the impact of ICT use on business performance). Each of these studies has brought not only its own theoretical but also empirical understanding. The methodologies of these studies are different, and the outcomes have ranged from similar to diverse. As these approaches and outcomes were divergent, a meta-analysis was required to integrate different streams of studies on the topic. Though there were a couple of meta-analyses in the past that explored the relationship between IT and business performance, they did not consider the communication angle of ICT. Also, previous meta-analyses did not comprehensively analyse the impact of using such a wide range of different ICT tools on business performance. This meta-analysis has explored the impact of using a wide range of ICT tools on business performance, including more recent ICT technologies such as cloud computing, which has rarely been analysed in any previous meta-analysis. Existing ICT tools were categorised into GPTs and ETs, and the meta-analysis chapter comparatively explored the impact of their use on BVICT and thus contributed to the existing IT, ICT, and IS literature.

The absence of integration of updated results after the last meta-analysis on the topic has caused ambiguity in the debate over whether IT matters or not. Carr (2003) initiated this debate by claiming that organizations might have overspent on IT by overstating its strategic value. This meta-analysis's results discard this argument by showing that most of the ICT tools positively impact the performance of a firm. However, not all of the hypotheses were wholly supported. Both the bivariate analysis and the meta-regression consistently supported H1, which expected that primary studies that consider ET use as an independent variable found a larger effect size (BVICT) than studies that used GPTs.

Since the use of ET-related ICT tools such as ERP, cloud computing, e-commerce, and IMIS require specialized knowledge and training for adoption and usage, once embraced within organizations they bring about a visible positive influence on business performance. For instance, the use of transactional ET tools such as ERP results in improvements to the efficiency of existing business processes. In contrast, analytical ET tools such as MIS and big data help firms explore new product, service, and process innovations. They also help firms make better decisions by attaining better business intelligence. Moreover, they enhance productivity and other aspects of business performance (Chen, Chiang and Storey, 2012; Müller, Fay and vom Brocke, 2018; Sharma, Mithas and Kankanhalli, 2014). Furthermore, the implementation and usage of these ET tools are subject to considerable cost and skill development via training (Manyika, 2011; Sivarajah et al., 2017; Tabesh, Mousavidin and Hasani, 2019), which results in a more cautious use of ET tools and assessment of its value. That is why, at many organisations, ET tools such as e-commerce, IMIS, and ERP are more effective in providing higher value.

This meta-analysis, on the other hand, reports that GPTs have a lower impact on BVICT compared to ETs. Most of the GPT-related ICT tools are so widely used that other factors can dilute their

contribution to business performance. It is consistent with the argument of Feeny and Ives (1997) that only radically new resources can provide value to business, rather than overtly used existing resources. It is also consistent with Miller's theory, which argues that as some ICT tools become a commodity available to everyone, it no longer adds any value to business outcomes (Schubert and Leimstoll, 2007). Anecdotal evidence suggests that compared to ET tools, less investment and training is required to implement GPTs at the firm level. Because of this lower financial and training cost, firms do not always pay much attention to using GPTs optimally. This is in line with the findings of Díaz-Chao, Sainz-González and Torrent-Sellens (2015), who reported a causal relationship between ICT investment and use, which means that more investment in ICT leads to more effective ICT use. This might be a reason for GPTs rendering less value than their potential, as the payoff delivered by ICT depends on the actual use of the concerned ICT tools (Devaraj and Kohli, 2003). Another probable clarification of lower payoff from GPT-related ICT tools is —a host of other factors might outweigh the impact of GPT-related ICT tools, meaning that its influence is not demonstrated to a statistically significant level (Liang, You and Liu, 2010). Among these factors, the time lag factor is mentionable, as argued by Kohli and Devaraj (2003). The external environment also plays a big part (Melville, Kraemer and Gurbaxani, 2004).

H2, which expected that the use of ICT tools (both GPTs and ETs) results in a larger effect size in SMEs compared to non-SMEs, was supported by both bivariate and meta-regression analyses. One justification could be ICT tools now act as an enabler for SMEs to compete with larger firms by improving flexibility, productivity, responsiveness, decision making as well as decreasing costs (Ashrafi and Mutraza, 2008; Balocco et al., 2009; Bayo-Moriones and Lera-López, 2007; Chacko and Harris, 2006; Fu et al., 2001; Mbuyisa and Leonard, 2017; Schware, 2003; Torero and von Braun, 2006; Vidgen et al., 2004). Though ICT brings similar benefits to large firms, SMEs make

the optimum use of these tools. It is because SMEs make the optimum use of most of their available resources, making the best out of less (Baporikar, 2017; Davidsson et al., 2017; Johnston, Wade and McClean, 2007; Woschke, Haase and Kratzer, 2017). SMEs show entrepreneurial bricolage, which means showing resourcefulness by deploying different combinations of resources for new purposes, which creates CA or superior performance for SMEs (Davidsson et al., 2017).

H3, which expected that firm size, at the SME level, moderates the BVICT in such a way that the use of ET tools results in a larger effect size (BVICT) than GPTs, was supported by both bivariate and meta-regression analyses. Though SMEs adopt advanced ICT tools less than the simple ICT tools because of the resource constraint (Johnston, Wade and McClean, 2007; Woschke, Haase and Kratzer, 2017), whenever SMEs adopt ETs, they get unique benefits which cannot be replaced by the benefits brought about by the GPTs. These unique benefits include enhanced financial performance (e.g. profitability), innovation performance, and operational performance (e.g. enhanced efficiency, flexibility, coordination with the stakeholders as well as better forecasting and resource planning) (Basu et al., 2018; Garrison, Wakefield and Kim, 2015; Hassan, Tretiakov and Whiddett, 2017; Ooi et al., 2018; Popa, Soto-Acosta and Perez-Gonzalez, 2018; Sánchez-Rodríguez, Martínez-Lorente and Hemsworth, 2019; Zhou, 2016). ET use also develops a range of ICT capabilities in SMEs that contributes to their financial and non-financial performance (Ooi et al., 2018; Sánchez-Rodríguez, Martínez-Lorente and Hemsworth, 2019).

H4 predicted that consideration of both the genders in the sample of primary studies results in a larger effect size in the case of GPT use compared to ET use. Supporting this hypothesis, the interaction term between gender reporting and GPT use—business performance relationship (BVICT) is indeed significant and positively related in both the bivariate analysis and meta-regression results. It means that the GPT use and business performance relationship is moderated

by gender reporting in a way that if both the genders are included in the sample in the primary studies, the relationship becomes more robust. The widening availability and use of GPT-related ICT tools play a vital role in fulfilling the information and communication necessities of a considerable number of people, including women (Basu and Fernald, 2007), even after the introduction of ETs. By providing instant messaging, email services, video call features (Biagi, 2013; Corrado, Haskel and Jona-Lasinio, 2017) at a comparatively cheaper cost than ETs, ICT-related GPTs have made worldwide communication and information sharing cheaper, more convenient, more widespread, and more innovative (Biagi, 2013; Corrado, Haskel and Jona-Lasinio, 2017). Thus, they (GPTs) help women communicate better by fighting mobility-related issues that affect women more than men. GPT tools help women build national and international online networks (Maier and Nair-Reichert, 2007), which help their professional performance. Moreover, by building ICT-related capabilities, these GPT-related ICT tools work to empower women further, resulting in greater efficiency at the firm level. All of these affect business performances positively (Guerrieri and Padoan, 2007).

Compared to past studies (Kivijärvi and Saarinen, 1995; Li and Ye, 1999; Tanriverdi, 2005; Tanriverdi, 2006), recent studies (Falk and Hagsten, 2015; Polo Peña, FríasJamilena and Rodríguez Molina, 2013; Thompson, Williams and Thomas, 2013; Yunis, El-Kassar and Tarhini, 2017) on GPT use and business performance relationship increasingly incorporate gender reporting (reporting both males and females in the sample size). One reason for this increasing interest in gender reporting in recent studies is to avoid reporting bias. Research in the past has been criticised for this prevalence of gender-related reporting bias. This increasing trend of gender reporting, to a great extent, ensures more female perspectives on the above topic, considering that only male perspectives used to be captured in past research. On the other hand, GPT plays a

catalytic role in empowering female firm owners or members of the workforce by providing access to information and developing their skills (OECD, 2018). This, in turn, helps these women achieve better business performance (Ikyembe, 2017). Based on both these arguments, it can be justified that consideration of both the genders in the sample of primary studies results in a larger effect size in the case of GPT use. This is consistent with the findings by King, Grover and Hufnagel (1989) and Li and Ye (1999), who reported that the effect of IT (GPT) on performance is dependent on other constructs.

Meta-analysis results also partly supported (supported in meta-regression but not supported in bivariate analysis) that consideration of both the genders in the sample of primary studies results in a smaller effect size in case of ET use. The reason for this could be that in many instances, it is seen that women are less confident in using the ET-related ICT tools compared to GPT tools (Li, Glass and Records, 2008), which could result in lower adoption of ETs among the female workforce within firms and resultant lower BVICT, which is consistent with the findings of the meta-regression analysis. Moreover, as mentioned earlier, the implementation and usage of ET tools require substantial investment and training (Manyika, 2011; Sivarajah et al., 2017; Tabesh, Mousavidin and Hasani, 2019), which results in a more cautious use of them and assessment of the value they provide. That is why, at many organisations, ET tools are more effective in providing value for both men and women in firms, which is consistent with the bivariate analysis outcomes.

Only 53 studies, among the 104 studies considered in the meta-analysis, controlled for the industry. The regression outcomes reveal that the relationship between ICT use and business performance is negatively associated and not statistically significant if controlled for the industry. Those studies that controlled for the industry also considered other industry-related factors that impact ICT use

and business performance relationships. According to Bain (1951), Mason (1939), and Porter (1985), the structure of an industry directly influences the performance of different organisations in that industry. Nonetheless, the inclusion of industry-related controls in empirical studies does not directly explain how industry-related characteristics limit or stimulate organisations in utilising ICT to improve business performance (Melville, Kraemer and Gurbaxani, 2004).

Furthermore, the regression results show that sample size affected the BVICT positively and significantly, which is consistent with the findings of Kohli and Devaraj (2003) and Sabherwal and Jeyaraj (2015) that BVIT (BVICT in this case) increases when the sample size increases. They argue that a large sample size makes it easier to decrease standard errors and isolate IT or ICT payoff from random noise.

Regarding the performance measures, conflicting results in the bivariate and meta-regression analysis were found. In the bivariate analysis, it was found that the other performance measure is associated with the largest effect size, followed by the growth and profitability performance measures. On the other hand, a larger impact of growth-based performance measures on BVICT than profitability performance measures were found in the meta-regression. One reason for this could be that growth as a performance measure has been widely studied and proven consistent in reporting a positive influence on performance (Capon, Farley and Hoenig, 1990) compared to other performance measures.

Ideally, a meta-analysis should be the synthesis of published and unpublished studies on the subject matter. If only published studies are considered in a meta-analysis, this creates publication bias (Kepes and Thomas, 2018). To avoid publication bias, both published and unpublished studies were considered in this meta-analysis. The bivariate analysis shows that a larger effect size is found

in the case of the unpublished study compared to the published study. Anecdotal evidence shows that because of less robust statistical quality maintenance in unpublished literature, there is a chance that they show inflated results. It might be why the unpublished result showed higher BVICT than published studies in the bivariate analysis. In the case of meta-regression, the impact factor negatively impacted (however, it is not statistically significant) the BVICT. In other words, it supported the findings of bivariate analysis.

Conflicting results were found in the bivariate analysis and meta-regression when the primary studies' development context was controlled for. In the meta-regression, it was found that if the primary studies are based on emerging economy or economies, it affects the BVICT negative but statistically significant way. On the other hand, if the primary studies are based on developed economy or economies, it affects the BVICT positive but statistically significant way. This finding is in line with some prior studies which reported that ICT-related disparities are closely related to the economic development of the country (Kraemer et al., 2005), where developed economies own better ICT infrastructure compared to emerging economies. Furthermore, the availability of a robust ICT infrastructure remains crucial for the access, implementation, improvement, and better use of ICT tools (Huang and Palvia, 2001; Madon and Krishna, 2018). On the other hand, the bivariate analysis shows that a higher BVICT was found in the case of emerging economies than in developed economies. Since most of the unpublished study in this meta-analysis was based on emerging economies[77], the less robustness in the statistical quality maintenance of these studies might result in this higher BVICT in emerging economies.

[77] Among the 58 unpublished studies, 33 studies were based on emerging economies.

Finally, it was found that control for different types of ICT tools considered in the primary studies affected the BVICT significantly in the meta-regression. On the other hand, the magnitude of the effect size was found to be changed according to the types of ICT tools used in the bivariate analysis.

This meta-regression analysis clarifies a portion of the variances in the ICT use and business performance relationship. In this chapter, 37.5%, 6.70%, 22%, 23.30%, and 28.40% of the variance can be explained by the control variables (model 1 in Table 2.4), different ICT tools as independent variables (model 2 in Table 2.4), consideration of different firm sizes (SMEs and Non-SMEs) as independent variables (model 3 in Table 2.4), SMEs as a moderator (model 4 in Table 2.4) and gender reporting as moderator (model 6 in Table 2.4) respectively. Overall, these numbers point out that although this research incorporates key structural variables and moderators of the ICT use and business performance relationship, there are other structural variables and moderators that this chapter did not consider. Future studies can explore these other factors.

2.5.2. Contributions and implications for research

A stream of literature argues that ICT holds the potential to bring about the most significant technological revolution in human history. A study by Snow (1966) reported such an optimistic outlook on IT or ICT's impact around fifty-five years ago. Several recent studies also maintain this contention, and report that ICT has a positive influence on business performance as proof (e.g. Lopez-Nicolas and Soto-Acosta, 2010; Falk, 2005; Luo and Bu, 2016; Hwang and Min, 2015; Yunis, El-Kassar and Tarhini, 2017; Liang, You and Liu, 2010, for a meta-analysis). However, some other studies have shown a more cautious view of ICT since their authors feel that ICT productivity might have stagnated (Brynjolfsson, 1993). A closer look at the extant literature

indicates that mismeasurement might be a prime cause of this reported productivity paradox[78] (Chan, 2000). Thus, this meta-analysis is a critical addition to the existing IS, IT, and ICT literature, since it addresses the critical question of how the contribution of ICT use to business performance can be measured (when measuring the contribution of GPTs and ETs separately).

The mismeasurement of BVICT might also be caused by not considering relevant contextual firm-level factors such as firm size and human capital attributes (such as reporting the gender of the human resources who use ICT in firms). Firm size is relevant as a moderator since existing literature shows that firm size influences ICT adoption. Though older literature shows that ICT is mostly used in larger firms, recent literature shows that SMEs are increasingly adopting ICT (both GPTs and ETs), and this meta-analysis validates that conclusion. This meta-analysis's findings show that ICT does indeed have a positive impact on business performance in SMEs, and advanced ICT tools contribute more to SME performance than the traditional ones. This runs contrary to the popular belief that SMEs only adopt more straightforward ICT tools.

Since the ways in which firm size influences the ICT use and business performance relationship has rarely been explored in a prior meta-analysis, by exploring the impact of firm size (of SMEs and non-SMEs), this meta-analysis contributes to BVICT and firm size literature. By exploring the moderating role of SMEs on different ICT tools (both ETs and GPTs), it further adds value to ICT literature.

[78] The "productivity paradox" debate has appeared in the past few decades, asking whether "IT matters" or not (Carr, 2003; Zhu and Kraemer, 2005), with some arguing that numerous firms have not only overestimated but also overspent on ICT, which is an extension of IT. However, the opponents of this argument contend that it remains crucial to consider the impact of long-term ICT investment because ICT's positive effect is evident after a time (Bayo-Moriones, Billon and Lera-Lopez, 2013).

Gender reporting is an increasingly relevant contextual factor since both genders are more often being considered in samples of primary studies in recent times compared to the past (Holdcroft, 2007; Petkovic et al., 2018). However, whether the presence of gender or gender reporting holds any positive or negative impact on the relationship of ICT use to business performance has not been explored before.

This chapter explores whether the presence of gender strengthens or weakens BVICT. More specifically, this chapter is the first attempt to explore how firm-level factors such as a human capital factor (gender reporting) impact the ICT use and business performance relationship differently in the case of GPT use and ET tools. Thus, this meta-analysis chapter contributes to gender, IS, IT, ICT, and business management literature by enhancing the understanding of the moderating role of gender reporting in the relationship between ICT use and performance in firms.

Additionally, this meta-analysis is the first attempt to integrate the effect of ICT use on business performance since previous meta-analyses only analysed the effect of IT use on business performance, excluding communication-related tools. This chapter also digs deeper into this issue by categorising ICT tools into GPT and ET categories and exploring their separate impacts on BVICT — one of the substantial contributions of this chapter to the existing IS, IT, and ICT literature.

Most of the existing studies on ICT use and business performance (BVICT) seem to address the question, "what is the effect of ICT use on business performance?" However, this meta-analysis additionally tries to explore an associated set of questions—"when, where and how does ICT impact business performance?"—by categorising ICT tools into ETs and GPTs and investigating the impact of their use on BVICT as well as exploring the moderating role of firm size and gender

reporting in these abovementioned relationships. Thus, this chapter enhances existing ICT use and business performance-related literature.

2.5.3. Implications for practice

This chapter also presents some potentially valuable insights for business owners, managers, and senior business and IT executives. Firstly, they can understand which ICT tools can contribute to their firm's performance more and under which contexts. This insight can help them to choose the ICT tools that have the potential to bring about the optimum results for their firms[79].

Secondly, unlike the previous meta-analyses on IT investment, this meta-analysis primarily focuses on ICT use. Furthermore, positive and significant results regarding the relationship between ICT use and business performance indicate that the abovementioned decision makers should not focus on ICT investment alone. Instead, they should pay close attention to how ICT investment can be transformed into performance improvements via optimum use, since ICT investment in and of itself does not always result in an optimum payoff. This particular recommendation is in line with prior research by Devaraj and Kohli (2003), who considered IT or ICT use an intermediate step for IT or ICT investment to contribute to business performance.

Thirdly, this meta-analysis has particular implications for SME owners due to its findings that ICT impacts SME performance positively, and advanced ICT tools can bring many benefits to SMEs if they invest in them.

[79] We acknowledge that choosing the specific ICT tools depends on many factors like the product or services that the firm produces, industry, business operation, and preference of other stakeholders. However, this meta-analysis's findings can also add to this list of factors and help the management and decision-makers choose the best fitting ICT tools for the firm.

Fourthly, since gender reporting shows a significant impact on BVICT, the owners, managers, and policymakers in firms should take a gendered perspective of BVICT and identify the areas where both the genders' preferences lie in terms of optimal use of different ICT tools. Training to develop skills and capabilities might also be driven by this gendered perspective of BVICT.

Fifthly, the findings indicate that decision makers should look for more insights into the particular conditions (such as firm size and individual traits of human resources) of the firm when assessing the effects of ICT tools.

2.5.4. Policy implications

In addition to its academic and practical contributions, the meta-analysis has policy implications. For instance, this meta-analysis's outcomes show that ET tools have a higher impact on business performance. A robust ICT infrastructure and congenial laws at the national level are essential for facilitating the development and use of ET tools like AI, big data, e-commerce, and ERP at the firm level (Subramaniam and Shaw, 2002; Dai and Kauffman, 2002; Ruivo, Oliveira and Neto, 2012), thus leading to better use of ETs. However, discrepancies persist in terms of ICT infrastructural development among different countries. Some prior studies reported that ICT infrastructure-related disparities are closely related to the country's economic growth (Kraemer, Ganley and Dewan, 2005), where developed economies own better ICT infrastructure than emerging economies. This inequality in ICT infrastructure development status impacts the disparities in access to and use of ICT tools across countries (Park, Choi and Hong, 2015). In turn, this affects the payoff of ICT use in firms, since better use of information technology causes better output (Devaraj and Kohli, 2003). Such differences also vary according to different ICT tools. The extensive use of GPTs in both developed and emerging economies (Çilan, Bolat, and Coşkun,

2009) supports the argument that GPT-related ICT infrastructure is not drastically different in emerging and developed economies.

On the other hand, the use of ETs is not yet as prevalent in emerging economies as in developed economies (Huang and Palvia, 2001; Hawari and Heeks, 2010; GSMA, 2017). Therefore, it can be assumed that ET-related ICT infrastructure in emerging economies is not as good as in developed economies. Consequently, governments should consider expanding infrastructure for ET tools and also training facilities. This capability building should be mainly targeted towards women since a stream of existing literature shows that women lag behind men in using ET tools.

Moreover, governments should also provide individual facilities (such as tax cuts, ICT investment-related loans, etc.) to SMEs to help them invest in advanced ICT tools.

2.5.5. Limitations

The findings of this meta-analysis need to be interpreted, taking into consideration its limitations. Firstly, only quantitative empirical studies were considered to fulfil the requirements of a meta-analytic process. Consequently, the results of qualitative studies, other meta-analyses, conceptual articles, and simulations have not been included. Therefore, this provides a limited overview of the ICT use and business performance relationship (BVICT) literature.

Secondly, this meta-analysis has other potential limitations that are similar to other meta-analyses, such as scope, publication bias, observation bias, and the impact of confounding variables. For example, this meta-analysis's outcome depends on various previous research extracted from diverse sources at different times. Therefore, the data vary due to the diversity of industries (Byrd and Davidson, 2003; Straub, Rai and Klein, 2004), economic environments (Liang, You and Liu,

2010), and social conditions (Zhu, Kraemer and Dedrick, 2004; Tanriverdi, 2005; Wang, Tai and Wei, 2006). Thus, there is a possibility of observation biases. A few measures were adopted to prevent the abovementioned potential issues. For instance, the considerable size of the total observations of this meta-analysis enhances the robustness of the outcomes, thus minimising the observation biases to some extent. Further, this meta-analysis endeavoured to avoid publication biases by including non-published outcomes. However, access to such empirical research remains limited.

Thirdly, it was likewise observed that cross-sectional studies dictate quantitative ICT use and business performance research[80]. Nonetheless, longitudinal investigations could uncover the long-term positive impacts of ICT. Therefore, the cross-sectional primary examinations that dictate the existing meta-investigation may have undervalued performance-related impacts.

Fourthly, another limitation intrinsic in the primary studies that are passed on to the meta-analysis is that only surviving firms' performance is examined in all primary studies in this meta-analysis, resulting in a survivor bias (Rauch et al., 2016). This meta-analysis is, therefore, no exception to survivor bias. Survivor bias is a form of sampling error or selection bias that occurs when a trial's selection process favours certain individuals who have passed a specific barrier or time point and disregards those who have not (and are therefore less visible) (Mangel and Samaniego, 1984). This survivor bias might lead to a decreased performance variance, which, in turn, might impact studies' correlations (Hunter and Schmidt, 2004). It is, therefore, essential to generalise the results to surviving firms.

[80] 94 out of the 104 studies in our data set are cross-sectional.

Fifthly, in this meta-analysis, a significant portion of the variance across studies was unexplained. It suggests that there may be scope for additional factors in this context.

Sixthly, only the direct effect of ICT use on business performance was explored. However, according to Liang, You and Liu (2010), the indirect effect of the ICT use and business performance relationship (via mediator) reports better outcomes than the direct effect model.

Seventhly, a meta-analysis is conducted by coding data extracted from prior primary studies, however, not all relevant data from all the prior primary studies is possible to extract, which leads to approximations in the coded data (Sabherwal and Jeyaraj, 2015). This meta-analysis also suffers from this issue.

Finally, another related limitation involving human coding is that different coding may lead to different results. This issue is also acknowledged. A strict coding protocol involving three coders has been followed to ensure consistency in the coding process.

2.5.6. Directions for further research

The limitations mentioned above indicate future avenues for research. Firstly, by and large, this investigation distinguished two critical contextual factors, firm size and gender reporting, that affect the relationship between ICT use and business performance. In this process, it is expected to catalyse a more contextual understanding of the relationship between ICT use and business performance. The identified variables are indicators of only two salient contextual aspects, yet it is not proposed that the distinguishing factors are the only ones since a significant portion of the variance across studies is unexplained. Additional research can be conducted to reveal other

diverse factors (e.g. other structural variables and moderators) impacting BVICT and outline the precise mechanisms of how ICT use influences business performance.

Secondly, although only the direct effect of ICT use on business performance was explored, scholars including Liang et al. (2010), Ray et al. (2005), and Wang et al. (2006) have opined that exploring the direct link between ICT use and business performance does not always provide the accurate BVICT. This mismeasurement has led to the exploration of the indirect effect of ICT use on business performance. Though different scholars have used several mediators, including organisational capabilities (in a meta-analysis by Liang, You and Liu, 2010), business process reengineering (BPR) (Bresnahan, Brynjolfsson and Hitt, 2002), and supply chain management (SCM) (Zhang, Pieter van Donk and van der Vaart, 2011), many mediators remain unexplored. Therefore, future research could investigate these unexplored mediators to better understand the indirect impact of ICT use on business performance. For instance, a theoretical investigation of these unexplored mediators may reveal new information on topics such as the impact of learning, knowledge, capabilities, and networking on the ICT use and business performance relationship.

Thirdly, since the time lag factor exists when the effect of IT payoff is considered, as argued by Kohli and Devaraj (2003), studies adopting a more longitudinal focus are essential to understand why some firms are better at converting their IT use into superior business performance. However, the availability of such primary longitudinal studies on BVICT is limited. Hence, more primary research on this topic is necessary.

Overall, future research should explore whether other measures can explain BVICT in a better way. Such an enhanced explanation will also allow for theory development.

2.5.7. Conclusion and implication for the next two chapters

This chapter has integrated the findings of more than two decades of research (from 1998 to 2018) following a meta-analysis approach. This meta-study has comparatively analysed the impact of ETs and GPTs on BVICT by analysing 270,847 observations in 104 papers. Moreover, this chapter has also examined how firm-level structural variables such as firm size and gender reporting moderate the impact of GPTs and ETs on BVICT.

One outcome of the chapter reports that the effect size of the ET use-business performance relationship is larger than that of the GPT use-business performance relationship. This needs to be tested further in the empirical parts of the study. Though the meta-regression in this chapter reported a negative effect size for the GPT use-business performance relationship, the bivariate analysis reported a positive and statistically significant effect size for the same. The reason for this could be that some GPT tools (such as communication-related GPTs—a subset of the latter) can impact business performance in certain contexts but not in others (Torero and von Braun, 2006; Schware, 2003; Chacko and Harris, 2006). This issue will be empirically explored further in chapter 4.

On the other hand, the effect size related to the ET use-business performance relationship was found to be positive and statistically significant in both the bivariate and meta-regression analysis in this chapter. This will be empirically examined further in chapter 3. To capture a more comprehensive picture of ETs' and GPTs' impact on the business performance, not only the direct effect but also the indirect effect via the mediators will be analysed empirically in chapter 3 and 4.

Another result of this meta-analysis chapter shows that the effect size of ICT tools (both GPTs and ETs) on business performance is larger in SMEs compared to non-SMEs. Hence, it can be said

that SMEs are an interesting subject for further empirical investigation. Therefore, in its empirical sections (chapter 3 and 4), this thesis has concentrated on SMEs.

This chapter also reports that gender reporting moderates the relationship between ICT tools (both GPTs and ETs) and business performance. This finding implies that further empirical investigation on the impact of gender on different aspects of BVICT is needed. Hence, the sample size has been equally[81] divided between both genders for the empirical part of the study (chapter 3 and 4). Moreover, gender subgroup analyses were done in chapter 3. Furthermore, the moderating impact of gender on the relationship between different key constructs was tested in both chapter 3 and 4.

H4, which stated that consideration of both the genders in the sample of primary studies results in a smaller effect size in the case of ET use compared to GPT use, was not supported in bivariate analysis. This could be attributed to the fact that ET tools catalyse certain collaboration capabilities of human resources at the firm level (Xanthidis, Alali and Koutzampasopoulou, 2016). Women tend to utilise these ICT oriented collaboration capabilities better than men (Davaki, 2018; Ikyembe, 2017; Tekobbe, 2013) due to their tendency to follow a more collaborative approach at the workplace (Fenwick and Neal, 2001; Woolley et al. 2010). This enhanced ICT collaboration capabilities in female ICT users in SMEs are likely to contribute to enhanced business performance in SMEs. This is investigated further in chapter 3, where the direct and indirect effects of ET use on SME performance have been empirically explored.

[81] For the empirical part of this thesis, 302 SME entrepreneurs were taken as the sample size, of which 151 were male and the other 151 were female.

CHAPTER 3: THE ROLE OF DYNAMIC CAPABILITY IN BUSINESS PERFORMANCE UNDER RESOURCE-BASED VIEW: AN EMPIRICAL ANALYSIS INVESTIGATING ICT CAPABILITIES IN SMES

3.1. INTRODUCTION

Considering the significant contribution of SMEs[82] to job and wealth creation (Watson, 2012), owner-managers, policymakers, and researchers are increasingly investigating which factors contribute to SMEs' enhanced performance (Low and MacMillan, 1988; Rosa et al., 1996; Watson, 2012). Previous studies have identified that diverse elements – such as advanced human resources practices (Carlson, Upton and Simon, 2006), access to finance (Beck and Demirguc-Kunt, 2006), and training to employees (Bryan, 2006) – are contributing to SME performance. However, ICT has only become part of the conversation in the past several years. In that time, the contribution of ICT to business performance[83] in general, has been increasingly acknowledged by owner-managers, policymakers, and researchers. However, debate persists on the less known aspects of this subject. One less known aspect is the underlying reasons for inconclusive results in previous studies on ICT's effect on business performance (Bauer, Dehning and Stratopoulos, 2012; Luftman, Lyytinen and Zvi, 2017; Wu et al., 2006). One such underlying reason could be the diverse formulation of this topic's key constructs (e.g. the type and scope of the ICT instruments being explored) and their inter-relationships. Specifically, in the context of SMEs, what seems to be largely missing in the ICT payoff literature is studies that investigate how different ICT tools

[82] The meta-analysis (2nd chapter) found that SMEs are an interesting segment of firms, worthy of further empirical research. Hence, the 3rd and 4th chapters are focused on SMEs.

[83] "Business Performance" and "Firm Performance" are used interchangeably in this chapter.

adopted by SMEs influence business performance (Bayo-Moriones, Billón and Lera-López, 2013). Given the considerable cost of ICT investment, a deeper understanding of how ICT affects SMEs' performance is desirable.

The effect of advanced ICT instruments on SME performance in the context of emerging economies is another less known aspect, as most of the literature on the effect of advanced ICT instruments relates to developed nations (Kozma and Vota, 2014). Hence, this chapter will explore this relationship in the SME context in Bangladesh (an emerging economy). SMEs are considered one of the main engines of economic growth in Bangladesh, as they are in other emerging economies, where SMEs often act as the backbone of the economy and are the largest contributors to employment (Cravo, Gourlay and Becker, 2012).

In the literature on how companies produce economic rents[84], two distinct causal mechanisms (direct and indirect paths) have been proposed. The direct path has been referred to as resource-picking, whereas the indirect path has been referred to as the capability-building mechanism. Under the resource-picking mechanism, managers collect information to out-do their competitors at picking resources, similarly to how a mutual fund manager attempts to outsmart the stock market in choosing stocks (Makadok, 2001). By contrast, under the capability-building mechanism, managers design and build organisational systems to improve the productivity of the resources that the company acquires. These two mechanisms are not mutually exclusive, and companies generally use both of them. The relationship between these two mechanisms of rent-creation is, therefore, essential to consider. Understanding whether these two mechanisms complement[85] or

[84] A mentioned in Chapter 1, economic rent means what businesses earn in excess of the capital employed (differential profit) (Peteraf, 1993).

[85] Two mechanisms complement each other means whether the two mechanisms increase the value of each other.

substitute each other[86] is a vital prerequisite for understanding how companies can divide their time and effort between these two mechanisms. This chapter constructs a basic theoretical model and draws testable hypotheses from the model to answer these questions.

Resource-based view (RBV), along with Dynamic capabilities view (DCV), has been used in this chapter to evaluate the relationship mentioned above[87]. The role of strategic resources is discussed, as they directly affect business performance, according to RBV. As mentioned earlier, over the past three decades, RBV has been established as a widely used theory to explain differences in business performance (Crook et al., 2008). RBV claims that the ownership of strategic resources determines competitive advantage (superior business performance) (Barney, 1991). There are four criteria for a resource to be considered a "strategic resource" (which will be discussed in more detail later in this chapter): value, rarity, imperfect imitability, and non-substitutability.

It is disputed whether or not ICT meets these criteria (Liang, You and Liu, 2010). For example, some ICT tools are so widely used that they can no longer be considered rare and inimitable. For instance, competitors can easily purchase the same ICT tools (e.g. hardware-related technology) or implement the same ICT project (Ross, Beath and Goodhue, 1996). On the other hand, some ICT tools are still valuable, rare, inimitable, and non-substitutable (strategic) due to having novelty in their design and configuration (Amit and Han, 2017). Further, the implementation and use of these strategic ICT tools are dependent on the skill sets and capabilities of firms' human resources (Adeniran and Johnston, 2016; Bharadwaj, 2000); this is consistent with categorizing technology into GPT and ET categories based on whether they are widely used or not (Teece, 2018). ETs meet

[86] Two mechanisms substitute each other means whether they reduce the value of each other.

[87] This chapter uses RBV and DCV to evaluate the relationship between ICT use and firm performance.

the criteria (inimitable, rare, valuable, and non-substitutable) of a strategic resource. By contrast, GPTs do not, as they are neither inimitable nor rare. Therefore, this chapter explores the impact of ETs as a strategic resource[88] on SMEs' business performance.

Even though a substantial number of studies have been published that use the RBV to determine the direct influence of ICT on business performance, the findings are not conclusive (Weill, 1992; Mitra and Chaya, 1996; Li and Ye, 1999; Ray, Muhanna and Barney, 2005; Wang, Tai and Wei, 2006; Liang, You and Liu, 2010). Several recent studies have begun to explore the indirect effect of ICT use on business performance by examining the influence of various mediators. They have found that the mediated model (indirect effect model) can clarify ICT's impact better than the direct effect model (without the mediator) (Liang, You and Liu, 2010). These studies have used mediators such as organizational capabilities (in a meta-analysis by Liang, You and Liu, 2010), Business Process Reengineering (BPR) (Bresnahan, Brynjolfsson and Hitt, 2002), and Supply Chain Management (SCM) (Zhang, Pieter van Donk and van der Vaart, 2011). However, very few of the existing studies on the relationship between ICT use and business performance explored the mediating impact of ICT collaboration capabilities on that relationship. There is, however, evidence in the current literature that ICT use does have an impact on ICT collaboration capabilities (Davidson and Olfman, 2004). Extant literature also shows evidence of ICT collaboration capabilities affecting business performance (Parida and Örtqvist, 2015). Hence, this

[88] As explained in chapter one, ET-related ICT tools can be considered a strategic resource as they fulfil the VRIN framework's conditions. For instance, ETs are still valuable and rare at the firm level (Seethamraju, 2015; Teece, 2018) and cannot be imitated as the associated human resource (expertise) is a prerequisite for replicating their success (Ram, Corkindale and Wu, 2015). Human-level capabilities will always be different in each organization as each individual is unique (Nada and Kumar, 2016). Finally, the combination of ET and the associated capabilities is non-substitutable because the value they generate in combination with one another cannot be replaced by other resources (Ruivo, Oliveira and Mestre, 2017). GPTs, on the other hand, have become widely used (Bresnahan and Trajtenberg, 1995; Guerrieri and Padoan, 2007) and are not compatible with the VRIN structure. Therefore, GPTs are not considered a strategic resource.

chapter will also explore the indirect impact of strategic ICT resources on business performance via the mediation of ICT collaboration capabilities as dynamic capabilities, drawing on the DCV theory.

There are very few studies in the existing literature that have explored the impacts of different ET-related ICT tools on SME performance in combination, through the direct and indirect effect models; a gap exists in the literature in this area. Therefore, this chapter proposes an integrated framework to address this research gap by examining both the direct impact of ET tools' use on business performance and their indirect impact via ICT collaboration capabilities. This chapter also discusses a firm-level factor's (gender of the entrepreneur[89]) moderating effect on the relationship between SME performance and ICT collaboration capabilities, building on previous literature that shows that this relationship is influenced by firm-level factors[90] (Chen et al., 2014). In short, by suggesting and examining a model of the relationships between ET use, ICT collaboration capabilities, gender of the entrepreneur, and SME performance, this chapter attempts to contribute to the current understanding of these topics. The model and the constructs applied in this chapter have been derived directly from the existing literature. The chapter's insights contribute to the field of ICT use in firms and busines performance, and have implications for managers in evaluating the benefits of investing in advanced ICT tools (ETs).

[89] The gender of the SME entrepreneur, who is part of an enterprise's human resources, has been considered the moderator in chapter 3 and 4 to explore how this entrepreneurial factor influences the indirect relationship between resources (GPTs and ETs) and performance in SMEs.

[90] Though existing literature explored diverse firm-level factors (e.g. family ownership vs. institutional ownership) on the relationship between ICT collaboration capabilities and SME performance (Chen et al., 2014), very few studies explored the impact of entrepreneurs' gender on this relationship. However, existing literature reports a difference in ICT collaboration capabilities for males and females (Scherer and Siddiq, 2015). Hence, it is worth exploring how the gender difference in ICT collaboration capabilities translates into a difference in SMEs' business performance.

The rest of the chapter is structured as follows: The Literature Review and Research Framework section analyses current literature to collect various dependent, independent, mediator, and moderator constructs or variables used in previous papers to construct the research model, the Research Methodology section explains the research strategy, data collection, measurements and analysis methods applied in this chapter, the Results section summarises the outcome, and the Discussion and Conclusion section presents findings, limitations, and implications for future research.

3.2. LITERATURE REVIEW AND RESEARCH FRAMEWORK

3.2.1. Resource-based view and business performance

RBV has been a widely used theoretical framework for understanding organisational performance over the last three decades (Newbert, 2007). It originated from Penrose's (1959) seminal work, which defines a firm as an amalgamation of productive resources and the process by which these resources contribute to the future growth of firms through effective utilisation. Wernerfelt (1984) endorsed this and added that resources catalyse effective strategies in the product market. This theory was strengthened by scholars such as Barney (1986, 1991), Amit and Schoemaker (1993), Peteraf (1993), and Collis and Montgomery (1995), who developed specific standards to qualify organisational resources as "strategic resources".

According to Barney (1991), a resource is considered valuable if it enables a firm to exploit opportunities and neutralise threats. He further stated that resources are distributed heterogeneously in different firms, and some resources are not entirely substitutable or imitable. When a firm has distinctive groups of resources, these resources are called rare resources (Barney, 1991), and this situation is called resource heterogeneity (Peteraf, 1993). A situation where

competitors cannot effectively imitate a resource is referred to as imperfect imitability (Barney, 1991), and when there is a lack of substitute resources to formulate and deploy strategies as effectively or efficiently as the original resources, those original resources are inferred as non-substitutable (Barney, 1991). For several resources, some qualities (for example, their social unpredictability, the underlying ambiguity encompassing the way they work, or one of the distinctive historical collection circumstances) make it difficult for competing firms to gain similar or substitute resources (Lippman and Rumelt, 1982; Dierickx and Cool, 1989).

Strategic resources develop competitive advantages (CA hereafter) for firms by generating economic value (Crook et al., 2008), and these CAs have a greater chance of being sustainable in the long term since competitors cannot easily replicate strategic resources (Hoopes, Madsen and Walker, 2003). Thus, organisations in possession of strategic resources are likely to enjoy long-term CAs over their rivals (Barney, 1991).

Many scholars have used the term competitive advantage (CA) as a synonym[91] for "performance" (Crook et al., 2008) because it is hard to measure CA quantitatively (Ketchen, Hult and Slater, 2007) and CA is "generally used to describe the relative performance of rivals in a given (product) market environment" (Peteraf and Barney, 2003: 313). Along these lines, many scholars have tried to empirically correlate strategic resources with business performance instead of CA (Barney and Arikan, 2001). The underlying argument is that CA should exist if strategic resources are correlated to business performance (Crook et al., 2008). Therefore, according to RBV, ownership of strategic resources should have a positive impact on business performance (Crook et al., 2008).

[91] In this thesis, competitive advantage and firm performance have been used synonymously, following previous research.

In RBV, there are three primary constructs:

- Organisational Performance
- Organisational Resources
- Capabilities

The dependent construct in this theory is organisational performance, while the key independent construct is organisational resources that comprise "all of the assets, capabilities, organizational processes, firm attributes, information knowledge, controlled by a firm that enables the firm to conceive of and implement strategies that improve its efficiency and effectiveness" (Barney, 1991:101).

3.2.1.1. ICT as a strategic resource and its impact on business performance

Despite the ongoing debate about whether "IT[92] matters" or not in the organizational context (Carr, 2003; Polák, 2017), the Business Value of ICT (BVICT[93]) still receives much attention. The reason for this attention could be due to several BVICTs reported by empirical studies. These benefits include improved profit ratio and Tobin's q (Bharadjaj, Bharadjaj and Konsinski, 1999; Santanam and Hartono, 2003) and catalysis of international marketing and diversification process (Chari, Devaraj and David, 2007; Sinkovics, Sinkovics and Jean, 2013). RBV has been used to describe BVICT in the IS literature, in which organisation-specific sets of resources determine the performance of the organisation (Caldeira and Ward, 2003; Hedman and Kalling, 2003; Mata, Fuerst and Barney, 1995; Perunović, Mefford and Christoffersen, 2012). However, not all ICT tools can be considered strategic resources since they do not meet the VRIN framework's

[92] IT and ICT are used interchangeably in this chapter, as ICT is an extension of IT.

[93] As mentioned earlier, the impact of ICT on firm performance and BVICT have been used interchangeably in this thesis.

conditions. For example, GPTs do not meet the rarity and inimitability criteria because of their extensive use. Therefore, they cannot be regarded as strategic resources. Consequently, GPTs alone cannot bring about firm-specific sustainable competitive advantage (SCA hereafter) and, in turn, enhanced business performance.

3.2.1.2. Enabling technologies (ETs) and SME performance

As mentioned earlier, Barney (1986) reported that certain resources (strategic resources) generate CA and proposed the VRIN framework for the purpose of identifying those resources. According to him, among the four attributes of the VRIN framework, being valuable and rare contributes to competitive advantage, while being inimitable and non-substitutable contributes to sustainable competitive advantage. All ETs fulfil the first two criteria (Seethamraju, 2015; Teece, 2018) and, therefore, contribute to competitive advantage. Most ETs also fulfil the last two criteria (Nada and Kumar, 2016; Ram, Corkindale and Wu, 2015; Ruivo, Oliveira and Mestre, 2017) and therefore, in most instances ETs have the potential to contribute to sustainable competitive advantage as well.

SMEs adopt ETs to a greater extent as they grow (Scuotto et al., 2017). However, the value that ETs create in SMEs depends on the extent to which SMEs can strategically use them in a competitive environment. If used in an optimum way, they can create optimum value (Ruivo, Oliveira and Neto, 2012), and a stream of existing literature reports that the use of ETs in SMEs not only contributes to the survival of SMEs but also adds value by increasing competitiveness. The use of ETs increases SMEs' competitiveness by increasing sales and productivity, improving communication and collaboration with customers, suppliers, and business partners, improving market position and customer service quality, and decreasing costs in operational processes (Abou-Shouk, Megicks and Lim, 2012; Kim, 2006; Saffu and Walker, 2008; Teo, Lin and Lai, 2009).

Accordingly, the following hypothesis is proposed to test the impact of the use of ETs as strategic resources on SME performance:

H1: Enabling technologies (ETs) as strategic resources are positively associated with the performance of SMEs.

3.2.2. Dynamic capabilities view

According to Helfat and Peteraf (2003), dynamic capabilities view (DCV) scholars are building on RBV to investigate the impacts of dynamic markets. The idea of DCV was presented by Teece, Pisano, and Shuen (1997) to discuss the critical roles that resource reconfiguration, integration, and resource building have in helping firms cope with highly dynamic circumstances. DCV describes business competitiveness in circumstances involving complex and rapidly evolving environments better than RBV (Eisenhardt and Martin, 2000; Teece et al., 1997; Wu, 2010; Zahra, Sapienza and Davidsson, 2006).

Scholars such as Barreto (2010), Helfat and Peteraf (2009), Loasby (2010), Narayanan, Colwell and Douglas (2009), Prange and Verdier (2011), Teece (2007), and Zhou and Li (2010) reported that DCV studies investigate the features, origins, mechanisms, effects, and contributions of dynamic capabilities. They also assumed that dynamic capabilities increase CA. Moreover, dynamic capabilities are considered to be a catalyst to turn resources into improved performance. Therefore, it was proposed by Wu (2007) that the dynamic capability mediates between performance and entrepreneurial resources.

Resources are at the core of RBV. Resources are specific organisational assets (such as superior sales force), human assets (such as chemistry expertise), and physical assets (such as geographical

location and advanced equipment) that can be used to execute strategies for value creation (Barney, 1986; Wernerfelt, 1984, 1995). They contain "local abilities" or "competencies" that remain essential for a company's CA, such as advertising for the consumer goods industry or molecular biology skills for pharmaceutical industries. Resources are the foundation of exclusive value-creating strategies and their associated operation structures, which target particular customers and markets in different ways and thus contribute to CAs such as lean development, lean development of organisational processes, and core competencies at the firm level (Collis and Montgomery, 1995, 1998; Porter, 1996; Prahalad and Hamel, 1990; Womack, Jones and Roos, 1991).

Grant (1996) and Pisano (1994) stated that dynamic capabilities are key strategic and organisational routines through which firms acquire, shed, incorporate, and recombine resources to modify their resource base. All these are done to make new value-creating strategies. Dynamic capabilities are the driving forces that, in turn, lead to other resources' development, evolution, and recombination for CA (Henderson and Cockburn, 1994; Teece et al., 1997).

This definition of dynamic capabilities is similar to a number of other terms provided by other authors. For instance, "combinative capability" is used by Kogut and Zander (1992) to describe organisational processes by which organisations synthesise and acquire information resources as well as create new applications for those resources. "Architectural competence" is used in a similar context by Henderson and Cockburn (1994), whereas Amit and Schoemaker (1993) used the term "capabilities."

Dynamic capabilities have also been defined with unclear terms such as "routines for learning routines," which were critiqued as non-operational, endlessly recursive, and tautological (Mosakowski and McKelvey, 1997). However, dynamic capabilities contain recognisable and

precise routines that have frequently been the focus of comprehensive empirical studies outside of RBV in their own right.

Mention of different kinds of dynamic capabilities can be found in the existing literature. Among these, absorptive, adaptive, innovative, and networking capabilities are most common (Parida, Oghazi and Cedergren, 2016; Teece, Pisano and Shuen, 1997; Wang and Ahmed, 2007). Adaptive capabilities are the ability of an organization to quickly recognize and capitalize on new market opportunities (Gibson and Birkinshaw, 2004). A high level of internal agility and flexibility are required to achieve this (Parida, Oghazi and Cedergren, 2016). There are three dimensions of adaptive capabilities: technological dimensions, external market dimensions, and internal organisational dimensions. All of these emphasise utilising internal and external organisational factors (Gibson and Birkinshaw, 2004; Ma, Yao and Xi, 2009; Wang and Ahmed, 2007) to exploit an opportunity. Hence, ICT capabilities can be considered adaptive capabilities, as ICT capabilities enable SMEs to take advantage of opportunities in the following ways:

Firstly, ICT capabilities help SMEs to conduct external environment scanning for new insights, which are used to catalyse prompt strategic responses to environmental challenges (Overby, Bharadwaj and Sambamurthy, 2006). Moreover, ICT capabilities can be used to collaborate with internal and external stakeholders to bring about efficiency and agility; an example of exploiting opportunities in SMEs (Parida, Oghazi and Cedergren, 2016). Supporting this, Sambamurthy, Bharadwaj and Grover (2003) stated that by collaborating with virtual markets to gain faster and more informed market insights SMEs can significantly enhance their organizational agility.

3.2.3. ICT capabilities as a mediator in the relationship between ET use and SME performance

Three key aspects of ICT capabilities have been recognised in the current literature:

- Internal use purpose (e. g., Levy, Powell and Yetton, 2001; Fillis, Johansson and Wagner, 2003),
- Use for collaboration purpose (e. g., Levy, Powell and Yetton, 2001; Sarshar and Isikdag, 2004),
- Use for communication purpose (e. g., Venkatraman, 1994).

Among these, the collaborative aspect of ICT capabilities was explored in this chapter, as mentioned earlier. The collaborative dimensions of an organisation's ICT capabilities suggest that ICT is used to initiate and maintain relationships with its external stakeholders, including its suppliers and customers (Ciappini, Corso and Perego, 2008). The existing literature shows that the use of advanced ICT tools (ETs) helps users develop these ICT collaboration capabilities in areas such as accessing and managing information, controlling processes and devices, solving problems, communicating, and making decisions while working independently and in collaboration with others (Xanthidis, Alali and Koutzampasopoulou, 2016). There is also evidence that ICT collaboration capabilities contribute to SME performance by enabling an SME to align its interests with internal and external stakeholders as well as share information, knowledge, and resources with them. This sharing results in greater trust and commitment amongst an SME's stakeholders (Arend, 2006; Cenamor, Parida and Wincent, 2019; Engel, Kaandorp and Elfring, 2017). For instance, by collaborating with internal and external partners, an SME can enhance responsiveness in meeting customer demands in a dynamic business environment (Bordonaba-Juste and Cambra-

Fierro, 2009; Corral de Zubielqui et al., 2019; Liao, Welsch and Stoica, 2003). Moreover, ETs' effective use can reduce communication barriers with network partners, allowing an SME to maintain closer relations with many stakeholders without incurring higher overheads (Bharadwaj, 2000). External connections such as these can catalyse resource procurement, knowledge creation, and innovation (Powell, Koput and Smith-Doerr, 1996; Soosay, Hyland and Ferrer, 2008; Liao, Kickul and Ma, 2009). Furthermore, such collaboration with SME partners, especially suppliers, helps to integrate the complementary resources synergistically, resulting in higher rents for each partner (Cragg, Mills and Suraweera, 2013). Based on these arguments, the following hypothesis is proposed:

H2: ICT collaboration capabilities positively mediate the relationship between ETs and performance in SMEs.

3.2.4. Moderating role of firm-level factors in the relationship between ICT collaboration capabilities and business performance

According to RBV, the tangible and intangible resources available to a firm influence the owner-managers' strategic decisions (Edelman, Brush and Manolova, 2005; Lerner and Almor, 2002). Among these resources, human capital is often considered the most vital (Delery and Roumpi, 2017). Markman and Baron (2003) argued that the owner-manager's demographic characteristics (human capital) impact performance positively by providing capabilities in the form of intangible and non-imitable assets. Gender is such a demographic characteristic.

Male and female entrepreneurs' management styles differ because of differences in biology, psychology, attitude, behaviour, and cultural upbringing (Robb and Watson, 2012). Therefore,

gender or sex of the entrepreneurs has a significant impact on business performance (Hoque and Awang, 2016; Gottschalk and Niefert, 2012).

Calás and Smircich (1989) and Shava and Rungani (2016) claim that because of the variances that emerge from the first stage of socialisation, differences in attitude and behaviour occur in women (Calás and Smircich, 1989; Shava and Rungani, 2016). Along these lines, Verheul, Thurik and Grilo (2008) have noted that female entrepreneurs have unique attitudes to risk and growth relative to male entrepreneurs; thus, they adopt different strategies to improve organisational performance than those of their male counterparts (Gottschalk and Niefert, 2012).

There are extensive studies on the relationship between gender and business performance. Several studies also demonstrate critical contrasts between men and women in their attitudes towards ICT and how they utilize it (Whitley, 1997). However, the impact of gender difference of entrepreneurs on the relationship between ICT capabilities (especially ICT collaboration capabilities) and SME performance is still mostly untouched in the existing literature.

Recent research reports men being more comfortable in dealing with high-level ICT skills (e.g. programming) (CERI, 2010), having broader computer experience, and more motivation for learning digital skills (Arnseth et al., 2007; Selwyn and Facer, 2007) than women. Also, several previous papers have reported that men have positive attitudes and greater interest in computer-related tasks than women. One reason could be that these technologies are implicitly designed to cater to men's needs (Basu et al., 2000).

More recent studies report that there is a persistent gender gap in digital skills in the digital labour market, where women lag behind men (Davaki, 2018). Recent studies on European contexts report that gender gaps are more prevalent in complex capabilities than basic ones, and sufficient

measures have not been taken to close the gap (Davaki, 2018). Nonetheless, recent papers report that group collaboration is significantly enhanced by the presence of women (Woolley et al. 2010). This result is consistent with Fenwick and Neal's (2001) related study, which found that teams with similar numbers of male and female participants and/or teams with more female participants than male participants showed better performance in a management simulation task compared to homogeneous groups. Fenwick and Neal (2001) further explained this effect by cooperative norms and more effective collaborative processes by females in groups.

Along these lines, Tekobbe (2013) argued that since women's digital skill gap is caused by lack of access to knowledge, in cases where legacy (i.e. previous) knowledge is not required, they (women) adopt the capabilities more effectively. The predominant use of Pinterest, a social bookmarking site by women, is proof of this.

This differing ICT collaboration capability in males and females is a factor that might affect male and female-owned enterprises' performance differently. ETs are increasingly acting as enablers for women for business and job purposes (Ikyembe, 2017) and paving new avenues for females' economic empowerment (OECD, 2018).

The following hypothesis is suggested based on these abovementioned arguments:

H3: Gender of the entrepreneurs moderates the relationship between ICT collaboration capabilities and SME performance in a way that ICT collaboration capabilities impact business performance more in female-owned SMEs.

So, as per the above literature review, the following research model is proposed for this chapter:

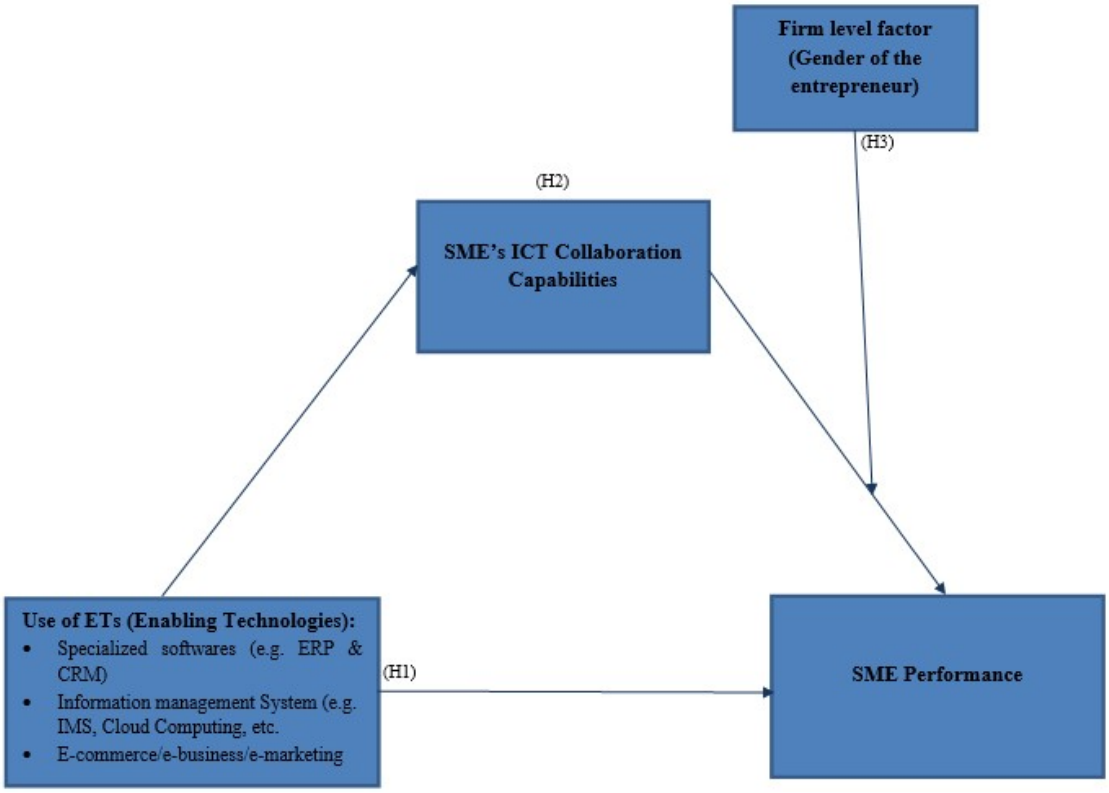

Figure 3.1: Research model

3.3. *RESEARCH METHODOLOGY*

3.3.1. Research design

This chapter concentrates on the relationship between ET use and SME performance in the context of an emerging economy. This chapter also explores how the ICT collaboration capabilities of SMEs mediate this relationship, using the DCV and RBV, with data collected from 302 entrepreneurs in Bangladesh. Furthermore, it explores how the gender of the entrepreneur as a firm-level factor moderates the relationship between ICT collaboration capabilities and the performance of SMEs. Though SMEs have different definitions, this research complies with the

previous literature (see, for example, Cardon and Kirk, 2015; Taylor and Banks, 1992) and the local standard set by Bangladesh Bank (the Central Bank of Bangladesh) that SMEs are considered to have a maximum of 250 employees (Bangladesh Bank, 2012).

3.3.2. Sample and data collection

As mentioned earlier, this chapter's purpose influenced the decision on the data collection method for this chapter. This chapter is predominantly quantitative and uses a semi-structured questionnaire (most of the questions are close-ended) for collecting data. Previous research similar to this chapter used data collection techniques and methods similar to those used in this chapter (e.g. Nandialath, Dotson and Durand, 2014). A survey instrument was created to investigate the research questions. An initial survey was created by picking suitable items from the existing literature and developing additional items as required. The tool for content validity was checked by four academic researchers (Venkatesh, Thong and Xu, 2012). The initial questionnaire was then pre-tested on ten firms to determine the complexity or uncertainty of any item and to evaluate the reliability and validity of the scales. For clarity, certain items were updated. This process presented initial evidence that the scales were reliable and valid. Two enumerators (research assistants)[94], along with the researcher, collected data from 302 founders or the owners possessing the majority ownership of selected SMEs from two cities, Dhaka and Khulna, in Bangladesh. These cities have significant socio-economic and infrastructural differences and, to some extent, represent rural-urban dynamism relevant to the entrepreneurial context of Bangladesh. The sampled SMEs were selected from the Chamber of Commerce and Industries' registries in both cities. The owner with

[94] The educational qualifications of the research assistants were at least a graduate with experience of field survey. To orient the field enumerators, measures were taken for conducting a two-day long orientation session on this study, its backdrop, objectives, techniques of interview, use of techniques for data gathering, and interpersonal communication.

the highest ownership share was selected as respondent only when the founding entrepreneur was no longer involved with an SME. Table 3.1 shows a sector-wise selection of SMEs in the sample.

Sector/Category	**Sector/Category**
Outsourcing (including content makers)	Agribusiness
Knitwear and Readymade Garments	Beauty salon
Educational and Consultancy Services	Handicrafts
Healthcare and Pharmaceuticals	Retailer/Grocery Shop
Infrastructure (Property, Transport, and Storage)	Textile Boutique Shop
Restaurant and Catering service	ICT
Broadcasting, advertising, and event management	
Sample Size	
13 sectors x 23 =	299
Others =	3
Total sample =	302

Table 3.1: Sector-wise representation of the sample

Of the approximately 350 SMEs approached for a survey, 302 firms responded positively. For each firm, one face-to-face survey was conducted through a semi-structured questionnaire that included questions regarding ET use, ICT collaboration capabilities, firm-level factors, and performance. The sample is representative of Bangladesh's current business context, having firms from the agribusiness, handicraft, retailing, knitwear, readymade garment, healthcare, infrastructure, media, and infrastructure sectors. The data were collected in compliance with the ethical approval granted by the researcher's university. The sampling was stratified by gender of the founder (50% males and 50% females), city (equally distributed between Dhaka and Khulna),

firm size (fewer than 250 employees), and industry type (13 industry types listed in the SME foundation directory in Bangladesh). For each stratum, the sample was selected randomly using a list of respondents from the Chambers of Commerce and Industries.

This above-mentioned stratified sampling technique was followed to avoid sampling bias. Moreover, six owner-managers or entrepreneurs (three males and three females) were interviewed to explore in depth how the use of ET tools has impacted their overall SME performance. The interview was also done to investigate whether ICT collaboration capabilities have any mediating impact on the relationship between ET use and SME performance.

Sources of start-up capital	**%**
Personal savings	24.83
Family support (spouse or parents)	30.79
Borrowed from relatives or friends	0.33
Bank loan	6.29
Micro-finance institutions or NGOs	2.65
Personal savings and family support	14.57
Personal savings and bank loan	4.64
Family support (spouse or parents) and bank loan	1.66
Personal savings, family support, and borrowed from relatives or friends	4.64
Personal savings, family support, and bank loan	2.32
Personal savings, family support, bank loan, and borrowed from relatives or friends	2.32
Others	4.96
Total	100
Firm Age (in years)	%
1-5	57.62
6-10	21.52
11-15	9.27
16-20	6.29
21-25	2.32
26-30	1.66
31-35	1.32
Total	100
Hours per day dedicated for business by the founder	%
Up to 5 hours	19.54
6-10	51.98
11-15	23.51
16-20	4.97
Total	100

No. of employees	%
1–99 (Small Enterprises)[95]	98.01
100-250 (Medium Enterprises)[96]	1.99
Total	100

Table 3.2: Sample characteristics (N = 302)

3.3.3. Variables and measure

Business performance and ET use are the dependent and independent variables in this research, respectively. In line with previous research (e.g. Armstrong et al., 2011; Jegadeesh and Livnat, 2006), the selected firms' yearly revenue is used to measure the dependent variable in the quantitative part of this chapter. Yearly revenue is, in most cases, used by the owners of firms to assess firms' business performance because the revenue is the most crucial measure of a firm's profitability, as profit generation is one of the primary purposes for any firm (Armstrong et al., 2011; Jegadeesh and Livnat, 2006; Singh et al., 2016). That's why firms' yearly revenue is one of the best measure of business performance in firms.

For the qualitative part of the study (for the interviews), apart from the yearly revenue, the business performance's subjective measures (overall performance) were used to measure business performance (Wall et al., 2004). These included survival of firms, being able to employ other people (in other words, increasing the firm size), better collaboration with stakeholders, better supply and demand forecasting, better inventory management, overall better productivity, overall smoother operation, establishing brand image, and expanding globally.

The independent variable of our model is the use of "ET use" which included advanced ICT tools use such as specialized software (e.g. ERP and CRM) and information management systems (e.g.

[95] This is as per the definition of Small Enterprises by Bangladesh Bank (2012).

[96] This is as per the definition of Medium Enterprises by Bangladesh Bank (2012).

IMS, cloud computing, e-commerce, and e-marketing)[97]. This is a firm-level dummy variable taking the value of 1 if a firm has used any ET tool and 0 otherwise.

ICT collaboration capabilities have been used as the mediator in this chapter. A refined scale of Parida and Örtqvist (2015) has been used to measure this variable[98]. On a five-point Likert scale in which 1 = strongly disagree and 5 = strongly agree, the key informants rated their ICT collaboration capabilities. In the regression model, an average score of the items in the scale is used (Lin and Wu, 2014). There is one moderating variable, gender (firm-level factor), in this chapter. It refers to the sex of the owner-managers. As a binary option in the gender variable, the answer "male" is coded as "1," whereas "female" as "0" (Nowiński et al., 2019).

A number of control variables have been used in this chapter, obtained from existing literature on ICT and business performance[99]. They are: i) location (adapted from Bertschek, Cerquera and Klein, 2013 and Colombo, Croce and Grilli, 2013); whether the selected SME is located at the capital city, ii) education (adapted from Jo and Lee, 1996; Montazemi, 1988; Naylor and Williams,1994); whether the entrepreneur is educated up to Higher Secondary (12th standard), iii) firm age (Colombo, Croce and Grilli, 2013); the number of years the selected SMEs have been in

[97] As mentioned in chapter 2, the abovementioned ICT tools were categorised as ETs by the researcher following Teece's (2018) definition of ETs.

[98] Parida and Örtqvist (2015), in their study, used three ICT capabilities, namely ICT use for internal purposes, collaboration, and communication. This chapter is based on advanced ICT tools, and literature suggests that advanced ICT tools especially have an impact on only ICT collaboration capabilities (they help improve the collaboration of a firm with its internal and external stakeholders), which in turn impacts the business performance in firms. Hence, only ICT collaboration capabilities have been used as a mediator in this chapter out of those three ICT capabilities explored by Parida and Örtqvist (2015). Hence, it has been mentioned that "a refined scale of Parida and Örtqvist (2015) has been used to measure ICT collaboration capabilities.

[99] These variables are often used in the advanced ICT tools' use-business performance relationship. If not controlled, they could influence the outcomes of the research model. To avoid this, this long list of variables has been used to increase the internal validity of the research by limiting the influence of confounding and other extraneous variables. This was followed to establish a causal relationship between the variables of interest (Newey and Stouli, 2021).

operation, iv) investment in ICT (Bertschek, Cerquera and Klein, 2013; Sabherwal and Jeyaraj, 2015); the overall investment in ICT in the last year, v) start-up capital (Lasch, Le Roy and Yami, 2007); capital invested in starting the business, vi) ICT training (adapted from Bertschek, Cerquera and Klein, 2013 and Chen, Jaw and Wu, 2016); whether the employees have received any training in ICT, vii) frequency of ICT usage (adapted from Polo Peña, Frías Jamilena and Rodríguez Molina, 2011); how frequently the employees use ICT for business purposes, viii) ET skills of employees (adapted from Gërguri-Rashiti et al., 2017); the skill level of employees in ETs, ix) hours spent in business (Chen, Jaw and Wu, 2016); daily hours spent in business by the entrepreneur, x) involvement in other business (adapted from Colombo and Delmastro, 2001); whether the entrepreneur is involved in any other business or, in other words, whether the entrepreneur is engaged in serial entrepreneurship, xi) involvement of family members in business (Díaz-Chao, Sainz-González and Torrent-Sellens, 2015); whether any family members of the entrepreneur are involved in this SME, xii) occupation of father (Gimeno et al., 1997); the occupation of the father of the entrepreneur, xiii) use of GPTs (Sabherwal and Jeyaraj, 2015); whether the SME uses GPTs, xiv) SME industry[100] (adapted from Becchetti, andres londono Bedoya and Paganetto, 2003); the industry to which the selected SMEs belong (refer to Table 3.1).

Variable	**Acronym**	**Variable**	**Acronym**
Dependent variable		***Control variables***	
Business performance	Bus_per	Occupation of father	Occu_fat

[100] The Industry variables are dummy variables.

		Use of GPTs	GPT
Independent variable		ET skills of employees	ET_ski
Use of ETs	ET	Hours spent in business	Hr_bus
		Involvement in other businesses	Oth_bus
Mediating variables		Number of employees	Fir_siz
ICT Collaboration Capabilities	ICT_cap	Outsourcing (including content makers) Sector	Out_s
		Knitwear and Readymade Garments Sector	Gar_s
Moderating variables		Educational and Consultancy Services Sector	Edu_s
Gender of the Entrepreneur	Gen	Healthcare and Pharmaceuticals Sector	Hea_s
		Infrastructure (Property, Transport, and Storage) Sector	Inf_s
Control variables		Restaurant and Catering service Sector	Res_s
Location of the SME[101]	Loca	Broadcasting, advertising, and event management Sector	Bro_s
Education (Higher Secondary or not) of the entrepreneur	Edu_entre	Agribusiness Sector	Agr_s
Firm age	Firm_age	Beauty salon Sector	Bea_s
Investment in ICT	Inv_ICT	Handicrafts Sector	Han_s
Start-up capital	Cap	Retail or Grocery Shop Sector	Ret_s

[101] It indicates whether the SME is located in the capital city or not.

ICT training for employees	ICT_tra	Textile Boutique Shop Sector	Tex_s
Frequency of ICT usage by employees	Fre_ICT	ICT Sector	ICT_s
Involvement of the founder's family in business	Fam_bus	Other Sectors	Oth_s

Table 3.3: Variables used in this research

3.3.4. Methods of data analysis

Data has been analysed by applying STATA 12. First, descriptive statistics (percentage) were used to analyse sample characteristics. Then Heckman Sample Selection Model was conducted (details are provided below):

3.3.4.1. Heckman Sample Selection Model

The Heckman correction is a statistical method for correcting bias from incidentally truncated dependent variables or non-randomly selected samples, a prevalent problem when using observational data in quantitative social sciences (Winship and Mare, 1992). Conceptually, this is done by specifically modelling each observation's sampling probability (selection equation) along with the dependent variable's conditional expectation (outcome equation). Mathematically, the resulting likelihood function is identical to the Tobit model for censored dependent variables, a relation first drawn in 1976 by James Heckman (Heckman, 1976).

The Heckman Sample Selection Model (1979) was used to check the presence of a selection bias issue. Since a stratified sampling based on "city," was followed in data collection, "city" as an instrumental variable was used in the selection model. Moreover, ETs use was used as the

dependent variable in this model, fulfilling the condition that the dependent variable must be a binary variable for the selection equations (Morrissey et al., 2016).

The outcome equation for this chapter:

$$\begin{aligned}\text{Business performance} = {} & \beta_0 + \beta_1\ \text{Education of the entrepreneur} + \beta_2\ \text{Occupation of father} \\ & + \beta_3\ \text{Involvement of family members in business} + \beta_4\ \text{Hours spent in business} \\ & + \beta_5\ \text{Involvement in other biz} + \beta_6\ \text{Firm age} + \beta_7\ \text{Start}-\text{up capital} + \beta_8\ \text{ICT training} \\ & + \beta_9\ \text{Frequency of ICT usage} + \beta_{10}\ \text{ET skills of employees} + \beta_{11}\ \text{Agribusiness Sector} \\ & + \beta_{12}\ \text{Beauty salon Sector} + \beta_{13}\ \text{Handicrafts Sector} + \beta_{14}\ \text{Retailer / Grocery Shop Sector} \\ & + \beta_{15}\ \text{Broadcasting, advertising and event management Sector} + \beta_{16}\ \text{Infrastructure Sector} \\ & + \beta_{17}\ \text{Outsourcing Sector} + \beta_{18}\ \text{ICT Sector} + \beta_{19}\ \text{Educational \& Consultancy Services Sector} \\ & + \beta_{20}\ \text{Restaurant \& Catering service Sector} + \beta_{21}\ \text{Knitwear \& Readymade Garments Sector} \\ & + \beta_{22}\ \text{Healthcare \& Pharmaceuticals Sector} + \beta_{23}\ \text{Textile Boutique Shop Sector} \\ & + \beta_{24}\ \text{Other Sectors} + \beta_{25}\ \text{Use of GPTs} \\ & + \beta_{26}\ (\text{ICT Collaboration Capabilities})\ (\text{Sex of the Entrepreneur}) + u_1\end{aligned}$$

The selection equation for this chapter:

$$\begin{aligned}\text{Use of ET} = {} & \gamma_0 + \gamma_1\ \text{Location of the SME} + \gamma_2\ \text{Education of the entrepreneur} \\ & + \gamma_3\ \text{Occupation of father} + \gamma_4\ \text{Involvement of family members in business} \\ & + \gamma_5\ \text{Hours spent in business} + \gamma_6\ \text{Involvement in other biz} + \gamma_7\ \text{Firm age} + \gamma_8\ \text{Start}-\text{up capital} \\ & + \gamma_9\ \text{ICT training} + \gamma_{10}\ \text{Frequency of ICT usage} + \gamma_{11}\ \text{ET skills of employees} \\ & + \gamma_{12}\ \text{Agribusiness Sector} + \gamma_{13}\ \text{Beauty salon Sector} + \gamma_{14}\ \text{Handicrafts Sector} \\ & + \gamma_{15}\ \text{Retailer / Grocery Shop Sector} + \gamma_{16}\ \text{Broadcasting, advertising and event management Sector} \\ & + \gamma_{17}\ \text{Infrastructure Sector} + \gamma_{18}\ \text{Outsourcing Sector} + \gamma_{19}\ \text{ICT Sector} \\ & + \gamma_{20}\ \text{Educational \& Consultancy Services Sector} + \gamma_{21}\ \text{Restaurant \& Catering service Sector} \\ & + \gamma_{22}\ \text{Knitwear \& Readymade Garments Sector} + \gamma_{23}\ \text{Healthcare \& Pharmaceuticals Sector} \\ & + \gamma_{24}\ \text{Textile Boutique Shop Sector} + \gamma_{25}\ \text{Other Sectors} + \gamma_{26}\ \text{Use of GPTs} \\ & + \gamma_{27}\ (\text{ICT Collaboration Capabilities})\ (\text{Sex of the Entrepreneur}) + u_2\end{aligned}$$

	Coef.	Std. Err.
Yearly Revenue (Business Performance)		
Level of Education of Founder (Higher Secondary or not)	0.160	(0.266)
Occupation of the father of the founder	-0.010	(0.036)
Involvement of the founder's family in business	-0.083	(0.159)
Daily hours spent in business	0.013**	(0.004)
Founders' involvement in other businesses	0.376	(0.241)
Firm age	0.106***	(0.024)
Start-up capital	0.075**	(0.025)
Employees' training on ICT	1.085***	(0.246)
ICT usage frequency of employees	0.878***	(0.237)
ET skills of employees	-0.009	(0.008)
Agribusiness Sector	1.779	(1.059)
Beauty Salon Sector	1.409	(1.123)
Handicraft Sector	1.874	(1.061)
Retailers Sector	2.271*	(1.078)
Broadcasting Sector	2.094*	(1.013)
Infrastructure Sector	3.160**	(1.033)
Outsourcing Sector	1.810	(1.022)
ICT Sector	2.748**	(1.038)
Education Sector	2.990**	(1.012)
Restaurant Sector	2.249*	(1.022)
Knitwear Sector	3.213**	(1.073)
Pharmacy Sector	2.449*	(1.048)
Textile Sector	1.960	(1.059)
Others Sector	0	(omitted)
Use of GPT	-1.553	(1.199)
ICT Collaboration Capabilities	0.281	(0.615)
Male entrepreneurs	0.933	(0.956)
Male Entrepreneurs X ICT Collaboration capabilities	-0.395	(0.784)
Constant	9.246***	(1.790)
Use of ET		
Capital City (1/0)	1.721	(68832.080)
Level of Education of Founder (Higher Secondary or not)	-2.045	(162301.200)
Occupation of father of founder	-0.333	(10807.100)
Involvement of founder's family in business	-5.182	(119993.500)
Daily hours spent in business	0.004	(3527.200)
Founders' involvement in other businesses	0.057	(117020.200)
Firm age	0.165	(9510.000)
Start-up capital	-0.253	(18092.800)
Employees' training on ICT	3.802	(175690.900)
ICT usage frequency of employees	4.354	(145599.700)
ET skills of employees	2.186	(8967.300)
Agribusiness Sector	11.694	(345060.900)
Beauty Salon Sector	15.922	(403481.200)
Handicraft Sector	4.068	(850514831.500)
Retailers Sector	16.608	(867289720.800)
Broadcasting Sector	21.294	(321488.600)
Infrastructure Sector	8.969	(295400.400)
Outsourcing Sector	-23.696	(323650.300)
ICT Sector	-8.207	(13674164.500)
Education Sector	4.047	(417321.400)
Restaurant Sector	17.720	(3955184.600)
Knitwear Sector	9.178	(344672.000)

Pharmacy Sector	17.984	(357615.200)
Textile Sector	23.994	(314095.900)
Others Sector	0	(omitted)
Use of GPT	0.714	(331115.400)
ICT Collaboration Capabilities	-0.352	(377296.000)
Male entrepreneurs	-3.301	(727528.400)
Male Entrepreneurs X ICT Collaboration capabilities	-0.466	(605259.300)
Constant	-30.840	(391792.800)
Athrho	-1.951	(164.9)
Lnsigma	0.272***	(0.054)
ρ	-0.960	(12.809)
σ	1.312	(0.071)
λ	-1.260	(16.807)
Observations	302	

Standard errors in parentheses
*p< 0.05, ** p< 0.01, ***p<0.001

Table 3.4: Heckman sample selection model outcome

Based on the Heckman selection test outcome (see Table 3.4), it can be claimed that no sampling bias exists based on the instrumental variable "city." Since the likelihood-ratio test indicates that the correlation is not statistically significant, the data do not have self-selection issues. Hence, this chapter has not proceeded with Heckman's technique to analyse the data. Instead, it has used factor analysis along with multiple hierarchical regression analysis.

3.3.4.2. Factor analysis

Factor analysis is often used in statistics in cases where a large amount of data exists in a study and can be applied for data reduction purposes. For example, it is used to extract fewer constructs from a large set of smaller and uncorrelated variables and bring together in a conceptual form a group of those small variables that measure a particular construct (Hatcher and O'Rourke, 2014). Confirmatory factor analysis (CFA) and exploratory factor analysis (EFA) are two key factor analyses.

EFA is applied after several responses have been obtained from several measures. There is a need to identify the underlying structure responsible for covariation in data (Hatcher and O'Rourke,

2014). EFA typically accounts for correlations, covariations, and variation relationships between items (observed variables). An observed variable is a linear function involving one or more common factors (the underlying variable) and a unique factor termed as the error or item-specific information.

CFA is a structural equation model that deals with the relationships between the observed variables or items and the latent variables. CFA is used to "explain the number of factors that account for variation and covariation among a set of indicators" (Brown, 2012:2).

Although EFA and CFA share certain qualities, there are also crucial differences between them. They are similar insofar as both are based on the common factor model. Most researchers will usually apply an EFA first to help solidify the development of a construct and then use the CFA as a second measure to demonstrate fit indices for comparison (Harrington, 2008). However, the difference lies in the more theory-driven nature of the CFA, as it requires all aspects of the model to be tested. On the other hand, the EFA is more of a data-driven technique, as its constructs are derived from the variables. According to Harrington (2008), a measure with a robust theoretical framework may find it possible to skip the initial exploratory factor analysis and go straight to performing confirmatory factor analysis. In this chapter, EFA has been applied to reduce data to a smaller set of summary variables (Hatcher and O'Rourke, 2014). To be specific, EFA helped the researcher to extract ICT collaboration capabilities from a set of ICT capabilities. Table 3.5 demonstrates the Rotated Factor Matrix for the ICT collaboration capabilities factors. A variable containing an absolute value of factor loading more than 0.4 has been taken into consideration as per the recommendations of Prasad, Ramamurthy and Naidu (2001) and Stevens (2012).

Rotated Component Matrix[a]	
	Component ICT Collaboration Capabilities
ICT is used to establish business collaborations with new partners	.799
ICT is used to enable work flexibility	.736
ICT is used to maintain collaboration with existing business partners	.617
ICT is used to enable collaborative competence/skills development for employees	.487

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 4 iterations.

Table 3.5: Pattern matrix

3.3.4.3. Multicollinearity test

Next, bivariate analysis (Pearson Correlation Coefficient) was conducted to check for the multicollinearity issue (details are given in table 3.8). When independent variables are highly correlated in a regression model, multicollinearity occurs. In the case of a high correlation between independent variables, it may cause problems when researchers fit the model and interpret the results (Disatnik and Sivan, 2016). Therefore, the Variance Inflation Factor (VIF hereafter) test was conducted for greater confidence about the multicollinearity issue (details are given in table 3.9).

3.3.4.4. Test of hypotheses

As this chapter deals with nested data, several hierarchical regression analyses were carried out for testing hypotheses related to the effect of ET use on SME performance and the mediator role of ICT collaboration capabilities, and the moderating role of gender (Ross and Willson, 2017). "Hierarchical regression can be useful for evaluating the contributions of predictors above and beyond previously entered predictors, as a means of statistical control, and for examining incremental validity''(Lewis, 2007:9). Sykes (1993) defined regression analysis as a statistical approach for analysing relationships within variables, typically attempted by the author to

determine one variable's causal influence upon another. The statistical significance of the estimated relationships is also assessed in regression analysis, which shows the degree of confidence[102]. In this case, the significance level is calculated as Alpha=1% or 5% or 10% significant difference. The impact of control variables, independent variable, and the moderator was explored in the first, second, and subsequent models in each case. The Sobel test statistic (Sobel Product of Coefficients) was used to test the mediator effect of ICT collaboration capabilities on the relationship between ET use and business performance.

Since one way of stratifying the samples was based on gender, the whole sample was also split into two groups by gender. Then, regression analyses were run on both subgroups (males and females) for exploring the influence of ET use on SME performance and how ICT collaboration capabilities mediate the relationship between ET use and business performance for both these groups. The regression equations used in this chapter are provided in table 3.6 under Appendix G.

[102] The degree of confidence means the degree to which the true association is close to the estimated one.

3.4. RESULTS

3.4.1. Outcome of the quantitative analysis

Table 3.7 provides the descriptive statistics (e.g. means and standard deviations) related to the chapter's variables. The mean for the business performance measure for SMEs was 14.16. As mentioned earlier, the hypothesized relations are tested through a hierarchical multiple regression. In preparation for that, all control, independent, and moderator variables are found to be significantly correlated to each other and the dependent variable (refer to Table 3.8). There is no multicollinearity issue with the data, as measured through correlation coefficient and VIF analyses. None of the correlation coefficients is more than 0.70 (Deborah, 2019) or 0.80 (Berry and Feldman, 1985) beyond the acceptable range of values in this regard.

	Mean	SD		Mean	SD
Business performance	14.16	1.80	Involvement in other businesses	0.53	0.50
Use of ETs	0.35	0.36	Outsourcing (including content makers) Sector	0.07	0.27
ICT Collaboration Capabilities	1.10	0.32	Knitwear and Readymade Garments Sector	0.07	0.27
Gender of the entrepreneur	0.50	0.50	Educational and Consultancy Services Sector	0.07	0.27
Location of the SME	0.50	0.50	Healthcare and Pharmaceuticals Sector	0.07	0.27
Education (Higher Secondary or not) of the entrepreneur	0.65	0.48	Infrastructure (Property, Transport, and Storage) Sector	0.07	0.27
Firm age	1.54	0.94	Restaurant and Catering service Sector	0.07	0.27
Investment in ICT	10.62	1.36	Broadcasting, advertising, and event management Sector	0.07	0.27
Start-up capital	3.36	4.28	Agribusiness Sector	0.07	0.27
ICT training for employees	0.54	0.47	Beauty salon Sector	0.07	0.27
Frequency of ICT usage by employees	1.44	0.82	Handicrafts Sector	0.07	0.27
Involvement of the founder's family in the business	0.57	1.07	Retail or Grocery Shop Sector	0.07	0.27
Occupation of the father	2.96	2.96	Textile Boutique Shop Sector	0.07	0.27
Use of GPTs	0.84	0.23	ICT Sector	0.07	0.27
ET skills of employees	17.76	21.15	Number of employees	12.47	32.14
Hours spent in business	59.37	25.42	Other Sectors	0.07	0.27

Table 3.7: Descriptive statistics

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1	1.0	0.45*																														
2	0.45*	1.0																														
3	0.17*	0.23*	1.0																													
4	0.19*	-0.02	-0.04	1.0																												
5	0.50*	0.57*	0.17*	0.03	1.0																											
6	0.29*	0.29*	0.12*	0.19*	0.32*	1.0																										
7	0.16*	-0.23*	-0.06	0.05	-0.24*	-0.19*	1.0																									
8	0.45*	0.33*	-0.01	0.01	0.25*	0.02	0.14*	1.0																								
9	0.33*	0.14*	0.03	-0.02	0.26*	0.13*	0.07	0.08	1.0																							
10	0.41*	0.44*	0.18*	-0.01	0.40*	0.25*	-0.10	0.20*	0.19*	1.0																						
11	0.47*	0.41*	0.23*	0.01	0.58*	0.35*	-0.22*	0.29*	0.16*	0.41*	1.0																					
12	-0.02	-0.10	0.03	-0.12*	-0.08	-0.14*	0.17*	-0.01	-0.01	0.04	-0.07	1.0																				
13	0.02	0.03	0.02	-0.00	0.14*	0.02	-0.12*	0.05	0.09	0.06	0.03	-0.02	1.0																			
14	0.29*	0.49*	0.19*	-0.03	0.46*	0.38*	-0.23*	0.17*	0.15*	0.37*	0.62*	-0.04	0.05	1.0																		
15	0.35*	066*	0.22*	0.02	0.49*	0.28*	0.24*	0.24*	0.06	0.37*	0.39*	-0.10	0.02	0.50*	1.0																	
16	0.18*	0.05	0.01	0.08	0.06	0.06	0.09	0.09	0.13*	0.05	0.00	0.04	0.01	-0.02	0.00	1.0																
17	0.19*	0.06	0.14*	0.21*	0.03	0.03	0.06	0.06	0.07	0.08	0.04	-0.02	0.11	-0.02	0.05	0.17*	1.0															
18	-0.03	0.23*	0.12	0.09	0.04	0.04	-0.02	-0.02	-0.09	-0.01	0.28*	-0.08	-0.01	0.10	0.34*	0.09	0.02	1.0														
19	0.02	-0.05	-0.07	0.04	0.04	0.04	-0.01	-0.01	0.02	-0.04	-0.08	-0.05	0.08	-0.07	-0.10	-0.09	-0.05	-0.08	1.0													
20	0.22*	0.16*	0.04	0.06	0.21*	0.21*	0.18*	0.18*	0.13*	0.19*	0.14*	-0.04	0.11	0.13*	0.15*	-0.03	0.10	-0.08	-0.08	1.0												
21	0.02	-0.02	-0.01	-0.09	-0.01	-0.01	-0.05	-0.05	0.08	-0.05	-0.07	-0.00	0.08	0.05	-0.05	0.08	-0.05	-0.08	-0.08	-0.08	1.0											
22	0.15*	-0.02	0.05	0.09	0.09	0.09	0.15*	0.14*	0.05	0.07	-0.00	-0.00	-0.06	-0.04	-0.04	-0.01	0.02	-0.08	-0.08	-0.08	-0.08	1.0										
23	-0.06	-0.05	0.03	0.06	-0.06	-0.06	-0.04	-0.04	0.06	0.00	-0.10	0.08	-0.05	-0.09	-0.08	0.14*	0.10	-0.08	-0.08	-0.08	-0.08	-0.08	1.0									
24	0.04	0.07	-0.06	0.04	0.09	0.09	0.03	0.03	0.10	0.10	0.09	-0.02	0.06	0.13*	0.05	-0.02	-0.03	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	1.0								
25	-0.06	-0.05	0.10	-0.01	-0.04	-0.00	-0.05	-0.05	-0.02	-0.01	-0.09	0.06	-0.10	-0.09	-0.06	-0.08	0.07	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	1.0							
26	-0.09	-0.14*	0.01	-0.29*	-0.19*	-0.16*	-0.07	-0.07	0.01	-0.08	-0.10	0.14*	-0.01	-0.13*	-0.16*	0.02	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	1.0						
27	-0.12*	-0.05	-0.03	-0.16*	0.01	-0.10	-0.05	-0.05	-0.10	-0.09	-0.05	-0.02	0.02	-0.01	-0.06	-0.03	-0.03	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	1.0					
28	-0.09	-0.12*	-0.10	0.09	-0.16*	-0.16*	-0.06	-0.06	0.00	-0.10	-0.10	-0.02	0.06	-0.09	-0.10	0.02	0.02	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	1.0				
29	-0.11	-0.05	0.03	-0.06	-0.04	-0.04	-0.06	-0.06	-0.13*	-0.04	-0.08	-0.04	-0.04	-0.01	-0.07	-0.15*	-0.10	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	1.0			
30	0.14*	0.09	0.03	0.13*	0.04	0.04	0.06	0.06	-0.08	0.06	0.16*	0.02	0.05	0.09	0.19*	0.05	-0.00	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	1.0		
31	0.55*	0.21*	0.01	0.03	0.21*	0.11	0.16*	0.64*	0.15*	0.20*	0.14*	0.27	-0.04	0.10	0.12*	0.12*	0.12*	-0.07	0.12*	0.08	-0.03	0.23*	-0.04	-0.02	-0.04	-0.04	-0.05	-0.07	-0.07	-0.00	1.00	
32	-0.05	-0.00	0.06	0.10	0.03	0.03	-0.02	-0.02	-0.07	0.03	0.02	-0.05	-0.07	0.07	-0.01	0.05	0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.02	1.00

*** p<0.01, ** p<0.05, * p<0.1

N.B.: 1=Business performance, 2=Use of ETs, 3=ICT Collaboration Capabilities, 4=Sex of the entrepreneur, 5=Location of the SME, 6. Education (Higher Secondary or not) of the entrepreneur, 7=Firm age, 8=Investment in ICT, 9=Start-up capital, 10=ICT training for employees, 11=Frequency of ICT usage by employees, 12=Involvement of the founder's family in the business, 13=Occupation of the father, 14=Use of GPTs, 15=ET skills of employees, 16=Hours spent in business, 17=Involvement in other businesses, 18=Outsourcing (including content makers) Sector, 19=Knitwear and Readymade Garments Sector, 20=Educational and Consultancy Services Sector, 21=Healthcare and Pharmaceuticals Sector, 22=Infrastructure (Property, Transport, and Storage) Sector, 23=Restaurant and Catering service Sector, 24=Broadcasting, advertising, and event management Sector, 25=Agribusiness Sector, 26=Beauty salon Sector, 27=Handicrafts Sector,28= Retail or Grocery Shop Sector, 29=Textile Boutique Shop Sector, 30=ICT Sector, 31=Number of employees, 32=Other Sectors

Table 3.8: Correlation statistics

However, to be more precise on this multicollinearity problem, the VIF analysis was also run, which measures inflation in the parameter estimates due to multicollinearity potentially created by correlated predictors (refer to Table 3.9). Following the standard set by Kutner et al. (2005), there is no proof of multicollinearity in the data, as all VIF values are less than five.

Variable	**VIF**	**1/VIF**
1. Use of ETs	2.96	0.338
2. ICT Collaboration Capabilities	1.17	0.854
3. Sex of the Entrepreneur	1.36	0.732
4. Location of the SME	1.97	0.507
5. Education of the entrepreneur (Higher Secondary or not)	1.46	0.687
6. Firm age	1.43	0.701
7. Investment in ICT	1.95	0.513
8. Start-up capital	1.22	0.822
9. ICT training for employees	1.47	0.682
10. Frequency of ICT usage by employees	1.48	0.675
11. Involvement of founder's family in business	1.12	0.895
12. Occupation of father	1.15	0.872
13. Use of GPTs	1.76	0.567
14. ET skills of employees	2.02	0.495
15. Hours spent in business	1.18	0.847
16. Involvement in other business	1.17	0.852
17. Outsourcing (including content makers) Sector	2.33	0.430
18. Knitwear and Readymade Garments Sector	2.15	0.465
19. Educational and Consultancy Services Sector	2.28	0.438
20. Healthcare and Pharmaceuticals Sector	2.03	0.500
21. Infrastructure (Property, Transport, and Storage) Sector	2.18	0.458
22. Restaurant and Catering service Sector	2.12	0.472
23. Broadcasting, advertising, and event management Sector	2.16	0.463
24. Agribusiness Sector	2.04	0.490
25. Beauty salon Sector	2.04	0.489
26. Handicrafts Sector	2.05	0.487
27. Retailer/Grocery Shop Sector	2.06	0.485
28. Textile/ Boutique Shop Sector	2.08	0.480
29. ICT Sector	2.20	0.454
30. Other Sectors	1.24	0.806
31. Firm size	1.23	0.810
Mean VIF	1.79	

Table 3.9: VIF test results of predictors

Next, two hierarchical regression analyses were run to explore both direct and indirect effect models. These regression results supported all hypotheses summarized in Table 3.10.

Hypothesis	Supported in Multiple linear regression	Conclusion for hypothesis
H1: Enabling technologies (ETs) as strategic resources are positively associated with the performance of SMEs.	**1.136****	Supported
H2: ICT collaboration capabilities positively mediate the relationship between ETs and SME performance.	**2.100** (Sobel test statistic)	Supported
H3: Gender of the entrepreneurs moderates the ICT collaboration capabilities and SME performance relationship in a way that ICT collaboration capabilities impact business performance more in female-owned SMEs	**-0.844***	Supported

*** p<0.01, ** p<0.05, * p<0.1

Table 3.10: Outcomes of hypotheses tests

3.4.1.1. Outcome of the direct effect model

In Table 3.11, the regression results of the direct effect model are shown. The hierarchical regression is carried out in five steps, creating five models. The control variables, the independent variable, moderator variable, and the mediator variable are entered in the 1st, 2nd, 3rd, and 4th models. Furthermore, the 5th model includes the interaction of the moderator variable with the mediator variable.

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**
	Business Performance	Business Performance	Business Performance	Business Performance	Business Performance
Capital City (1/0)	0.989***	0.931***	0.907***	0.902***	0.935***
	(0.212)	(0.213)	(0.210)	(0.210)	(0.210)
Level of Education of Founder (Higher Secondary or not)	0.376**	0.376**	0.280	0.274	0.282
	(0.184)	(0.183)	(0.184)	(0.183)	(0.183)
Occupation of father of Founder	-0.028	-0.027	-0.025	-0.025	-0.028
	(0.027)	(0.027)	(0.027)	(0.027)	(0.027)

Involvement of founder's family in business	-0.041	-0.029	-0.012	-0.016	-0.020
	(0.074)	(0.074)	(0.074)	(0.074)	(0.073)
Daily hours spent in business	0.008**	0.007**	0.007**	0.007**	0.007**
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Founders' involvement in other businesses	0.435***	0.436***	0.353**	0.327**	0.348**
	(0.159)	(0.158)	(0.159)	(0.160)	(0.160)
Firm age	0.063***	0.062***	0.060***	0.061***	0.061***
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
Start-up capital	0.054***	0.054***	0.056***	0.057***	0.058***
	(0.020)	(0.019)	(0.019)	(0.019)	(0.019)
Employees' training on ICT	0.634***	0.575***	0.596***	0.581***	0.594***
	(0.190)	(0.191)	(0.189)	(0.189)	(0.188)
ICT usage frequency of employees	0.804***	0.652***	0.637***	0.637***	0.640***
	(0.200)	(0.213)	(0.210)	(0.210)	(0.209)
ET skills of employees	-0.008	-0.020**	-0.020**	-0.020**	-0.021**
	(0.007)	(0.009)	(0.009)	(0.009)	(0.009)
Agribusiness Sector	0.003	-0.013	-0.218	-0.239	1.114
	(0.403)	(0.401)	(0.401)	(0.401)	(0.808)
Beauty Salon Sector					1.379*
					(0.827)
Handicraft Sector	-0.070	-0.070	-0.175	-0.146	1.192
	(0.404)	(0.402)	(0.398)	(0.399)	(0.812)
Retailers Sector	0.187	0.212	-0.094	-0.054	1.319
	(0.395)	(0.393)	(0.402)	(0.402)	(0.810)
Broadcasting Sector	0.234	0.255	-0.035	0.012	1.392*
	(0.405)	(0.403)	(0.410)	(0.411)	(0.807)
Infrastructure Sector	0.613	0.637	0.351	0.346	1.715**
	(0.403)	(0.401)	(0.408)	(0.407)	(0.804)
Outsourcing Sector	-0.197	-0.062	-0.387	-0.394	0.976
	(0.428)	(0.431)	(0.440)	(0.439)	(0.813)
ICT Sector	0.765*	0.917**	0.575	0.588	1.988**
	(0.411)	(0.416)	(0.426)	(0.426)	(0.806)
Education Sector	0.598	0.629	0.352	0.375	1.742**
	(0.419)	(0.417)	(0.422)	(0.422)	(0.809)
Restaurant Sector	-0.003	-0.035	-0.313	-0.307	1.049
	(0.405)	(0.403)	(0.409)	(0.408)	(0.807)
Knitwear Sector	0.557	0.525	0.255	0.287	1.697**
	(0.402)	(0.400)	(0.405)	(0.406)	(0.809)
Pharmacy Sector	0.528	0.501	0.329	0.347	1.710**
	(0.404)	(0.402)	(0.401)	(0.401)	(0.809)
Textile Sector	0.159	0.138	-0.045	0.008	1.408*
	(0.408)	(0.405)	(0.405)	(0.406)	(0.808)
Others Sector	-1.022	-0.971	-1.400*	-1.437*	
	(0.832)	(0.828)	(0.830)	(0.829)	
Use of GPT	-0.738	-0.693	-0.592	-0.631	-0.673
	(0.454)	(0.453)	(0.448)	(0.448)	(0.447)
Use of ET		**1.136****	1.254**	1.231**	1.241**
		(0.567)	(0.561)	(0.561)	(0.559)
Male entrepreneurs			0.501***	0.515***	1.433**
			(0.171)	(0.171)	(0.554)
ICT Collaboration Capabilities				0.323*	0.840**
				(0.247)	(0.385)

Male Entrepreneurs X ICT Collaboration capabilities					**-0.844***
					(0.484)
Constant	11.162***	11.257***	11.262***	10.942***	8.996***
	(0.483)	(0.482)	(0.476)	(0.534)	(0.968)
Observations	302	302	302	302	302
R-squared	0.509	0.516	0.531	0.534	0.539

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.11: Regression results of the effect of ET use on business performance of SMEs (direct effect model)

In Table 3.11, the outputs in the second model ($R^2 = 0.516$, $p<0.01$) support the first hypothesis that enabling technologies (ET) as strategic resources are positively associated with the performance of SMEs. With the ß value of 1.136, the relationship is at the 5% level of significance.

Model 5 ($R^2 = 0.539$, $p<0.01$) in Table 3.11 provides evidence that the relationship between ICT collaboration capabilities and SME performance is moderated by the gender of the owner-managers of SMEs. Supporting the third hypothesis, the outputs (ß = -0.844, $p<0.1$) indicate that SMEs with female founders see significantly more contribution from ICT collaboration capabilities toward their performance than SMEs with male founders.

Among the control variables, location of SMEs (whether located in the capital city or not) (β = 0.989, p <0.01), Level of education of founder (Higher Secondary or not) (β = 0.376, p <0.05), Daily hours spent in business by the founder (β = 0.008, p <0.05), Founders' involvement in other businesses (β = 0.435, p <0.01), Firm age (β = 0.063, p <0.01), Start-up capital (β = 0.054, p <0.01), Employees' training in ICT (β = 0.634, p <0.01), ICT usage frequency of employees (β = 0.804, p <0.01) and ICT sector (β = 0.765, p <0. 1) show a positive and statistically significant association with the dependent variable. All other control variables have a non-significant relationship with the dependent variable.

3.4.1.2. Outcome of the indirect effect model

In Table 3.12, the regression results of the indirect effect model are shown. The hierarchical regression is carried out in two steps, creating two models. The control variables and the independent variable are entered in the 1st and 2nd models, respectively.

	Model 1	**Model 2**
	ICT Collaboration capabilities	ICT Collaboration capabilities
Capital City (1/0)	0.064	0.026
	(0.046)	(0.048)
Level of Education of Founder	0.023	0.017
	(0.044)	(0.044)
Yearly investment in ICT	-0.000	-0.000
	(0.000)	(0.000)
Start-up capital	-0.003	-0.003
	(0.005)	(0.005)
ICT training for employees	0.083*	0.062
	(0.044)	(0.045)
Firm age	0.007	0.014
	(0.021)	(0.021)
No of employees	0.000	0.000
	(0.001)	(0.001)
Male Entrepreneurs	-0.030	-0.026
	(0.038)	(0.037)
Use of GPT	0.146	0.097
	(0.097)	(0.098)
Use of ET		**0.162****
		(0.070)
Constant	0.910***	0.920***
	(0.086)	(0.085)
Observations	302	302
R-squared	0.063	0.080

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.12: Regression results of the effect of ET use on ICT collaboration capabilities of SMEs (indirect effect model)

The results of Model 2 in Table 3.12 show that the use of ETs ($\beta = 0.162$, $p<0.05$) has a significant positive impact on ICT collaboration capabilities.

Amongst the control variables (Model 1, Table 3.12), ICT training for employees ($\beta = 0.083$, $p <0.1$) has a positive and significant association with the ICT collaboration capabilities of SMEs. All other control variables have a non-significant relationship with the ICT collaboration capabilities of SMEs.

Sobel test statistic for the mediator effect of ICT collaboration capabilities in ET use and Business Performance relationship	2.10** (Preacher and Leonardelli, 2012)

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.13: Sobel test statistic (Sobel product of coefficients) for mediator effect

Hypothesis 3 states that SMEs' ICT collaboration capabilities positively mediate the relationship between ET use and SME performance, and it is supported by the Sobel test statistic (2.10, p <0.05) (Preacher and Leonardelli, 2012) (see Table 3.13).

3.4.1.3. Outcome of sample split: male-owned vs. female-owned enterprises

The full sample was split into two subsamples based on gender: (1) Male owner-managers (N = 151) and (2) Female owner-managers (N = 151) and a regression was run on each subsample. Some control variables were adjusted in subgroup analysis. To be specific, those control variables were included in the subgroup analysis, which helped obtain an unbiased and statistically efficient comparison of the subgroups (Pocock et al., 2002). The results of the subgroup analyses are presented below:

3.4.1.3.1. Outcome of male sub-group analysis

	Model 1	**Model 2**	**Model 3**
	Business Performance	Business Performance	Business Performance
Capital City (1/0)	0.831***	0.644**	0.627**
	(0.287)	(0.306)	(0.309)
Yearly investment in ICT	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)
Start-up capital	0.060**	0.058**	0.058**
	(0.026)	(0.026)	(0.026)
ICT training for employees	0.677**	0.527*	0.511*
	(0.270)	(0.283)	(0.286)

Firm age	0.544***	0.586***	0.582***
	(0.124)	(0.126)	(0.126)
Daily hours spent in business	0.001	0.004	0.003
	(0.029)	(0.028)	(0.029)
Number of employees	0.013***	0.013***	0.013***
	(0.004)	(0.003)	(0.003)
Use of ET		**0.173***	0.167
		(0.104)	(0.105)
ICT Collaboration Capabilities			**0.155**
			(0.305)
Constant	11.698***	11.599***	11.463***
	(0.372)	(0.374)	(0.460)
Observations	151	151	151
R-squared	0.592	0.600	0.601

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.14: Regression results of the effect of ET use on business performance of SMEs (direct effect model) on male subgroup

Since ICT collaboration capability (β = 0.155, n.s.) does not significantly impact the SME performance of male-owned enterprises, it can be said that ICT collaboration capability does not act as a mediator in this case. However, the use of ETs (β = 0.173, p<0.1) shows a positive and statistically significant influence on the SME performance of male-owned enterprises.

3.4.1.3.2. Outcome of female sub-group analysis

	Model 1	**Model 2**	**Model 3**
	Business Performance	Business Performance	Business Performance
Capital City (1/0)	1.063***	0.940***	0.963***
	(0.196)	(0.207)	(0.202)
Yearly investment in ICT	-0.000*	-0.000**	-0.000*

	(0.000)	(0.000)	(0.000)
Start-up capital	0.058**	0.061***	0.065***
	(0.023)	(0.023)	(0.022)
ICT training for employees	0.587**	0.498**	0.473**
	(0.229)	(0.233)	(0.228)
Firm age	0.663***	0.694***	0.695***
	(0.097)	(0.098)	(0.096)
Daily hours spent in business	0.020	0.017	0.017
	(0.025)	(0.025)	(0.025)
Number of employees	0.031***	0.030***	0.029***
	(0.005)	(0.005)	(0.005)
Use of ET		**0.134***	0.096
		(0.077)	(0.077)
ICT Collaboration Capabilities			**0.860*****
			(0.306)
Constant	10.961***	10.869***	9.943***
	(0.280)	(0.283)	(0.430)
Observations	151	151	151
R-squared	0.644	0.652	0.670

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.15: Regression results of the effect of ET use on business performance of SMEs (direct effect model) on female subgroup

The regression results for the female subgroup shows that Use of ETs (IV) has a positive and significant impact ($\beta = 0.134$, $p<0.1$) on SME performance (DV). Similarly, ICT collaboration capabilities have a positive and statistically significant impact ($\beta = 0.860$, $p<0.01$) on female owner-managers' SME performance.

	Model 1	Model 2
	ICT Collaboration capabilities	ICT Collaboration capabilities
Capital City (1/0)	0.014	-0.027
	(0.053)	(0.056)
Yearly investment in ICT	-0.000	-0.000
	(0.000)	(0.000)
Start-up capital	-0.006	-0.005
	(0.006)	(0.006)
ICT training for employees	0.059	0.029
	(0.062)	(0.063)
Firm age	-0.011	-0.001
	(0.026)	(0.026)
Daily hours spent in business	0.001	-0.000
	(0.007)	(0.007)
Number of employees	0.001	0.001
	(0.001)	(0.001)
Use of ET		**0.045****
		(0.021)
Constant	1.108***	1.077***
	(0.076)	(0.076)
Observations	151	151
R-squared	0.027	0.058

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.16: Regression results of the effect of ET use on ICT collaboration capabilities of SMEs (indirect effect model)

The regression results for the female subgroup shows that use of ETs (IV) has a positive and significant impact ($\beta = 0.045$, $p<0.05$) on ICT collaboration capabilities (mediator).

Sobel test statistic for the mediator effect of ICT collaboration capabilities in ET use and Business Performance relationship in female-owned SMEs	1.70* (Preacher and Leonardelli, 2012)

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.17: Sobel test statistic (Sobel product of coefficients) for mediator effect

From these findings, it can be said that SMEs' ICT collaboration capabilities positively mediate the relationship between ET use and SME performance for the female subgroup, and this is supported by the Sobel test statistic (1.71, p <0.1) (Preacher and Leonardelli, 2012) (see Table 3.17).

3.4.2. Main outcome of the qualitative research

Six owner-managers (three males and three females) were interviewed to deeply explore how ICT tools have impacted their overall business performance. Excerpts of the six interviews are provided below:

The owner-manager of firm A is a female entrepreneur holding a Master's degree, working in Dhaka in a chain of boutique stores. She is familiar with recent developments in the field of ICT, and according to her:

> "The use of advanced technologies like SAP has helped me collaborate with all the branches of my business. It helped me to collaborate with my employees, suppliers, and also with clients in a better way. I started using SAP 2 years back. Though initially, I was a bit reluctant to incur the installation cost as I was not fully sure of its benefits, a friend of mine who is also in business convinced me. As a result, I got visible benefits like better collaboration, better supply and demand forecasting, and overall better productivity."

The owner-manager of firm B is a female entrepreneur holding a Bachelor's degree, working in an agro-based firm with a national presence (head office in Dhaka). She was not earlier

aware of the use of ETs. However, the IT department of her firm convinced her to sell her agro-based output (organic honey) through the website or, in other words, e-commerce. In her own words:

> "Before using e-commerce to sell our organic honey, our business was only limited in some selected cities and districts in Bangladesh. However, after using the e-commerce option, we have expanded our selling to more Bangladeshi locations and abroad. It has helped us establish our brand image and also fulfilled my dream of expanding globally. It was my dream all along to go beyond the outcomes in terms of profitability and numbers. After using e-commerce, I was able to fulfil my dream of expanding beyond my homeland."

The owner-manager of firm C is a female entrepreneur holding a Bachelor's degree, working in the outsourcing sector. To be precise, she is still a student at Master's level and has started an IT outsourcing business located in Khulna. Enabling technologies help her in the following ways:

> "I have always been a technology savvy person partly because I come from a family where both my brothers were always into technology, and my father works in the IT sector. I always wanted to be financially independent and start a business that would not have required me to move around different places because of my family's restrictions. So, I started doing IT outsource work using open-sourced big-data, cloud computing. I started with my two brothers, and now I am employing ten other people and continuing my studies. For the past few years, my business's survival has been my most significant business success, and the fact that we are already profitable is the biggest performance indicator for me. Many women working in my firm were previously unemployed because it was impossible to work outside due to their domestic

responsibilities. However, as they can work from the comfort of their own home for my organization, they can contribute to the economy and their family. In my small capacity, I have been able to empower some women. I consider this the biggest performance or success of my business."

The owner-manager of firm D is a male entrepreneur holding a Master's degree, working in the capital city in a marketing agency (event management and communication). According to him, enabling technologies helped his business, but their effectiveness depends on human resources' technological knowledge. In his words,

> "Undoubtedly, these advanced technologies like ERP, cloud computing are becoming the necessities of business in this modern age. These technologies indeed help the business's overall smooth operation, which helps save costs and increase productivity. However, these technologies are as good as the technological know-how of my human resources. Hence, after installing these technologies, I ensured that the concerned human resource is trained on them."

The owner-manager of firm E is a male entrepreneur holding a Master's degree, working in Khulna in a chain of restaurants. According to him,

> "I believe in the enormous power of these advanced enabling technologies. However, I feel their main contribution lies in providing a platform for effective planning, analysis, and operation. However, effective collaboration is not necessarily created by these technologies. Rather it depends on the soft skill of the concerned persons. For instance, soft skills such as negotiation and communication skills of my employees are more important to create and sustain collaboration capabilities. These advanced technologies can catalyse this process by suggesting the frequency of communication needed and other support information. Moreover, though these enabling technologies can be, in

some instances, copied by my competitors, the technological know-how of my employees and the technologies themselves create such a unique resource for my organization, which is hard to imitate and hard to substitute with other kinds of resources. In such cases, these technologies provide unique benefits for the longer-term. Of course, I make sure I treat my employees well enough that their turnover rate is not too high."

The owner-manager of firm F is a male entrepreneur holding a Higher Secondary degree, working in the telecommunications industry in Khulna. To be specific, he is the owner of several mobile top-ups, phone-fax, and repair shops, and he is actively involved in managing all these shops. According to him,

"In my business, I use a locally developed ERP solution to keep track of my accounting. It also helps me collaborate with all the branches in supply and demand analysis and inventory management. Though I don't always believe this technology helps me collaborate with my suppliers and clients. At best, it helps me collaborate with my employees. It helps the business's daily operation, and it helps me keep accounting on track. These, in turn, have a positive impact on my business performance."

3.5.DISCUSSION AND CONCLUSION

3.5.1. Main findings of the quantitative research

This chapter's primary purpose was to explore how ETs, as a strategic resource, directly and indirectly, contribute to firms' performance. The outcomes show that these two distinct causal mechanisms (direct and indirect paths), resource-picking and capability-building, are complementary. Organisations can increase their CAs and, therefore, their performance by accumulating strategic resources and developing dynamic capabilities (to mediate those

resources). Because of their direct effects on output as per RBV and their indirect effects mediated by dynamic capabilities as per DCV, strategic resources' critical role is, therefore, discussed in this chapter.

The findings also indicate that strategic resources can improve business performance. The results of previous studies also support this finding (Barney, 1986; Dierickx and Pleasant, 1989; Grant, 1991; Ray et al., 2004; Wernerfelt, 1984). To be specific, according to the RBV, for the total sample and also for male and female subgroups, H1, which predicted enabling technologies (ETs) to be positively associated with the performance of SMEs as a strategic resource, is supported. ET resources presumably cannot be imitated by other SMEs and thus would render an SCA. ET tools are relatively new, and SMEs might not have enough time to imitate each other's ET tools (Zhuang and Lederer, 2006). When a firm wants to copy a competitor's ET use, they need to change their ET instruments. Nonetheless, this move can incur costs that outweigh the advantages.

Moreover, to attain the CA of a competing firm, it's not enough to simply copy the enabling technologies; it's also necessary to copy the human resources' knowledge and skillset. Hence, ET tools are heterogeneous, valuable, and challenging to reproduce or substitute with other resources. These findings are consistent with a large number of papers (e.g. Barney, 1991; Chatfield and Bjørn-Andersen, 1997; Mata, Fuerst and Barney 1995; Ross, Beath and Goodhue, 1996) on RBV suggesting the assimilation of the human factors with IT or ICT is necessary to create an SCA. The view that business resources are immobile, heterogeneous, and valuable coincides with this (Zhuang and Lederer, 2006).

H2, which expected SMEs' ICT collaboration capabilities would positively mediate the relationship between ET and SME performance, is supported as per DCV and RBV in the overall samples. The analytical results show that strategic resources are significantly mediated

by dynamic capabilities to increase business performance. However, this is not supported by results in the male subgroup, although the female subgroup supports it. This is in line with a stream of existing literature (e.g. Adeniran and Johnston, 2016; Powell and Dent-Micallef, 1997; Sigala et al., 2004), indicating that rents cannot be created by ICT tools alone. In this context, RBV suggests that a possible source of SCA in the combination of ICT instruments and ICT knowledge. If skilled users and ICT tools are combined, this combination acts as a strategic (VRIN) resource for a firm. Hence, by using ICT, a highly skilled workforce can build a significant CA over less capable rivals by converting computing power into knowledge and skills (Barney, Wright and Ketchen, 2001). From the perspective of dynamic capabilities, ICT collaboration capabilities enhance human resources' expertise by learning internally via initiatives to develop human resources, or externally through a strategic cooperative alliance (Fang and Zou, 2010; Mody, 1993).

Much of the previous RBV literature focused on how various ET resources and capabilities interact to affect business performance ('Bryan' Jean, 2007). For instance, Kim, Cavusgil and Calantone (2006) showed that the integration of Supply Chain Communication Systems (SCCS) is a valuable resource that can increase the supply chain's capabilities in terms of responsiveness, coordination, and information exchange. They also illustrate that this would lead to the superior market performance of the organisation. Similarly, Wu et al. (2006) found that IT alignment and IT advancement for SCCS improve marketing and financial performance by facilitating supply chain capacities. On the other hand, in the field of IS analysis, studies have attempted to create a positive association between ICT capabilities and business performance (e.g. Bharadwaj, 2000; Parida, Oghazi and Cedergren, 2016; Kearns and Lederer 2003). While there has been some progress in this direction, there is still a significant knowledge gap about this relationship, especially in dynamic markets (Stoel and Muhanna, 2009; Wade and Hulland, 2004). However, a few papers, such as one by Sanders and Premus

(2005), report that advances in ICT use (use of ETs) have substantially enhanced the degree of internal and external information sharing in firms via dynamic capabilities like ICT collaboration capabilities. ICT collaboration capabilities, on the other hand, have been positively related to business performance (Bharadwaj, 2000; Kearns and Lederer, 2003) and have shown the ability to provide organisations with a substantial CA (Earl, 1993; Ives and Jarvenpaa, 1991; Kathuria, Anandarajan and Igbaria, 1999).

In SMEs, dynamic capabilities such as ICT collaboration capabilities catalyse efficient use of limited internal ET resources (Parida, Oghazi and Cedergren, 2016). Such dynamic capabilities develop, integrate, and reconfigure strategic resources like ETs to help the firm sustain its CA in an unpredictable environment (Teece, Pisano and Shuen, 1997). SMEs can do this by concentrating on the specific use of the ICT capability components. SMEs that are good at developing and maintaining external connections are likely to have internal processes and routines that enable them to collaborate (Parida, Oghazi and Cedergren, 2016). For instance, SMEs, which can coordinate relationships with different partners in real-time, are likely to use real-time systems and data management systems enabled by ETs (Ozer, 2004). Such activities have a positive effect on the ICT collaboration capability of an organization as they increase knowledge of stakeholders (Ozer, 2004). As small organizations continue to expand their partner network through ETs, the opportunity to search and absorb complementary knowledge is also increased.

RBV and DCV were used in combination to explain H3, which stated the gender of the entrepreneurs moderates the relationship between ET use and SME performance in such a way that ICT collaboration capabilities affect business performance more in female-led SMEs than in male-led ones. This hypothesis is supported by the total sample, and also the male and female subgroups. A stream of literature suggests that females are equally capable as males (Fischer,

Reuber and Dyke, 1993). The proposition explains the observed disparities found in male and female accomplishments. It states that females have less frequently realized their maximum abilities only because they have been deprived of essential opportunities (Fischer, Reuber and Dyke, 1993) such as education, access to advanced ICT technologies like ETs, and necessary training in these ET tools. When these opportunities are available to them, women entrepreneurs catalyse these opportunities with their feminine leadership skills of creating a better collaboration with existing and new partners [103], and hence, show better ICT collaboration capabilities, which eventually lead to superior SME performance. So, the founder's feminine collaborative qualities help those firms with female owner-managers exploit ICT collaboration capabilities to the optimum level and create a more dynamic capability that, in turn, contributes more to the business performance.

Based on the discussion above, the findings of the quantitative analysis of this chapter are summarised below:

The use of the RBV for investigating the association between ET use and business performance in existing IS research has proven inconclusive, with the research model not including firm-level capacities. To enhance understanding of this issue, this chapter has analysed primary data with 302 SMEs using both RBV and DCV to investigate whether the use of ETs as a strategic resource can increase the organization's performance. It was found that the indirect-effect model based on DCV involves dynamic firm-level capabilities (ICT collaboration capabilities) as mediators between organisational resources (use of ETs) and business performance. It can better describe the value of ETs [104] than the direct-effect RBV model (β=1.136, $p<0.05$).

[103] Feminine leadership skills and ET resources create a strategic resource bundle in female-owned SMEs as per RBV.

[104] Sobel test statistics for the mediation effect is 2.10, $p<0.05$.

Moreover, the moderating impact of the gender of the entrepreneurs as a firm-level factor in the indirect effect model has been supported.

3.5.2. Main findings of the qualitative research

From the three female owner-managers' interviews, it was found that ETs helped their businesses have better collaboration with different stakeholders such as employees, suppliers, and customers. All these affected the businesses positively in terms of expansion (nationally and internationally), productivity, and employee empowerment along with profitability.

From the three male owner-managers' interviews, it was found that they acknowledge that ETs positively impacted their business performance in terms of smooth operations, streamlined supply chain, and effective accounting maintenance. However, they agreed that their human resources' knowledge and soft skills on these technologies are as important (if not more) as these enabling technologies in order to create and sustain capabilities like ICT collaboration capabilities. These, in turn, affect different indicators of performance. Moreover, though competitors can try to copy these enabling technologies, the combination of the employees' technological know-how and the technologies themselves create such a unique resource that is hard for others to imitate or to substitute with other resources. In such cases, these enabling technologies can be considered strategic resources of an organization and create firm-specific SCA.

3.5.3. Contributions and implications of research

Several papers have researched the direct relationship between ET use and SME performance (Hagsten and Kotnik, 2017; Popa, Soto-Acosta and Perez-Gonzalez, 2018; Trigueros-Preciado, Pérez-González and Solana-González, 2013). However, very few studies explored the impact of ICT collaboration capabilities on SME performance (Parida, Oghazi and Cedergren, 2016).

This chapter contributes to IS, ICT, and IT literature by exploring the indirect effect of ETs (via ICT collaboration capabilities' mediating effect) on SME performance. Moreover, very few previous results have explored the moderating impact of gender on the relationship between ICT collaboration capabilities and SME performance. Thus, this chapter contributes to the gender literature as well.

Further, the whole analysis has been done from the RBV and DCV perspective. Hence, it contributes to strategic management and strategic entrepreneurship literature. Although many papers have worked on ETs' effect on SME performance, this chapter's results illustrate an approach of considering resources and dynamic capabilities in combination. As CAs result from strategic capital accumulation and dynamic capabilities development, the main question for entrepreneurs remains to find out which resources are strategic resources, and which dynamic capabilities mediate them effectively in competitive environments. The combination of DCV and RBV, rather than either's separate application, should be considered by strategic management.

Also, since this chapter focuses on ET use and SME performance in an emerging economy context, it contributes to the Entrepreneurship and Regional Development literature.

This chapter also has a few significant practical consequences for SME CEOs, managers, and founders (entrepreneurs) apart from the theoretical contribution. First, this chapter supported that ETs can enhance organisational capabilities. Owner-managers should develop ET resources in their organisations and carefully incorporate them in building their core competence.

Second, IT owner-managers should give careful consideration on how to transform ET resources into firm-level capabilities during the assessment of IT investment programs. This chapter shows that compared to ETs' direct effect, ETs' indirect effect has a greater impact on

the organisation's performance. Managers who want to make the most of ETs should also concentrate on turning ET resources into functional capabilities. As Bharadwaj (2000) said, rather than only investing in ETs, organisations should find ways to build capabilities.

3.5.4. Limitations and avenues for further research

There are some limitations to this chapter that provide opportunities for future studies. First, this chapter's sample size may restrict the results' generalizability. Therefore, careful consideration should be given in interpreting and implementing the recommendations. Second, being based on only two cities limits the generalizability of this chapter for Bangladesh overall. Third, though the inclusion of samples in Khulna covers some aspects of rural entrepreneurship, it is predominantly urban sample-based research where rural aspects are not fully covered. Fourth, other factors that potentially mediate the interrelation between ET use and SME performance are not examined in this chapter. Fifth, future studies can examine the moderating effect of other firm-level and external factors (Stoel and Muhanna, 2009; Tan et al., 2010).

Even with these limitations, this chapter remains one of the first to empirically explore the largely assumed relationship between ET use and SME performance and the mediating impact of ICT collaboration capabilities on that relationship. Further, the moderating effect of gender on the relationship between ICT collaboration capabilities and SME performance was explored, which is one of this chapter's original contributions.

3.5.5. Conclusion and implications for the next chapter

The findings of this chapter show that ETs, as strategic resources, generate competitive advantages for SMEs. GPTs, on the other hand, being non-strategic resources, do not generate competitive advantages for SMEs. Existing literature does, however, include some evidence of

certain GPTs impacting SME performance positively, for instance, in regard to communication-related GPTs (Torero and von Braun, 2006; Schware, 2003; Chacko and Harris, 2006). Hence, only communication-related GPTs have been tested as the independent variable in the next chapter (chapter 4). The justification for this is that although all GPTs do not qualify as strategic resources as per the VRIN framework, they are nevertheless essential tools for firms (Agarwal and Audretsch, 2001; Çilan, Bolat and Coşkun, 2009). Their pervasive use across firms may not create a competitive advantage for an SME in all contexts. However, in certain contexts, they might still contribute to an enhanced performance. And this is the topic of exploration in the next chapter.

CHAPTER 4: USING SOCIAL NETWORK THEORY TO INVESTIGATE THE INTERPLAY AMONG COMMUNICATION-RELATED ICT TOOLS, NETWORKING, AND SME PERFORMANCE

4.1. INTRODUCTION

Though not all GPT tools are still capable of bringing about distinguishing performance benefits or competitive advantages to businesses[105], existing literature suggests that some GPT tools are still capable of contributing positively to business performance under certain contexts. Communication-related ICT resources are such examples (Torero and von Braun, 2006; Schware, 2003; Chacko and Harris, 2006).

These communication-related GPT tools have developed rapidly and significantly in recent years, impacting business growth in most countries worldwide, including the emerging economies (Luo and Bu, 2016). According to the International Telecommunications Union (ITU, 2019), the last decade has seen strong growth in worldwide GPT penetration with an increase in all metrics (mobile-cell phone subscriptions, Internet connectivity, mobile and fixed broadband subscriptions). By 2019, mobile-cell subscribers hit 8.3 billion – almost as many as the entire global population (Statista, 2019). Increased Internet connectivity has facilitated the rise of various new forms of information and communication tools, such as social media. These innovations are, in turn, changing the way people live and how businesses operate. For example, businesses and consumers now communicate more frequently via virtual networks (Ramanathan, Subramanian and Parrott, 2017). The Internet and other communication technologies have become convenient platforms for businesses to seek potential clients, partners, and suppliers (Tsiatsis et al., 2018). Ong and Chen (2014) and Barnes (2003) echoed

[105] This was supported in the previous chapter.

this by reporting these communication-related GPT tools' positive contribution to business performance. However, most studies found in the existing literature on this topic were conducted on large firms, while only a limited number focused on small and medium-sized enterprises (SMEs) (Eggers et al., 2017). Hence, a research gap exists regarding the impact of these communication-related GPT tools on business performance in the context of SMEs. Among the limited number of studies exploring the impact of communication-related GPT tools on SME performance, Chen, Jaw and Wu (2016) reported that these tools bring about tangible financial benefits to SMEs. This was echoed by Wang, Pauleen and Zhang (2016), stating that communication-related GPT tools help SMEs communicate with stakeholders and enhance marketing and innovation performance. However, some studies report communication-related GPTs having only marginal effects on SME performance (e.g. Giuri, Torrisi and Zinovyeva, 2008; Thompson, Williams and Thomas, 2013; Parida and Örtqvist, 2015) that fall within the so-called IT-productivity paradox (Brynjolfsson, 1993; Biagi, 2013; Lucas, 1999; Tippins and Sohi, 2003). Given the resource constraints that most SMEs face and the costs associated with investment in communication-related GPTs (Baporikar, 2017; Davidsson et al., 2017), it is crucial to develop a better understanding of how these tools impact business performance.

One reason behind this mixed result[106] could be that the existing literature generally focuses on the direct effects of communication-related GPTs. In contrast, these GPT tools' indirect effects on SMEs' performance are less studied (Tarutė and Gatautis, 2014). Networking by the entrepreneur is one factor that has never been explored as a mediator in the abovementioned

[106] These mixed results range from negative impact (Bauer, Dehning and Stratopoulos, 2012); zero impact (Venkatraman and Zaheer, 1990); a conditional positive impact (Tippins and Sohi, 2003; Wu et al., 2006) and also a direct positive impact (Falk and Hagsten, 2015; Hagsten and Kotnik, 2017; Lopez-Nicolas and Soto-Acosta, 2010; Luftman, Lyytinen and Zvi, 2017; Luo and Bu, 2016).

relationship, though there is evidence in the literature that SMEs use communication-related GPTs for networking, especially in the emerging economies (Luo and Bu, 2016; Zinnbauer, 2007). Existing literature also includes evidence of networking bringing about several benefits to businesses, such as delivering cost-effective access to critical resources not under the owners' control (Florin et al., 2003; Jarillo, 1989; Sheng, Zhou and Li, 2011). So, a research gap exists in this case as well. To address the research gaps mentioned above, an integrated model was used to explore both the direct influence of communication-related GPTs on SME performance and the indirect (mediator) influence through SME owners' networking to enhance our understanding of BVICT. This integrated model can clarify how these communication-related GPT tools influence SME performance (even though they are not strategic resources[107]) and the extent of that influence.

While the arguments for networking seem convincing, and the majority of the current literature is based on the assumption that networking is useful (Havnes and Senneseth, 2001), the current literature demonstrates mixed outcomes regarding the effect of networking on business performance (Stam, Arzlanian and Elfring, 2014). Therefore, another goal of this chapter is to explore the association between the networking activities of owners and SME performance as part of the indirect effect model to deepen understanding of this relationship, especially in the emerging economies context. Further, the impact of gender of the entrepreneurs (firm-level factor) on the relationship between communication-related GPT use and networking by SME owner-managers was also explored, since anecdotal evidence shows that gender of the entrepreneurs impacts GPT use for networking in firms.

[107] Although communication-related GPT tools may not be a strategic resource for all kinds of firms in technologically advanced nations, they are, nevertheless, valuable resources for SMEs, especially in emerging economies.

So, this chapter explores three central research questions:

1. Do communication-related GPTs contribute to SME performance directly?

2. Do different networking aspects by SME owners mediate the relationship between communication-related GPT use and SME performance?

3. Does the gender of the entrepreneurs moderate the relationship between communication-related GPTs use and different networking aspects by the entrepreneurs?

By exploring these questions, this chapter contributes to several streams of literature. First, by exploring this indirect effect of communication-related GPT use on SME performance via the mediating effect of entrepreneurs' networking, this chapter contributes to networking in SMEs and ICT use in SMEs literature. Second, the chapter's study of the direct effect of communication-related GPT use on SME performance also contributes to ICT use in SMEs literature. Finally, very few previous studies have explored the moderating impact of gender of the entrepreneurs on the relationship between GPT use and networking by SME owners, especially in the SME and the emerging economy contexts. Thus, this chapter contributes to the Gender in ICT use in SMEs, SME performance as well as SME entrepreneurship and regional development literature as well.

The chapter is arranged in the following manner: the existing literature is reviewed to integrate diverse independent, dependent, mediator, and moderator constructs used in various studies to develop the research framework in the Literature Review and Research Framework portion. The research technique, data collection, estimation, and analysis approach used for the research is discussed in the Research Methodology section. The research outcomes are reported in the

Results section. The outcomes and limitations of this chapter, as well as implications for future research, are presented in the Discussion and Conclusion section.

4.2. LITERATURE REVIEW AND RESEARCH FRAMEWORK

4.2.1. Social network theory

Over the years, the use of social network theory, also known as social network approach or social network analysis, has increased in the management and organisational sciences (Borgatti and Foster, 2003) due to increased research on various aspects of networks and networking in the management and organisational sciences (Cross, Martin and Weiss, 2006; Cross, Parise and Weiss, 2007). Several proponents of this theory have defined social networks from different perspectives. Although these definitions are broadly similar, they do contain some subtle differences. Some of the relevant definitions are critically analysed below:

According to Tichy (1981) and Brass and Burkart (1992), social network analysis (SNA) is an approach that considers society as a system of actors (e.g. individuals, groups, and organisations) connected by a number of relationships. Laumann and Pappi (1976) and Lazega (1998) similarly defined the social network as a group of nodes (e.g. individuals, organisations, etc.) connected by a group of social relationships (e.g. friendships, formal relationships, etc.). More recently, Lomi and Pattison (2006) described social networking as a set of interconnected relationships between individuals to individuals or organisations to organisations in a social-organisational setting.

From these definitions, it can be understood that the first vital aspect of social networks is their nodes or actors, for instance, individuals, groups, organisations, etc. Another important aspect of a social network is its 'relationships' or 'ties' – the associations among the actors or nodes (Borgatti et al., 2009; Curran, Graham and Temple, 2010). There are diverse ties in a social

network (e.g. family, friends, colleagues, acquaintances, etc.), and the presence or absence of these ties is investigated in the SNA (Tichy, 1981; Brass and Burkart 1992). The SNA also includes analysis of the ties' structure, including network size, centrality, density, frequency (extent of contact among the nodes), activity, and ties' virtual intimacy. Moreover, SNA analyses the ties' antecedents and consequences (Tichy, 1981; Laumann and Pappi, 1976; Nohria, 1992).

The benefits (e.g. access to resources) drawn from these ties are known as social capital (Li, Lin and Huang, 2014; Pena-López and Sánchez-Santos, 2017), which is another critical aspect of social network theory. Some recent definitions of SNA have focused on the interaction or communications between different actors in a social network. For instance, scholars like Borgatti et al. (2009) and Curran et al. (2010) have interpreted social networks as a collection of individual ties or linkages pursuing different kinds of interactions or communications, including work-related ones. Many scholars (e.g. Ahuja and Carley, 1999; Robert, Dennis and Ahuja, 2008) have used this perspective of communications or interactions as the defining features of social networks to analyse virtual networks, virtual work, and virtual teams. In this way, they have analysed diverse kinds of interactions, such as both internal and external communications of organizations. This interaction-based perspective allows a better understanding of how communications by network actors impact organizations' processes and performance (Lamb and Kling, 2003; Reagans, Zuckerman and McEvily, 2004). Hence, this interaction or communications-based view provides a more comprehensive understanding of SNA than earlier definitions. The following sets of questions can help us understand the interaction aspects of SNA more deeply by comparing the relative behaviours of actors (Iacobucci and Hopkins, 1992:5):

1. 'Which actors have the most ties with other actors?'

2. ‘Which actors are most active in their relationships?’
3. ‘Which actors have the most critical position in the network?’

Some key structural components of a social network, including the volume or size of the network, its frequency of use (or density), and the centrality position can be used to address these questions sequentially. This is further explained in the subsequent paragraphs of this section.

Since this chapter is based on how communication-related GPT tools affect SME performance via networking, the communication aspects of SNA is the prime focus in this chapter. To be specific, the abovementioned three dimensions[108] of networking (network size, frequency of using the network, and network centrality) as mediating constructs have been used to explain how communication-related GPT tools’ use as the independent construct affects the dependent construct SME performance.

Seibert, Kraimer and Liden (2001) defined network size as the total number of actors with whom an individual is associated. Krackhardt (1990) claims that the frequency of using the network (network density) measures the degree to which members of the network communicate with each other, that is, the average level of interaction between network actors. Network centrality refers to the level of the focal actor’s strategic position in the network (Freeman, 1978; Gnyawali and Madhavan, 2001); an individual with high centrality would occupy a more strategic position in the network than an individual with low centrality. The focal actor

[108] A prime focus of social network analysis is to analyse the network structure (Wellman and Berkowitz, 1997). Analysis of social networks is quantitative and requires relational databases. That is, the structure is derived from the relationship patterns between social entities, such as individuals, groups, or organisations. For instance, network structure could involve the size of a network (e.g. “how many close friends do you have?’’) or the contact frequency (e.g. “How many times per month do you have dinner with close friends?’’). Questions might include the network centrality characteristics (i.e. social support or the resources (social capital) that an actor with a central position receives from that network) (Hawe, Webster and Shiell, 2004). Hence, in this chapter, we have covered not only the network composition-related constructs (i.e. network size, frequency of using the network) but also the position of an actor within the network (network centrality characteristics).

maintains the strategic position [109] in the network, being involved in numerous ties simultaneously (Wasserman and Faust, 1994). Along these lines, Sparrowe et al. (2001) defined network centrality in the context of human-to-human interaction. They reported that network centrality is the degree to which a network member is linked with other members. They also indicated that network centrality is a structural resource related to control, innovation, and decision-making. Furthermore, they pointed out that the more central the network position, the more access to network resources and knowledge. Higher network centrality also makes it easier to establish good social relations with other network members.

All the above-mentioned dimensions (i.e. network size, frequency of using the network, and network centrality) of a network help actors within that network optimise their social capital. This is in line with the definition of individual social capital of Pena-López and Sánchez-Santos. According to them, "individual social capital is the network of relations that a specific subject has, and its value lies in the resources he or she can draw from them" (2017:1). For instance, a larger network provides a greater likelihood of obtaining higher social capital. Hence, individual network members (nodes/ actors) on these platforms show a keen interest in enlarging their social networks to receive more benefits (higher social capital) from a greater number of social relationships (Tsai et al., 2012). Similarly, more frequent use of network results in higher social capital by inducing mutual trust, cooperation, and reciprocity amongst network actors (Coleman, 1988; Krackhardt, 1992). Network centrality, likewise, has a positive impact on social capital. For instance, a central position in the network provides a firm with opportunities to access diverse knowledge. Sometimes this knowledge is new, which helps

[109] Strategic position in a network refers to a position that provides the focal person access to strategic and operational know-how and information (Baum and colleagues, 2000; Koka and Prescott, 2002). "The greater the information, the higher the opportunity set" (Gulati, 1999: 399). The focal actor is likely to discover these opportunities as he/she has more exposure to diverse ideas, initiatives, and developments by being the centre of many relationships.

firms develop new products and ideas (Tsai, 2001). It is worth mentioning that social capital has a positive impact on firm performance; the higher the social capital, the more probability of a firm's positive financial payoff (Lins, Servaes and Tamayo, 2017).

4.2.2. Communication-related general purpose technologies (GPTs) and SME performance

Communication-related GPT tools such as mobile phones, the Internet, and social media provides individuals with more opportunities to be involved in social networks. For instance, virtual networks allow people to be connected and interactive (Cheung, Chiu and Lee, 2011). Thus, it provides individual network members the opportunity to maximize benefits from their social relationships (also known as social capital) (Pena-López and Sánchez-Santos, 2017).

These benefits are numerous and applicable to both business-to-business (B2B) and business-to-consumer (B2C) in most cases. For instance, communication-related GPT tools enhance external communications and service quality for existing and new customers. Moreover, the use of these ICT tools facilitates the management of information and knowledge within an organisation. Furthermore, these tools minimise transaction costs and improve the speed and efficiency of transactions in firms (OECD, 2004).

These tools also render several benefits to SMEs[110]. SMEs, especially in emerging economies, face the formidable challenge of surviving and competing in a global marketplace. As one of the key catalysts of globalisation, these simple ICT tools can provide SMEs a range of benefits (social capital) by increasing accessibility of information and knowledge, which is considered vital for SMEs to attain success in the global market (Child and Hsieh, 2014). Other ways communication-related GPTs bring benefits to SMEs include streamlining business

[110] Since SMEs are a specific focus of this chapter, this separate literature review on the impact of communication-related GPT tools on SME performance has been conducted in this paragraph.

communication, lowering expenses as well as improving responsiveness, decision-making, flexibility, and efficiency (Torero and von Braun, 2006; Schware, 2003; Chacko and Harris, 2006). Also, through the effective use of communication-related GPTs, SMEs are able to promote their goods to foreign markets and compete effectively with larger companies (Ramsey et al., 2003). All these process-related benefits bring about financial benefits for SMEs (Lins, Servaes and Tamayo, 2017).

Based on the above review, the following hypothesis is proposed to explore the direct influence of communication-related GPTs on SME performance:

H1: The use of communication-related GPT tools affects SME performance positively.

4.2.3. Mediating impact of networking by SME founders and its impact on the relationship between GPT use and SME performance

4.2.3.1. The concept of networks and networking

Networks are abstract notions, and they can be difficult to scrutinise because of unique patterns of interconnection among different ties and the reluctance of network members to disclose their contacts or discuss the nature of their association with other individuals in the network (Birley, Cromie and Myers, 1991). In the business context, personal networks[111] are the relationships and contacts between entrepreneurs and others (Burt, 1992). Such contacts are prospective sources of CA to the extent that they provide the means to identify, obtain, and utilize resources optimally. Social networks' significance has been ascribed to the access they provide to resources or emotional support (see, for instance, Birley, 1985; Lin, 1982).

[111] Though different kinds of networks exist, we are only focusing on the entrepreneurs' personal networks.

4.2.3.2. Impact of communication-related GPT tools on networking by SME founders

Increased networking in a global economy is attributable to the increasingly widespread use of ICT, particularly communication-related GPT tools (Tapscott and Williams, 2006), which catalyse the linkage of individuals and firms (Levine et al., 2000; Tsui, 2009). The Internet-based economy (Ticoll et al. 1998) depends on the correct set of links between individuals and firms.

Communication-oriented GPT instruments facilitate networking among firms (Bauer, Grether and Leach, 2002; Mansell, 1999; Sigala, 2007; White and Daniel, 2004) but are less developed in emerging economies than developed economies (Chang et al., 2015; Lai, 2019). For example, in most cases, Internet speeds are faster in developed economies than in emerging economies; the 55.18 Mbps average Internet speed of Sweden compared to the 2.72 Mbps average Internet speed of Bangladesh, for instance (Lai, 2019). Firms in an emerging economy can nevertheless gain significant advantages by networking efficiently (Nawinna and Venable, 2019). Facilitated by the use of communication-oriented GPTs, a manufacturing site's networking capacity improves inter-organization collaboration. Furthermore, GPT-oriented firms can collaborate virtually with other firms (Filos, 2005).

Significantly, the use of these GPTs contributes to the growth of social network size (Schwanen and Kwan, 2008; Aguiléra, Guillot and Rallet, 2012). By expanding the capacity of human interaction (Katz, 2002), communication oriented GPTs might also catalyse the frequent use of simple communication methods over time and space between partners (Yang, 2005). For instance, cellular communications, the Internet, and social networks help individuals overcome spatial separation (Kakihara and Sorensen, 2002). According to Durugbo (2016), these GPTs also help develop networking infrastructure, for instance, Inter-Organizational Systems (IOSs hereafter). IOSs act as a basis for collective action (Leana and Van Buren, 1999; Crona, Gelcich

and Bodin, 2017) by forming social capital (Calabrese and Borchert, 1996). When integrated with social network theory, social capital (being a multidimensional as well as a relational concept) acts as an effective analytical tool for networking studies (Ahuja, 2000; Borgatti and Everett, 1997; Borgatti and Foster, 2003; Borgatti et al., 2009; Cross, Borgatti and Parker, 2002; Gulati, 1998; Walker, Kogut and Shan, 1997). Along with IOS, numerous other communication-related GPT tools are well known catalysts for social capital growth (Huysman and Wulf, 2006; Reich and Kaarst-Brown, 2003; Shah et al., 2005; Steinfield, 2004; Williamson, 2004).

Furthermore, in the ICT network, those companies with more ICT (GPT) use are more central (Arling and Subramani, 2011). These GPTs can make a significant contribution to linking individuals, SMEs, support systems, and institutions (Ritchie and Brindley, 2005), and to catalyzing the development of "virtual stakeholder communities" that create and exchange knowledge, information, and expertise (Chaparro, 1999).

4.2.3.3. Impact of networking by SME founders on SME performance

A significant number of academics have recognized the network's significance as a resource for business development and growth. In his seminal papers, Granovetter (1973, 1985) indicated that any economic entity is linked to personal networks and these personal networks or social associations between firms remain vital (Granovetter, 1985). Johannisson and Nilsson (1989) stressed the significance of networks in the successful development of an enterprise. These networks are more widely utilized and have a greater effect in emerging economies (Chuang and Schechter, 2015), which frequently lack other business support such as formal infrastructure and institutional support (Puffer, McCarthy and Boisot, 2010).

In support of the above proposals, and despite Aldrich and Reese (1993) and Cooper et al. (1994) not discovering any significant association between networking and business

performance, a stream of literature has documented a positive link between networking and business performance.

Network size is an important indicator of business performance as per network literature. Hansen (1995) demonstrated that there is a favourable connection between network size and business performance. Likewise, Coviello (2006), Goerzen and Beamish (2005), and Lechner et al. (2006) noted that large networks have a favourable effect on business performance due to the increasing number of ties as well as sharing critical information, resources, and control within those ties. Additionally, network use frequency is positively associated with business performance (West and Noel, 2009); frequent and close collaboration with external and internal stakeholders is an important factor in determining business performance (Littler, Leverick and Bruce, 1995). In the case of SMEs, collaboration resulting from networking leads to reduced costs, improved efficiency, and improved cycle time in firms (Banker, Bardhan and Asdemir, 2006), which has a positive impact on SME performance. Besides, previous studies have empirically evaluated the significance of network centrality in business performance (Powell et al., 1999; Surin and Ab Wahab, 2013). In the current literature, network centrality is regarded as essential to shorten the gap between network relationships and to allow resource exchange at minimal cost (Powell et al., 1999; Surin and Ab Wahab, 2013). Therefore, obtaining a central position in the social network would enhance the likelihood of improved business performance (Sparrowe et al., 2001). Considering the logic put forward for networking and the evidence available to date, it would be sensible to expect surviving and thriving SMEs to be more engaged in networking than failed or less efficient SMEs.

The following 2nd set of hypotheses are suggested considering the above review:

H2: The networking of the entrepreneur positively mediates the relationship between communication-related GPT use and SME performance.

H2a: The network size of the entrepreneur positively mediates the relationship between communication-related GPT use and SME performance.

H2b: The entrepreneur's frequency of network use positively mediates the relationship between communication-related GPT use and SME performance.

H2c: The network centrality characteristics of the entrepreneur positively mediate the relationship between communication-related GPT use and SME performance.

4.2.4. The influence of firm-level factors on the relationship between communication-related GPT and networking by SME Founders

Anecdotal evidence shows that the relationship between the use of communication-related GPT tools and networking by entrepreneurs is affected by many firm-level factors such as age, level of education, ICT training, and available ICT infrastructure. The gender of the entrepreneur is another factor that is less studied in the abovementioned relationship, but which has a considerable impact according to anecdotal evidence.

Scholarly research shows differences in technology use between men and women (Kimbrough et al., 2013). Women are typically more frequent users of GPT-facilitated communications tools than men. For instance, women use text messages, social media, and video calls more frequently (Kimbrough et al., 2013). Empirical research also indicates that social media was used by 6% of women and 8% of men in 2005. However, women started using social media at rates significantly higher than men at the beginning of 2009. Nowadays, 62% of men and 68% of women use social media, which is not a statistically significant difference (Perrin, 2015).

Weiser (2000) hypothesized that in the past, women might have less access to computers or less need for them than men. Fallows (2005), more recently, has stated that there is no longer a significant gender gap in total Internet usage, but rather variations in the utilisation of online

time. For instance, women tend to use the Internet for social networking and maintaining relationships, whereas men tend to be engaged in more task-based activities[112] online. These findings indicate that women have established preferences for text-based interactions over the years. Women have been using e-mail more than men in terms of usage and engagement. Women also tend to use e-mail to manage relationships and spend more of their online time e-mailing family and friends than men do. That women use these tools for social purposes to a greater extent than men suggests a similar potential difference between male and female entrepreneurs in the extent to which these tools are used for business purposes. The use of GPT-mediated communication by women for social purposes suggests women are more likely to add members to their network, as communication-related GPT tools provide a platform to increase network size (Agoso, Abbas and Naughton, 2011). Women also engage in frequent communication within these networks, which suggests more frequent engagement with overall networking (Fallows, 2005). Finally, by using these tools for relationship building, women form a trusting relationship with network members and in turn, develop social capital[113]. And building social capital through networking and gaining a central position are closely related (Pena-López and Sánchez-Santos, 2017).

The following 3rd set of hypotheses are suggested considering the above review:

H3: Gender of the entrepreneurs moderates the relationship between the use of communication-related GPTs and networking by entrepreneurs favouring female entrepreneurs.

[112] Task-based activities such as reading the news and providing financial information.

[113] Strong relationships lead to trust, which is a central component of social capital (Pena-López and Sánchez-Santos, 2017).

H3a: Gender of the entrepreneurs moderates the relationship between the use of communication-related GPT tools and network size of entrepreneurs favouring female entrepreneurs.

H3b: Gender of the entrepreneurs moderates the relationship between the use of communication-related GPT tools and the frequency of using networks by entrepreneurs favouring female entrepreneurs.

H3c: Gender of the entrepreneurs moderates the relationship between the use of communication-related GPT tools and network centrality characteristics of the entrepreneurs favouring female entrepreneurs.

Based on the above review, the following research model is proposed for this chapter:

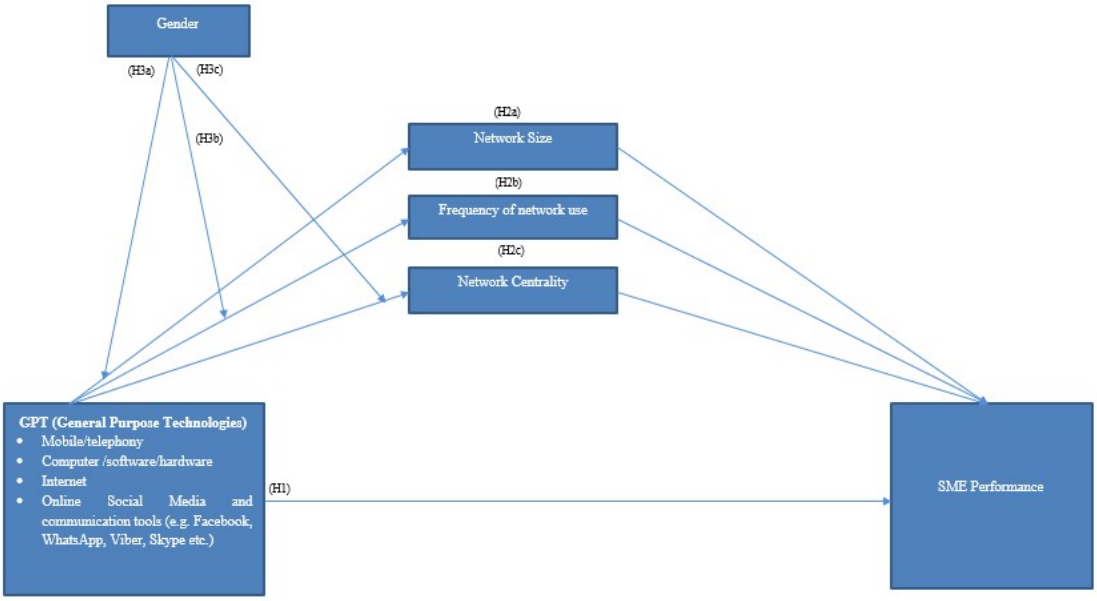

Figure 4.1: Research model

4.3. *RESEARCH METHODOLOGY*

4.3.1. Sample and data collection

The questionnaires were administered to owner-managers of SMEs of two different cities (capital and non-capital) in Bangladesh. Two research assistants were employed who sought the entrepreneurs' consent to administer the questionnaires. After obtaining consent, the face-to-face survey was conducted. As stated previously, 302 completed questionnaires were received from a sample size of 350. This gap was created due to non-response caused by the refusal of respondents to participate in the survey and ineligible respondents who were 48 in number. This accounts for an 86.29% response rate, which is a reasonable response rate, according to Saunders et al. (2012).

It is worth mentioning here that data was collected through a field survey with a decent sample size in order to carry out a comprehensive test of the instrument. Data collection was restricted to SMEs based in just two cities in Bangladesh following studies that support such restrictions to control for confounding variables through study design (Aschengrau and Seage, 2009; Pfeffer, 1977; Pourhoseingholi, Baghestani and Vahedi, 2012). Thus this thesis controls for confounding by firm size and location.

As mentioned earlier, firms with a maximum of 250 employees (SMEs) were included in the sampling. This is in line with the Central Bank of Bangladesh's definition of an SME (2011), as well as Taylor and Banks (1992), and Cardon and Kirk (2015). In terms of sampling technique, around 50% of firms were selected from Dhaka and the other 50% from Khulna. The firms were all randomly selected using data from the registers of the Chambers of Commerce and Industries in both cities. This was done to avoid sampling bias. Around 50% of the samples were taken from female-owned firms and the other 50% from male-owned firms. The entrepreneurs surveyed were from 13 different industries where each industry had the same

number of entrepreneurs (details provided in the last chapter). Table 4.1 shows other characteristics of the sample.

Entrepreneur's age	%	Number of children	%	Firm Age (in years)	%	Number of dependent	%	Hours per day dedicated for business by the entrepreneur	%	No. of employees	%	Help at home	%	Bachelor's degree	%
Up to 25 years	11.92	0	41.06	1-5	57.62	0	31.13	Up to 4 hours	13.58	1–99 (Small Enterprises)	98.01	Yes	77.81	Yes	29.14
26-30	20.53	1	23.51	6-10	21.52	1-2	43.05	5-8	32.45	100-250 (Medium Enterprises)	1.99	No	22.19	No	70.86
31-35	28.43	2	28.81	11-15	9.27	3-4	21.86	9-12	42.05	**Total**	**100**	**Total**	**100**	**Total**	**100**
36-40	16.93	3	4.64	16-20	6.29	5-6	3.30	13-16	10.06						
41-45	8.94	4	1.32	21-25	2.32	7-8	0.33	17-20	1.32						
46-50	5.97	5	0.33	26-30	1.66	9-10	0.33	**Total**	**100**						
51-55	2.98	6	0.33	31-35	1.32	**Total**	**100**								
56-60	1.98	**Total**	**100**	**Total**	**100**										
Beyond 60	2.32														
Total	**100**														

Table 4.1: Sample characteristics (N = 302)

The ethical issues related to the administration of the questionnaire were managed as per the university guidelines. As previously stated, informed consent was ensured by obtaining consent from the SMEs' entrepreneurs, who were the survey participants. A copy of the cover letter and a questionnaire were shared with each participant. The questionnaire also included a short introduction that indicated the intent and confidentiality of the survey. No questions regarding the identity of the participants were asked to ensure anonymity. It was also explicitly stated that the data obtained will only be used for academic purposes and will only be accessed by the researcher.

4.3.2. Measures

Constructs and measurements were developed in two ways, in consideration of the exploratory nature of this chapter. First, measures were accepted and followed for variables used in prior research so long as they could provide acceptable measurement standards with minor wording adjustments to improve their applicability in the Bangladeshi context. Second, this research established operational measures based on previous conceptual studies for variables not used in prior researches and ensured content validity through interviews with ten SME entrepreneurs and four scholars. The entrepreneurs and the scholars were sampled as per convenience sampling (Churchill and Brown, 2004). The constructs of this chapter are described below:

Communication-oriented GPT use was used as the independent variable in both the direct and indirect effect models, and it included the use of GPT tools such as mobile, telephone, basic computer, software, hardware, the Internet, broadband, social media, Internet communication tools (e.g. Viber, Skype, and WhatsApp), and company website. This group refers to any GPT resources that can be used to strengthen communication for business purposes. This is a firm-level dummy variable taking the value of 1 if a firm has used any GPT tools and 0 otherwise.

On the other hand, the dependent variable of our model is the SMEs' business performance (annual business revenue). Yearly revenue is, in most cases, used by the owners of firms to assess firms' business performance because the revenue is the most crucial measure of a firm's profitability, as profit generation is one of the primary purposes for any firm (Armstrong et al., 2011; Jegadeesh and Livnat, 2006; Singh et al., 2016). That's why firms' yearly revenue is one of the best measures of business performance in firms. It is worth mentioning that not all SMEs in this sample are publicly traded. Moreover, it was anticipated that the respondents would be reluctant to provide precise financial information. Consequently, performance-related self-reports were used (Dess and Robinson, 1984). To be specific, the self-reported annual revenue of SMEs[114] was recorded in 2017 and measured in the currency of Bangladesh (Bangladeshi Taka aka BDT[115]). This variable was log-transformed to achieve normality. For the measurement of gender, the female was coded as 0 and the male as 1 (Nowiński et al., 2019).

The entrepreneur's network size, entrepreneur's frequency of using the network, and network centrality characteristics have been used as the mediators. According to Seibert, Kraimer and Liden (2001), network size reflects the total number of actors an individual is linked with. Network size analyses the degree of accessibility of resources at the entrepreneur level, as the larger the network size, the more likelihood of access to a larger pool of resources (Aldrich and Reese, 1993; Hansen, 1995).

It is worth mentioning that the monthly frequency of using networks was used to calculate the frequency of using networks by the entrepreneur (adapted from Berrou and Combarnous, 2012 and Neergaard, Shaw and Carter, 2005). This frequency of using networks, also known as

[114] This is in line with Armstrong, Core and Guay (2014) and Jegadeesh and Livnat (2006).

[115] US Dollar (USD) to Bangladeshi Taka (BDT) average exchange rates for 2017 was: 1 USD= 81.1892 BDT (Exchangerates.org.uk, 2021). Since the SMEs' annual revenue of 2017 was considered, the average exchange rate of that year is mentioned here.

contact frequency, is considered one of the three factors defining intensity (tie strength) in the social network literature. The other two factors in measuring intensity are friendship and reciprocity of favours and responsibilities (Granovetter, 1973). The abovementioned three elements of intensity (i.e. contact frequency, relationships, and reciprocity) are strongly linked in practice, and the network literature has used contact frequency as a surrogate for the other two elements of intensity (Nelson, 1989). A high frequency of contact was discovered to be accompanied by reciprocity and friendship. Hence, the frequency of contact was used as the only gauge of intensity by Granovetter (1973) in his seminal work on weak ties.

The final mediator is network centrality. This measure indicates the ability to access (or control) resources via both direct and indirect connections in a network due to an individual's strategic position in that network. Put differently, it demonstrates the actors' capacity to "reach" others in their network with the help of intermediaries (Hoang and Antoncic, 2003). Due to the difficulty of obtaining relationship information from the actors in a network (Hoang and Antoncic, 2003), network centrality has generally been less studied than network size. Researchers defined different degrees of resource access by evaluating interpersonal and inter-organizational network centrality (Brajkovich, 1994; Powell et al., 1996; Johannisson et al., 1994). The network centrality measure in this research was evaluated using eleven items on a 5-points Likert scale, where 1 indicated strong disagreement, while 5 points indicated strong agreement. This scale was adapted from Freeman's (1979) "betweenness" measure, which indicates "the frequency with which a point falls between pairs of other points on the shortest paths connecting them. An (actor) that falls on the paths between other (actors) exhibits a potential for control of their resources such as communication" (Freeman, 1978:221).

It is noteworthy that, with the Cronbach alpha value of 0.914 (details are given in table 4.3), this scale showed high reliability. The pre-testing of the scale on a convenience sample of

SMEs resulted in slight wording changes. Moreover, the principal components factor analysis results show that ten out of eleven items gained factor loading more than 0.40 and loaded under the same factor (Hinkin, 1995; Prasad, Ramamurthy and Naidu, 2001; Stevens, 2012). Hulland (1999) suggested that items with loadings less than 0.4 should be dropped, as they add little explanatory power to the model and bias parameter estimates. Hence, one item with a factor loading lower than 0.4 was dropped to ensure item reliability (details are given in Appendix H).

4.3.3. Methodology

Data were analysed applying Structural Equation Modelling (SEM) in STATA 12. To be specific, path analysis has been used, which is a subset of Structural Equation Modelling (SEM).

4.3.3.1. Structural Equation Modelling (SEM)

Various mathematical models, statistical methods, and computer algorithms are included in Structural Equation Modelling (SEM hereafter) (Kaplan, 2008). According to Ullman and Bentler (2003: 661), "Structural Equation Modelling (SEM) is a collection of statistical techniques that allow a set of relationships between one or more independent variables (IVs), either continuous or discrete, and one or more dependent variables (DVs), either continuous or discrete, to be examined. Both IVs and DVs can be either factors or measured variables. SEM allows questions to be answered that involve multiple regression analyses of factors.'' The popularity of Structural Equation Modelling over time is due to its ability to account for measurement errors, which are widely known to be present in the field of psychological and social science research (Raykov and Marcoulides, 2006 cited in Harrington, 2008).

SEM is also known as causal analysis, causal modelling, simultaneous equation modelling, analysis of covariance structures, etc. SEM also includes partial least squares structural equation modelling, latent growth modelling, confirmatory composite analysis, confirmatory factor analysis, and path analysis (Kline, 2011). The latter one is a special SEM which, in its simplest form, explores the relationship between a single measured dependent variable and other measured independent variables (Ullman and Bentler, 2003).

4.3.3.2. Model Fit

After the specification of the model and completion of the estimates, it is critical to evaluate the relationships' overall adequacy. It is also essential to assess whether the model fits the data (Hoyle, 2000). Several indices have been proposed to determine this model fit. These indices are grouped into two categories: Absolute and comparative fit indices. Some of the commonly used absolute indices include chi-square (X^2), Standardized Root Mean Square Residual (SRMR hereafter), and Root Mean Square Error of Approximation (RMSEA hereafter). On the other hand, the Comparative Fit Index (CFI hereafter) and the Non-Normed Fit Index (NNFI hereafter) or Tucker Lewis index are examples of the comparative fit indices. These indices will be discussed subsequently:

- **Chi-square (X^2)**

The chi-square test assesses the inconsistency between the sample and the covariance matrices. It is a test for evaluating the statistical significance and depends on assumptions like sample size and normality (Hooper et al., 2008). Though the chi-square is a good model fit indicator, the assumptions that must be met for a test to be seen as valid are mostly not met in reality (Hoyle, 2000).

- **Root Mean Square Error of Approximation (RMSEA)**

Steiger and Lind (1980) first introduced this index (Browne and Cudeck, 1993, cited in Yu, 2002). It indicates how well the parameter estimates and population covariance matrix fit together. RMSEA has the advantage of allowing the confidence interval to be calculated around its value because it knows the value of the distribution of the statistics. The suggestion is that an RMSEA index that is greater than 0.1 indicates a model with a poor fit, an index ranging from 0.05-0.08 is considered to have a fair fit, and the index of values less than 0.05 is deemed to be a good fit (Browne and Cudeck, 1993 cited in Yu, 2002).

- **Comparative Fit Index (CFI)**

Bentler (1990) first introduced this index (cited in Hooper et al., 2008). The CFI argues that the latent variables in the model (e.g. null or independence model) are uncorrelated. It also makes a comparison between the sample covariance matrix and the null model. This index has become one of the most widely used and acceptable indices to assess model fit because it is least affected by sample size. According to this index, a good fit is achieved when the CFI is equal to or greater than 0.90 (Hooper et al., 2008).

- **Non-Normed Fit Index (NNFI):**

NNFI is an incremental fit index not using chi-square in its raw form but comparing the value to a null model. A significant drawback of chi-square is its sensitivity towards the sample size, which underestimates the model fit for sample sizes below 200. In other words, poor models are likely to be accepted by the chi-square test in the case of small samples, which is a Type II error (West, Taylor and Wu, 2012). However, the NNFI index corrected this problem, supporting simpler models (Hooper et al., 2008). The NNFI cut off value is set at ≥ 0.80 as the lowest value, and values closer to 1.00 are considered a good fit.

4.3.3.3. Mediator analysis in SEM

The SEM command (estat teffects[116]) was used in STATA 12 to assess whether three dimensions[117] of networking by the entrepreneur could mediate communication-related GPTs' association with SME performance.

4.4. RESULTS

Table 4.2 shows the mean, standard deviation, and correlation coefficient for constructs used in the chapter. The mean for the business performance measure for SMEs is 14.158. Among the correlation coefficients, the correlation between the entrepreneur's network size and the monthly frequency of using networks is the highest (0.640*[118]). It suggests that this chapter's constructs are distinct both conceptually and empirically (Wang, Lo and Yang, 2004). The Network Centrality construct indicates acceptable reliability with the Cronbach's alpha value exceeding 0.80 (Hair et al., 2006) (details are given in table 4.3).

[116] It is an SEM command for mediation analysis in STATA.

[117] As mentioned earlier, these networking dimensions include the entrepreneur's network size, frequency of using networks, and network centrality characteristics.

[118] It is within the acceptable range of being under 0.7 (Deborah, 2019), indicating no multicollinearity between the predictors.

	Mean	SD	1	2	3	4	5	6
1.Business Performance	14.16	1.80	1.00					
2.Use of GPT	4.17	1.16	0.29*	1.00				
3. Network size of the entrepreneur	43.34	10.76	0.01	0.07	1.00			
4. Monthly frequency of using networks	6.86	0.62	0.06	0.10	0.64*	1.00		
5.Network centrality characteristics of the entrepreneur	0.98	0.41	0.02	0.00	0.33*	0.29*	1.00	
6.Male entrepreneurs	0.50	0.50	0.19*	-0.03	-0.06	0.11	-0.05	1.00

*** p<0.01, ** p<0.05, * p<0.1

Table 4.2: Descriptive and correlation statistics

Construct	Measures	Acronym	Cronbach's alpha
Network Centrality[119]	The frequency of connecting actors in the participant's network for business purpose.	Biz	0.914
	The frequency of connecting actors in the participant's network for social purpose.	Social	
	The frequency of connecting actors in the participant's network for sharing ideas.	Ideas	
	The frequency of connecting actors in the participant's network for sharing knowledge.	Knowledge	
	The frequency of connecting actors in the participant's network for sharing opinion.	Opinion	
	The frequency of connecting actors in the participant's network for sharing opportunities.	Opportunities	
	The frequency of connecting actors in the participant's network for advice.	Advice	
	The frequency of connecting actors in the participant's network for generating referrals.	Referral	
	The frequency of connecting actors in the participant's network for getting motivated.	Motivation	
	The frequency of connecting actors in the participant's network for solving particular problems.	Solution	
	The frequency of connecting actors in the participant's network for other purposes. †	Others	

† Dropped item (Hulland, 1999)

Table 4.3: Constructs and measures

[119] Since there is one latent variable in this chapter, the average of this variable's items has been used to represent "Network Centrality" in the path diagram following Lin and Wu (2014).

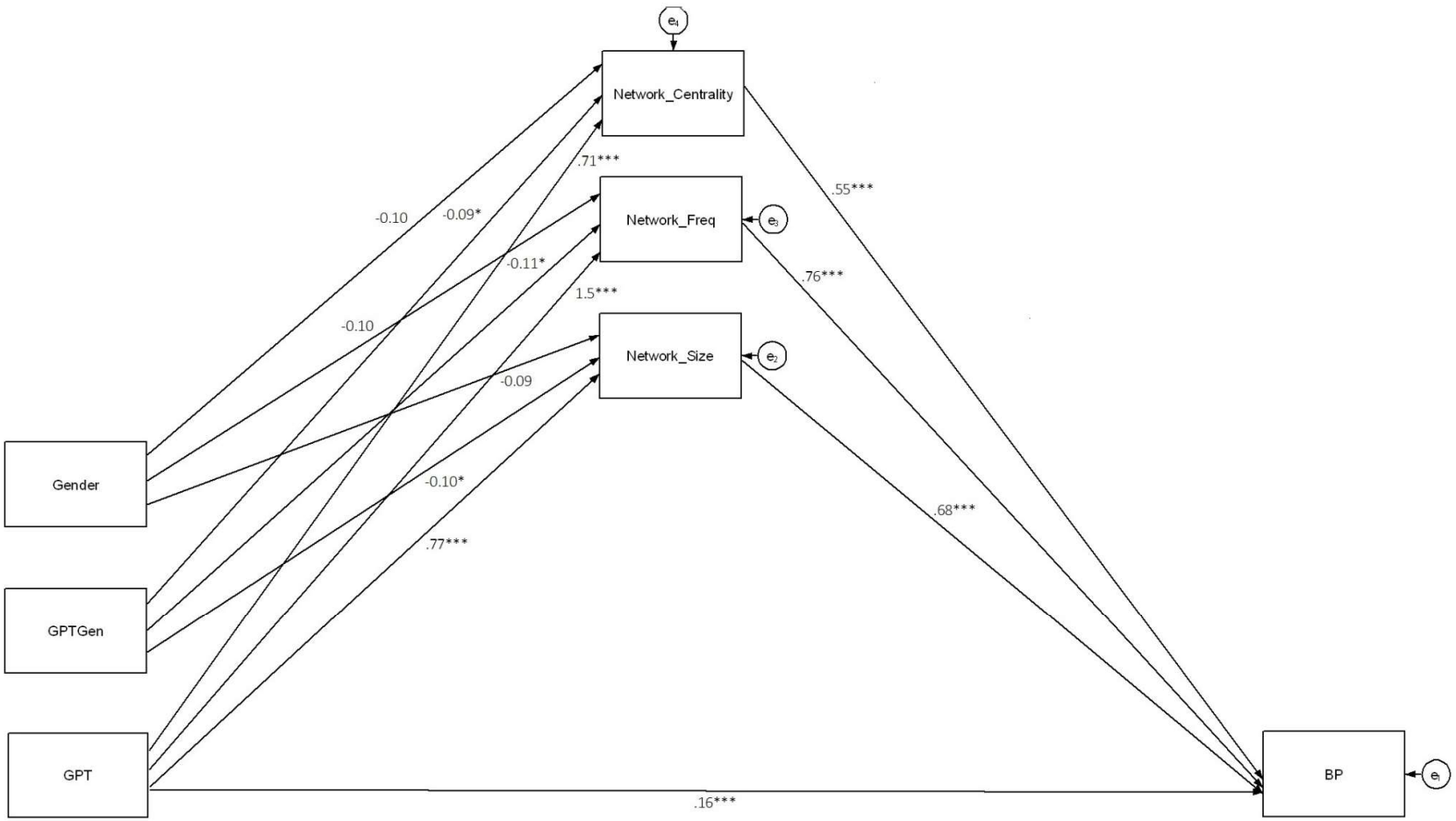

Figure 4.2: Path diagram of the research model

	Hypothesis path	Path coefficient(β)	p-Value	Decision	Fit indices
H1	GPT→BP[120]	0.161	0.001***	Supported	
H2a	GPT→BP via network size of the entrepreneur	0.524	0.001***	Supported	
H2b	GPT→BP via entrepreneur's frequency of using networks	1.14	0.000***	Supported	
H2c	GPT→BP via network centrality characteristics of the entrepreneur	0.391	0.006***	Supported	p-value of Chi square = 0.231; SRMR = 0.031; TLI = 0.994; CFI = 0.977; and RMSEA = 0.039
H3a	Gender* GPT → network size of the entrepreneur	-0.104	0.075*	Supported	
H3b	Gender* GPT → entrepreneur's frequency of using networks	-0.114	0.051*	Supported	
H3c	Gender* GPT → network centrality characteristic of the entrepreneur	-0.094	0.085*	Supported	

*** p<0.01, ** p<0.05, * p<0.1

Table 4.4: Outcomes of hypotheses test

[120] BP stands for Business Performance in this thesis.

This research examined the data based on SEM (path analysis) to capture the theoretical interdependencies between communication-related GPT use, networking by entrepreneurs, and business performance. Path analysis is an appealing option for testing mediating variables because all related mechanisms (paths) are directly analysed in one single model (Edelman et al., 2005). Moreover, path analysis is typically used in studies where the use of complete structural equation models is limited by small sample sizes (Chaudhuri and Holbrook, 2001). Since this chapter is based on mediation analysis, and the sample size is not very large, path analysis was conducted for hypothesis testing. Another reason for using path analysis was the predominantly measurable nature of our model's variables (Wolfle, 2003).

The structural model report that the direct effect of communication-related GPT tools on SME performance is positive and significant (β=0.161, $p < 0.01$). Hence, H1 is supported. The structural model also shows that the indirect effects of communication-related GPT tools on SME performance via networking mediators are positive and significant. Therefore, H2 is also supported. To be specific, H2a states that the entrepreneur's network size positively mediates the use of communication-related GPT tools and SME performance relationships, and it is supported (β=0.524, $p < 0.01$) by the SEM mediation test. Likewise, H2b is supported (β=1.14, $p < 0.01$), which states that these GPT tools and SME performance relationships are positively mediated by the entrepreneur's monthly frequency of using networks. Similarly, H2c, which states that the entrepreneur's network centrality characteristics positively mediate these GPT tools and SME performance relationships, is supported (β=0.391, $p < 0.01$).

The structural model outcomes also support H3, which states that the entrepreneur's gender moderates the relationship between the communication-related GPTs and networking by entrepreneurs favouring female entrepreneurs. To be specific, the results report that the gender of the entrepreneurs moderates the relationship between the use of communication-related GPT

tools and the network size of entrepreneurs in a negative but significant manner (β=-0.104, p <0.1). It implies that female entrepreneurs' use of these tools results in a larger network than male entrepreneurs. Therefore, H3a is supported. Similarly, the outcomes show that the gender of the entrepreneurs negatively but significantly moderates the relationship between the use of communication-related GPT tools and the frequency of using networks by entrepreneurs (β=-0.114, p <0.1). It indicates that female entrepreneurs' use of these tools results in the more frequent use of the network than male entrepreneurs. Therefore, H3b is supported. Similarly, H3c is supported as per the outcome model since the gender of the entrepreneurs negatively but significantly (β=-0.094, p <0.1) moderates the relationship between the use of communication-related GPT tools and network centrality characteristics of the entrepreneurs. The use of these tools by female entrepreneurs results in more central characters for female entrepreneurs than male entrepreneurs.

Figure 4.1 indicates this chapter's research model, including the mediating influence of the entrepreneurs' three networking dimensions: network size, network frequency, and network centrality. The path diagram of the research model is presented in Figure 4.2, and the results of this path analysis are listed in Table 4.4. Both the absolute and comparative fit indices of this path analysis indicate a closely fitted model. To be specific, p-value of Chi-square = 0.231(not statistically significant), SRMR = 0.031 (less than 0.05), TLI = 0.994 (greater than 0.95), CFI = 0.977(greater than 0.95), and RMSEA = 0.039 (less than 0.05) (Moore, 2005; Shook et al., 2004).

4.5. DISCUSSION AND CONCLUSION

4.5.1. Main findings

H1a, which proposed that the use of communication-related GPT tools affects SME performance positively, is supported. It is consistent with the findings of OECD (2004) that

GPTs can enhance information and knowledge management in SMEs, which in turn results in more productive business processes and improved SME performance. Nevertheless, the SEM results show that these GPT tools' direct impact on SME performance is not large. One explanation may be that the very existence of these GPT tools makes it difficult for them to directly affect SMEs' outcomes without being complementary to other business functions, such as networking by the firm owners. It is supported by resource complementary (Milgrom and Roberts, 1995) and organizational capabilities concepts (Liang, You and Liu, 2010).

H2a, which expected that the entrepreneur's network size positively mediates the relationship between the use of communication-oriented GPTs and SME performance, is supported. It is consistent with the findings of Schwanen and Kwan (2008) and Aguiléra, Guillot and Rallet (2012) that the use of GPT contributes to an increase in the SME owners' social network size (in terms of the number of members). Social networks of top management refer to the collections of relationships that top managers have with others in their organisation (internal networks) and with people outside the organisation (external networks) holding business knowledge of potential value. Essentially, the networks differ in size[121] and range[122] (Burt, 1982).

Larger networks comprise more ties and are likely to be more varied (Granovetter, 1973). Furthermore, larger networks typically hold more information than smaller networks (Burt, 1982; Granovetter, 1973). Collins and Clark (2003) stated that top management's external and internal networks' size provides informational benefits leading to competitive advantages (higher business performance). It is also consistent with the findings of Goerzen (2007) and

[121] Defined as the number of contacts.

[122] Defined as the diversity of contacts.

Musteen, and Francis and Datta (2010) that network size has a positive impact on business performance.

H2b, which expected that the entrepreneur's frequency of network use positively mediates the relationship between GPT use and SME performance, is supported. It is consistent with Zappalà and Gray's (2006) findings that these GPTs, such as the Internet, impact the frequency of using the network in SMEs. On the other hand, interaction frequency is an indicator of the strength of the founders' external and internal networks' ties (Granovetter, 1973). Furthermore, this strength of founders' ties renders information-related advantages to firms. Moreover, H¨agg et al. (1982) and Larson (1992) reported that strong ties allow enterprises to learn more about each other's activities, and thus allow tacit knowledge to be passed across firm boundaries (Uzzi, 1996). Transfer between the exchange partners is often enabled by the implementation of common processes and routines. Routine and process similarity, in turn, catalyses joint and coordinated action among the partners. All these result in improved productivity for enterprises and consequent performance benefits. Along this line, Banker, Bardhan and Asdemir (2006), Koka and Prescott (2008), and West and Noel (2009) reported that by reducing costs and increasing the quality of exchange relationship and cycle time in firms, the frequency of networking impacts SME performance positively.

H2c, which expected that the entrepreneur's network centrality characteristics positively mediate the relationship between GPT use and SME performance, is supported. It is consistent with Arling and Subramani's (2011) findings that those with higher ICT use are more central in the ICT network. It is also consistent with the findings of a stream of existing literature (e.g. Gulati et al., 2000; Reagans and Zuckerman, 2001; Tsai, 2002; Wang et al., 2015) that network centrality impacts business performance positively. Powell and Smith-Doerr (1994), in their intensive analysis of network-related literature, identified various mechanisms by which

network position enhanced business output. These mechanisms include rapid access to resources by start-ups (Uzzi, 1997), fast diffusion of information related to opportunities as well as threats, and receiving exchange partners' quality-related information. Uzzi (1996) further stated that enterprises in networks benefit from the assembling, collaboration, and synchronised adaptation of resources in different firms. In understanding the effect of online-based social networks on business performance, prior studies have focused on exploring the centrality of the network, a structural property that helps obtain valuable resources via direct and indirect ties (Ahuja, Galletta and Carley, 2003), which in turn impact performance positively. It is in line with Burt's (2009) classic work, which contends that enterprises (SME owners in this context) holding the preferred network position of bridging structural holes[123] tend to access more information and, thus, perform better.

SEM results also show that H3a, which stated that entrepreneurs' gender moderates the relationship between communication-related GPT tools' use and the entrepreneur's network size in a way that the use of these tools by female entrepreneurs results in a larger network compared to male entrepreneurs, is accepted. It is consistent with a stream of literature documenting that communication-related GPT tools result in a larger network size for women than men (McAndrew and Jeong, 2012; Moore and McElroy, 2012). This can be attributed to the fact that women tend to become more involved and intimate in their social relationships (Belle, 1987).

H3b similarly is supported by the SEM outcomes. It expected that the entrepreneur's gender moderates the relationship between the use of communication-related GPT tools and the founder's frequency of using networks in a way that the use of these tools by female entrepreneurs results in the more frequent use of the network compared to male entrepreneurs.

[123] The holes amid otherwise disconnected enterprises in the network.

This finding is consistent with past research reporting that women take part in GPT-facilitated networks like social media related networks more intensely and extensively than men (McAndrew and Jeong, 2012).

SEM outcomes further support H3c, which stated that the entrepreneur's gender moderates the relationship between communication-related GPT tools' use and the entrepreneur's network centrality characteristics, favouring female entrepreneurs. This is consistent with past study findings claiming that female entrepreneurs' use of these tools results in more central positions for female entrepreneurs than male entrepreneurs. For example, women tend to respond more to requests for social support (Maier et al., 2015). In turn, this central position has a positive influence on their enterprises (Venkatesh et al., 2017).

4.5.2. Contributions and implications for research

Several papers have explored the direct effect of the relationship between communication-related GPT use and SME performance (Lopez-Nicolas and Soto-Acosta, 2010; Luo and Bu, 2016; Tanriverdi, 2005; Tanriverdi, 2006). However, very few studies explored the impact of these GPT tools on SME performance via the mediating effect of different aspects of networking by the entrepreneur who has invested in these tools. This chapter contributes to the networking literature by investigating this less studied area. It also contributes to ICT use in SMEs and social network in SMEs literature. Moreover, very few previous results have explored the moderating impact of gender on the relationship between communication-related GPT use and networking by entrepreneurs. Thus, this chapter contributes to the gender in ICT use in SMEs literature as well. This chapter also contributes to the SME entrepreneurship and regional development literature by exploring the relationships mentioned above in an emerging economy context.

This research also has significant practical implications apart from its theoretical contribution, primarily for entrepreneurs and other concerned employees of SMEs. First, this chapter confirmed that communication-related GPT tools can enhance networking by entrepreneurs by increasing the network size, frequency, and centrality capacity. Increased networking, in turn, impacts the SME performance positively. In their SMEs, owner-managers should cultivate communication-related GPT tools and wisely utilize them in building their network.

4.5.3. Limitations and avenues for further research

Some limitations exist in this chapter, which are common with the previous chapter. These include the small sample size, limited generalizability of the findings across Bangladesh, and the use of only one moderator and mediator. Another limitation for both chapters 3 and 4 is that both the chapters relied on a single informant from every firm in investigating the research model. Although entrepreneurs' perspectives and experience (the single informant) are useful sources of knowledge in analysing a firm's business value, biases may have inflated the relationships between the constructs. Data collection from several informants in every firm should be considered in future research to minimize such biases. An additional limitation in this chapter is the possibility that the number of years using the GPT tools influences their contribution to SME performance, and further work should study maturity stages. Also, only a subset of GPTs has been discussed in this chapter; apart from these communication-related GPTs, future research might explore other GPT tools' impact on SME performance. Finally, only three structural properties of the network were examined. Other structural properties are also present (e.g. network constraint), which may affect business performance.

4.5.4. Conclusion

This chapter's findings show that despite not being strategic resources, communication-related GPT tools impact SME performance both directly and indirectly. However, the indirect effect

model via the mediator (i.e. three networking dimensions of SME entrepreneurs: network size, network frequency, and network centrality characteristics) shows a larger effect size than the direct effect model. It implies that these communication-related GPT tools can contribute optimally to the SME performance when they are optimally utilised for networking purposes.

CHAPTER 5: CONCLUSION

5.1. INTRODUCTION

The conclusions of this thesis are discussed in this chapter. A summary of the whole research procedure and results is presented in section 5.2. The contributions of this thesis are outlined in section 5.3 to articulate this thesis' contribution to the existing literature along with the practical and policy level contributions. The limitations of this thesis are explained in section 5.4, and avenues for future research are articulated in section 5.5. The overall conclusion is outlined in section 5.6. This thesis aimed to achieve a deeper understanding of the impact of various ICT tools (both simple and advanced) on business performance. To achieve this, this thesis explored both the direct and indirect influence of different ICT tools. To explore the indirect influence of ICT tools on business performance, two firm-level factors were examined as mediators: the ICT collaboration capabilities of firms and networking by entrepreneurs. This thesis also looked at the moderating impact of another firm-level factor, the gender of the entrepreneurs, to explore different relationships between these key constructs: different ICT tools' use, mediators, and business performance. Specifically, chapter 2 synthesized more than 20 years of research on the impact of both simple ICT tools (GPTs) and advanced ICT tools (ETs) on business performance via a meta-analysis. Chapter 3 explored the direct and indirect influence of ETs on SME outcomes (the indirect impact was explored via the mediator of ICT collaboration capabilities). Chapter 4 explored the direct and indirect impact of communication-related GPT tools on SME performance (the indirect impact was explored via the mediator of different aspects of networking by the entrepreneurs). The findings show that GPTs and ETs affect business performance via both direct and indirect routes. However, the indirect impact of these ICT tools is greater than the direct impact. Few previous studies have explored the two mediators examined in this study: A) ICT collaboration capabilities and B)

different aspects of networking, on the relationship between different ICT tools and SME performance. This study, therefore, marks a significant addition to the existing knowledge of BVICT.

5.2. RESEARCH SUMMARY

5.2.1. A meta-analysis investigating the relationship between ICT and business performance

Despite the business value (BV) of information and communication technologies (ICT) being a well-studied topic globally, research on this subject is still relevant since ICT is a fluid, growing, and dynamic concept (Choi, Kim and Kim, 2011). This dynamism is due to the continuous addition of more advanced tools under ICT's umbrella. As technologies such as big data, artificial intelligence, and cloud computing continue to emerge, there is a growing need to explore the impact of these advanced technologies separately from simpler ICT tools such as mobile phones, computers, and the Internet. Though a substantial number of empirical researches have been conducted on the relationship between ICT use and business performance (business value of ICT or BVICT), these studies report varied results depending on the nature, scope, and purpose of the ICT tools being examined. A meta-analysis is required to comparatively analyse the impact of ETs and GPTs on business performance to integrate these above-mentioned apparently contradictory outcomes of the relationship between ICT tools' use and business performance in the existing literature. To address this research gap, chapter 2 integrates research outcomes of more than two decades (from 1998 to 2018) via a meta-study that offers a comparative analysis of the impact of ETs and GPTs on BVICT by reviewing 104 studies with 270,847 observations. This chapter also explores how firm-level structural variables like firm size and gender reporting moderate the impact of GPTs and ETs on business performance. The outcomes of this chapter report that the effect size of GPTs and business

performance relationship is smaller than that of ETs and business performance relationship. It also reports that the effect size of ICT tools (both GPTs and ETs) and business performance relationship is larger in SMEs compared to non-SMEs, which shows that SMEs are an interesting subject for further empirical investigation. Therefore, this thesis has focused on SMEs in empirical research in chapters 3 and 4. Other findings in these chapters suggest that consideration of gender reporting[124] strengthens the effect of GPT use on BVICT, whereas the opposite happens in the case of ETs. Since gender reporting in this context means reporting female samples along with male samples, this finding means further empirical investigation on the impact of gender on the different aspects of the relationship between ICT (both GPTs and ETs) and firm performance is needed. This chapter adds to the BICVT literature with new evidence of the significance of firm-level factors such as firm size and human capital factors. Therefore, this chapter contributes to the ICT, IS, IT, business performance, and gender fields.

5.2.2. The role of dynamic capabilities in business performance under RBV: an empirical analysis investigating the role of ICT capabilities in SMEs

Chapter 3 examines the role of dynamic capabilities in the context of RBV. It examines relationships between ICT resources, dynamic capabilities, and business outcomes. To be specific, this chapter examines the direct and indirect influence of advanced ICT resources (ETs) on the business performance of SMEs in Bangladesh (an emerging economy), a country in which SMEs form the backbone of the national economy. This thesis used an integrated model to analyse the direct impact of ET tools on business performance as well as their indirect impact through the mediator of ICT collaboration capabilities (a dynamic capability). Based on the findings of chapter 2, the gender of entrepreneurs as a moderator in the indirect effect

[124] As mentioned earlier in the thesis, gender reporting indicates reporting both male and female genders of the firm-level ICT users (which also includes the firm owners/ founders/entrepreneurs) in the sample of the primary studies of the meta-analysis.

model – in other words, how entrepreneurs' gender moderates the influence of ICT collaboration capabilities on SME performance – was also investigated. Data was collected from a sample of 302 SME entrepreneurs across 13 different sectors and from two different Bangladeshi cities, which covered some aspects of urban-rural entrepreneurship in Bangladesh. The sample was split according to binary gender in order to explore the impact of gender of the entrepreneurs in the indirect effect model. Hierarchical regression analyses were applied to examine the impact of ETs on SME performance. Moreover, factor analysis was used to identify the best-suited ICT collaboration capabilities to use as mediators under the indirect effect model. Furthermore, the direct and indirect models were run on gender-based sub-samples. Additionally, six entrepreneurs (three males and three females) were interviewed to explore in more depth how the use of ICT tools has affected the overall performance of their firms. The outcomes related to the entire sample show that ICT collaboration capabilities can, as dynamic capabilities, mediate the valuable, rare, inimitable, and non-substitutable (strategic) resources of firms to enhance performance. The results suggest that the mediated model with ICT collaboration capabilities is better able to clarify the importance of ETs than the direct-effect model, which suggests that the doctrine 'no firm is an island' (Tidd, Bessant and Pavitt, 2005) rings true in the SME domain now more than ever before. By enabling work flexibility and collaborative competence or skills development for employees, ETs help SMEs to establish collaborations with both new and existing partners (Parida and Örtqvist, 2015), which, in turn, enhance the performance of SMEs. The sub-sample analysis shows that ICT collaboration capabilities act as a mediator in female sub-samples, but the same is not true for male sub-samples. However, the use of ET as a strategic resource affects SME performance in the case of both sub-samples. In line with this, the moderating impact of the gender of the entrepreneur in the relationship between ICT collaboration capabilities and SME performance shows that ICT collaboration capabilities affect business performance more in female-owned SMEs

compared to male-owned ones. This chapter's findings offer useful insight into ETs' impact on business performance, the mediating impact of ICT collaboration capabilities on the relationship between ET use and business performance, and the moderating impact of gender on the relationship between ICT collaboration capabilities and SME performance. Furthermore, the significant role of strategic resources is discussed due to their direct influence on business performance under the RBV framework and their indirect influence through the mediating impact of dynamic capabilities. The analytical outcomes also indicate, as RBV suggests, that ETs as strategic resources can boost business performance, and that these strategic resources can reinforce the growth of dynamic capabilities like ICT collaboration capabilities. Thus, this chapter contributes to ICT use in SMEs, SME entrepreneurship, and gender in ICT use literature.

5.2.3. Using social network theory to investigate the interplay among communication-related ICT tools, networking by entrepreneurs, and SME performance

The objective of chapter 4 was to determine the antecedents of the superior performance contributed by communication-related ICT tools of SMEs in the emerging economy context. To meet that objective, the direct link between communication-related GPTs and SME performance as well as the indirect link via the mediating influence of networking by SME owners on the abovementioned relationship was examined. Three dimensions of networking by SME owners – network size, network frequency, and network centrality – have been explored as mediators in this chapter. Data was collected for this chapter in a similar fashion to chapter 3. This chapter's hypotheses were tested using Structural Equation Modeling (path analysis) in Stata. This chapter's outcomes report that the indirect effect model, with networking by entrepreneurs as the mediator, explained the relationship between communication-related GPTs and SME performance better than the direct effect model. The

findings also report that the entrepreneurs' gender moderates the relationship between the use of communication-related GPTs and entrepreneurs' three dimensions of networking in favour of female entrepreneurs. In other words, female entrepreneurs' use of communication-related GPT tools results in a more extensive network, more frequent use of the network, and more central positions than that of male entrepreneurs. The findings in this chapter provide valuable insight into the effect of communication-related GPT tools on SME performance, the mediating impact of networking by SME owners on the relationship between these ICT tools' use and business performance, and the moderating impact of the gender of the SME owners on the relationship between the use of these GPT tools and networking by SME owners. Thus, this chapter contributes to social network in SMEs' context, ICT use in SMEs, SME entrepreneurship, and gender in ICT use literature.

5.3. CONTRIBUTIONS OF THIS RESEARCH

This thesis makes a number of contributions to various bodies of literature. Firstly, the thesis has categorised diverse ICT tools into two broad categories – GPTs and ETs. Secondly, it has summarised the findings of previous studies through meta-analysis. Thirdly, it has included communication-related ICT tools along with the IT tools in the meta-analysis. Fourthly, it has tested the impact of these ICT tools empirically. Fifthly, this thesis has explored both the direct effect of different ICT tools (both GPTs and ETs) on business performance and their indirect effect through mediators like ICT collaboration capabilities (in case of ETs) and networking by owner-managers (in case of GPTs) in the empirical parts of the thesis. Sixthly, this thesis has also categorised ICT tools into strategic and non-strategic resources as per the VRIN framework of RBV. Seventhly, it has analysed the mediator ICT collaboration capabilities in the indirect effect model as per dynamic capabilities theory and three networking dimensions of entrepreneurs: network size, frequency of using the network, and centrality position as per

social networking theory. Eighthly, this thesis has considered relevant contextual factors such as firm size and human capital attributes (such as reporting the gender[125] of the human capital of the firms who use ICT in the firm) to minimise the mismeasurement in capturing ICT tools' contribution to business performance. Ninthly, the empirical part of the study is studied in the SMEs in an emerging economy like Bangladesh and there have not been many studies on this topic in Bangladesh. These abovementioned main contributions of the thesis are categorised in three different broad categories, namely the theoretical, practical, and policy level contribution, and are reported in the following section:

5.3.1. Theoretical Contribution

Though existing literature holds substantial proof of the positive contribution of ICT tools to business performance, a stream of literature also displays a more cautious view of ICT's contribution by reporting the productivity paradox. According to Chan (2000), mismeasurement might be a major cause of this reported productivity paradox. This research is, therefore, a vital addition to the current IS, IT, and ICT literature, as it answers the critical issue of how to measure the contribution of ICT use to business performance.

Existing literature on BVICT mostly seem to explore the question, "what is the effect of ICT use on business performance?" This research, however, also seeks to explore associated questions – "when, where and how does ICT impact business performance?" – by categorising ICT tools into ETs and GPTs, measuring the contribution of GPTs and ETs separately through both direct and indirect effect models, and exploring the moderating role of gender in these abovementioned direct and indirect relationships. Thus, this research contributes to existing BVICT literature. All these theoretical contributions are elaborated below:

[125] The gender of the human resources who use ICT in firms was considered in the case of meta-analysis, and the gender of the entrepreneur was considered in the case of empirical studies.

This thesis has applied the resource-based view (RBV), dynamic capabilities view (DCV), and social network theory. The findings of this thesis have helped develop a robust model that is centred on the process by which different ICT tools affect business performance. This model uses two categories of ICT use – GPT use and ET use – to address the depth and breadth of ICT use. The established theories in the field mainly explored the phenomenon of ICT use from a developed nations' perspective, although their applicability in addressing related phenomena in an emerging economy like Bangladesh's perspective is still mostly unexplored. The outcomes of this thesis reveal that it is always beneficial to consider the interactions between technology and organizational human factors in exploring the influence of technology on business performance.

The thesis uses RBV to explain how using the strategic category of ICT resources (ETs) directly and indirectly contributes to business performance. The indirect effect of these advanced ICT tools (strategic firm resources) on business performance has been explained via the mediating influence of dynamic capabilities (ICT collaboration capabilities) by applying the RBV. In other words, this thesis explores the role of dynamic capabilities in the RBV context.

Previous research has contended that dynamic-capable SMEs should revisit and reorganise their firm-level resources to tackle the complexities of their business environment. There is, nonetheless, an absence of understanding as to how these critical capabilities can be developed. The results of this thesis indicate that SMEs may use strategic ICT tools as a catalyst to build diverse capacities. Thus, this thesis contributes to IS and RBV literature. To be precise, this thesis' analysis offers an alternate perspective on how ICT use affects SME performance by developing dynamic capabilities. This thesis, therefore, adds to the IS and RBV literature by connecting various components of ICT use to dynamic capabilities.

On the other hand, this thesis also found that certain (though not all) non-strategic ICT resources (e.g. communication-related GPTs) also contribute to SME performance. This positive impact mostly occurs via the mediating role of organizational human capital factors (in this case, networking by the SME entrepreneurs). Different networking dimensions of SME entrepreneurs, namely network size, network frequency, and network centrality, have been analysed with the social network theory. Thus, this thesis expanded the understanding of how network-related dynamics affect business performance. This thesis also creates a more nuanced understanding of online social networks and their direct and indirect impact on business performance. This thesis also advances understanding of social networks by integrating perspectives from complementary theories such as RBV. These theories combinedly help explain how a firm connected with other firms can create value from resources not entirely controlled by itself (Lavie, 2006).

Strategy scholars, particularly those following RBV, tend to emphasise the internal resources of the firm while underestimating the external sources available to the firm. Academics in the network field, on the other hand, prefer to concentrate on the network structure while ignoring the capabilities of individuals connected by that network. This thesis focused on the value of integrating these two fields by considering the contribution of ICT resources to both the actors' capabilities within an enterprise and the network structure of the entrepreneurs.

5.3.2. Practical contribution

The findings of this thesis show that the effective use of ICT tools has to be ensured to obtain optimal benefit from ICT investment. Hence, SME owner-managers should make sure that ICT tools are used optimally. These tools should not be used in a piecemeal way, for instance, only to perform discreet financial tasks such as managing payroll and bookkeeping. Rather, these ICT tools should be used for performing three hundred and sixty-degree organisational

functions, including managing the supply chain and operations as well as making managerial decisions connected to those functions. For instance, ICT should be used to minimize inefficiency in supply chain management in the case of obtaining raw materials and dispatching finished goods to markets. Moreover, communication and collaboration between the supply chain members (both external and internal) should be managed by the optimum use of relevant ICT tools. For example, RFID-related ICT tools can be utilised by agro-based (producer) SMEs to trace their products along the supply chain until it reaches the consumer, which can give the SME more control on the supply chain. Since ICT tools help SMEs overcome place and time-related barriers (Barba-Sánchez et al., 2007; Fulantelli and Allegra, 2003; Ghobakhloo et al., 2011; Ongori and Migiro, 2013; Tan et al., 2010), optimum use of ICT tools should be ensured to make organisational operations more efficient, automated, speedy, and error-free, and thus improve the bottom line.

Along these lines, the empirical part of this thesis has provided a clear picture of how different skills such as firm-level ICT capabilities (dynamic capability) and networking by SME owners ensures the optimal contribution of ICT to business performance in SMEs in an emerging economy like Bangladesh. Hence, the results of this study have practical consequences for the owners-managers of SMEs in Bangladesh. For example, the results could help owner-managers make more informed decisions when investing in diverse ICT tools[126]. The results could also help owner-managers of SMEs to use these ICT tools to build ICT collaboration capabilities, and to participate in networking as part of their SMEs' overall strategy. In addition, SME owner-managers will make more effective use of various ICT resources once they become

[126] This thesis provides valuable insights for business owners, managers, senior business, and IT executives on which ICT tools can contribute to their firm's performance more and under which contexts.

more aware of the influence of different ICT tools on business performance and the mediating impact of ICT collaboration capabilities and networking.

Prior research examining the adoption or use of ICT has usually assumed that ICT use would have a major impact on business performance. Interestingly, the outcomes of this thesis show that ICT use did not considerably increase the performance of SMEs directly. Rather, it was important for firms to use technologies properly to build different capabilities and skills in order to achieve superior performance. This is in line with the central tenets of RBV in the ICT context, which stresses the importance of integrating diverse ICT resources to develop rare, valuable, and sustainable ICT capabilities that can add to value generation. Since such capabilities are dynamic, they help sustain value in unstable surroundings. Internal and external stakeholders might find these findings relevant and concentrate on ICT integration to improve various organisational dynamic capabilities to enhance business performance.

5.3.3. Policy level contribution

The thesis' principal findings propose a number of policy implications for governments in emerging economies to support the adoption and effective use of various technologies. To begin, emerging economies should implement legislative measures to establish a supportive environment for adopting various ICT tools. This will provide additional incentives for enterprises to invest in both simple and advanced ICT tools.

To be specific, this thesis might help suggest some improvements and modifications to existing policies and strategies in Bangladesh to encourage ICT adoption (especially the use of ICT by SMEs) to accomplish economic growth. Bangladesh is an emerging economy where SMEs make up a significant part of the economy. The Government of Bangladesh is committed to leveraging ICT's capacity to aid the country's economic growth and to creating "Digital Bangladesh" by 2021. To this end, the Government of Bangladesh has already revised their

ICT policy and introduced measures such as removing all taxes from computer hardware, giving interest-free loans to ICT (software) companies, as well as taking up pro-ICT initiatives, grants, incentives, and motivational programmes to encourage the use of ICT in diverse sectors of the economy.

The results of this research indicate that the Government of Bangladesh should design policy with specific goals in mind. If the goal is to facilitate SMEs to improve their sales (profitability), effectiveness, and efficiency, priority should be given to developing advanced ICTs (ETs). To facilitate development and improved utilisation of these ET tools, a strong ICT infrastructure and congenial legislation at the national level is necessary. On the other hand, if the aim is to increase business (market) opportunities, emphasis should be placed on GPTs.

In either case, a crucial element is the development of human resources specially women within SMEs. This can be accomplished by reducing training costs, which can be accomplished by various policy instruments. Public policies ought to offer incentives for enterprises to invest in their employees' training and specialisation to promote internal knowledge and skills at the firm level. According to the EBRD (2014), countries must invest in education and specialised skills in order for businesses to absorb advanced ICT tools. Exchange visits between researchers and industry leaders with foreign countries and institutions, on the other hand, can help to spread new ideas and expertise.

Adopting and managing advanced technologies at the business level is difficult, especially for businesses with little resources, such as SMEs. In this respect, the findings of this study can be used to establish a congenial policy that provides SMEs with infrastructural, human resource, and other resource-related support in order for them to adopt and optimally use advanced technologies, including Industry 4.0 features.

Apart from government-level policymakers, this research has implications for policymakers at the firm level as well. Since the gender of the firms' workforce has a significant effect on ICT's contribution to business performance, policymakers at the firm level should adopt a gendered view of BVICT and identify areas of interest of both genders in optimal use of various ICT tools. Skills and capabilities development-related training may also be motivated by this gendered viewpoint of BVICT.

5.4. LIMITATIONS OF THIS THESIS

As with any research, there are several limitations to this thesis. The findings of this thesis need to be interpreted taking these limitations into account.

Firstly, the outcome of the 1st and 2nd research questions (meta-analysis) is dependent on diverse past research from different sources and written at different times. Hence, observation bias might occur due to various factors, including micro and macro-economic factors such as industry and social-economic conditions (Byrd and Davidson, 2003; Liang, You and Liu, 2010; Straub, Rai and Klein, 2004; Tanriverdi, 2005; Wang, Tai and Wei, 2006; Zhu, Kraemer and Dedrick, 2004).

Secondly, the focus was given on the mediating impact of ICT collaboration capabilities (organisational capability) on the relationship between ET use and SME performance for exploring the 3rd research question, and the mediating influence of networking on the relationship between GPT use and SME performance for the 5th research question. However, other external and internal factors might affect the outcome of these relationships. Additionally, how firm-level factors moderate the influence of capabilities on SME performance was explored in the 4th research question. On the other hand, the moderating impact of firm-level factors on the relationship between GPT use and SME performance was explored in the 6th research question. Nevertheless, other influences, including both internal and external

conditions (Stoel and Muhanna, 2009) and the industrial context (Tan et al., 2010), might affect the proposed relationship. Researchers are encouraged to expand on this research and render fresh insights by exploring new moderators and mediators (e.g. ICT marketing and communication capabilities, ICT strategic planning and information processing capabilities, and other mediators in general) in future research.

Thirdly, this thesis uses cross-sectional data (the survey data and the meta-dataset[127]). These provide a snapshot of the relationship between the independent and dependent variables, whereas longitudinal data help investigate the relationship's changes over time (Salthouse, 2009; Schaie, 2009). Hence, it was not possible to determine the effect of different ICT tools on business performance at various points in time.

Fourthly, the 3rd to 6th research questions were tested only in SMEs. Future studies can explore these on firms of all sizes to reach more generally applicable conclusions. Moreover, a comparison between SMEs and larger firms would allow an investigation to check whether findings obtained from SMEs are valid (Tambe and Hitt, 2012).

Fifthly, only surviving firms' performance is examined in this thesis, which has resulted in a survivor bias (Rauch et al., 2016). Future research is strongly encouraged to incorporate non-surviving firms in the sample to avoid this issue.

Sixthly, this research was carried out on a homogeneous group that included entrepreneurs, founders, and owner-managers of SMEs. They were asked to give their opinion on several aspects of their organizations' use of ICT and its consequent effect on business performance. Therefore, it could be said that the response received from the entrepreneurs, founders, and

[127] The meta-dataset is also mostly cross-sectional in nature.

owner-managers of SMEs is limited to their perception and has the probability of being one-sided.

Seventhly, being predominantly a quantitative analysis (apart from chapter 3), this research attempted to gather data as quickly as possible due to time and financial constraints inherent in the survey method (Groves, 2004). Thus, by performing only quantitative research, the researcher lost the chance to gain more detailed information from the respondents by using open interview questions that could have been used to more precisely identify the reasons behind their responses to the questionnaire. Moreover, some respondents may have given an incorrect answer when collecting data in the survey process, possibly because they did not understand the question or wanted to be seen in a better light (Vissak, 2010).

Finally, the field level survey was restricted to the cities of Dhaka and Khulna. Nationwide research would have provided a result from which more general extrapolations could be drawn. Similarly, multi-nation studies on the same topic will provide even a clearer result.

5.5. AVENUES FOR FUTURE RESEARCH

This thesis provides several options for future studies to dig deeper into specific topics. Firstly, this thesis used the categorization of ICT into ETs and GPTs as per the purpose of its use. The proposed categories can be sub-categorized in future research to develop a deeper understanding of each sub-category. For instance, GPTs may also include sub-categories such as knowledge dissemination technologies, contacting or communication technologies, entertainment-related technologies, or marketing technologies. Similarly, ETs can include sub-categories such as business productivity systems and advanced storage technologies.

Secondly, instead of focusing only on SMEs, future studies might explore BVICT in different sized firms. Future studies might also investigate the comparative impact of different ICT tools on different-sized firms, especially in emerging economies.

Thirdly, the empirical part of this thesis is based on only one emerging economy. Future studies can explore this topic in more than one emerging economy to have a more generalizable result.

Fourthly, the empirical part of this thesis has explored the moderating impact of the gender of the entrepreneurs on different links among the independent, mediating, and dependent constructs. Future studies can explore the impact of other characteristics of the entrepreneur on BVICT, such as age or education level. Future studies can also dig deeper by exploring the moderating impact of different age groups of two binary genders. For example, how a middle-aged female entrepreneur impacts BVICT compared to a middle-aged male entrepreneur.

Fifthly, the empirical part of this thesis explored business performance in terms of financial measures. Future studies can also explore growth measures or other subjective measures like firms' external and internal communication improvement, competitiveness, export performance, innovation performance, efficiency, domestic and export market expansions, and cost-saving. Future studies can empirically test one or more of these performance measures to gain a more comprehensive understanding of BVICT.

Finally, based on static cross-sectional methods, the essence of the present analysis is primarily taxonomic. Further study is required to explore, in particular, to what degree the use of various types of ICT tools influence workers' skills and improves, for example, the export efficiency of SMEs. A dynamic (panel) analysis is required for this purpose in the future.

5.6. CONCLUSION

This research aims to explain the role of strategic and non-strategic resources in business performance, especially in SMEs. SME success is of fundamental importance to all economies, whether developed or emerging. They catalyse a country's economic growth, are essential for a nation's financial stability, and serve as a buffer against economic disturbances and unexpected disruptions (OECD, 2017). Bangladesh, where the empirical part of this research is focused, depends significantly on SMEs' success for national economic development and growth. Hence, there is considerable academic interest in what contributes to SMEs' success or improved performance. Among many factors that contribute to SME success, different ICT resources are worth mentioning in this age of the 4th industrial revolution.

Furthermore, this thesis is driven by arguments in recent literature underlining that the adoption and use of different ICT tools have affected how these firms operate (Camra-Fierro et al., 2012). This thesis mainly explores the effect of different kinds of ICT resources on business performance and contains several findings that add to the existing knowledge on the topic. First, this research's outcomes support the notion that strategic resources add more value to business performance compared to non-strategic ones. This conclusion is supported by both the meta-analysis and the empirical analysis. Second, the results indicate that ICT use, when mediated by organisational factors such as SMEs' collaboration capabilities, have a greater influence on the SME performance (in the case of ETs) than the direct effect of ICT use. This finding is supported by arguments in existing literature that state IT capabilities are important for firms (Del Aguila-Obra and Padilla-Meléndez, 2006; Ada, 2009). This thesis' results further report that ICT use, when mediated by different networking dimensions by SME owners, has a greater influence on the SME performance (in the case of communication-oriented GPTs) than the direct effect of ICT use.

Fourth, the empirical findings reveal that firm-level factors like gender (human capital) affect links among the key constructs (different ICT tools, mediators, and SME performance). This is in line with prior research that recognizes that a complementary relationship exists between BVICT and firm-specific factors (Bayo and Lera, 2007; Bocquet et al., 2007; Fabiani et al., 2005; Giuri et al., 2008; Hollenstein, 2004; Lucchetti and Sterlacchini, 2004).

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APPENDICES

APPENDIX A: KEYWORDS USED TO SEARCH LITERATURE

The following keywords (categorized by three categories of performance scope) were used to search existing literature:

Firm Growth related keywords	Firm Profitability related keywords	Other Performance measures related keywords
• Impact of ICT on business growth • Impact of ICT on business productivity growth • Impact of ICT on economic growth of firms • Impact of ICT on employment growth of firms • Impact of ICT on sales growth of firms • Impact of ICT on Firm growth • Impact of ICT on general business growth of firms • Impact of ICT on growth in ROS of firms • Impact of ICT on growth in cash flow of firms • Impact of ICT on growth in revenue of firms • Impact of ICT on growth in net income of firms • Impact of ICT on growth in profit of firms • Impact of ICT on international sales growth of firms • Impact of ICT on labour productivity growth of firms	• Impact of ICT on business profitability • Impact of ICT on ROI (Return on Investment) of firms • Impact of ICT on ROE (Return on Equity) of firms • Impact of ICT on ROA (Return on Assets) of firms • Impact of ICT on Return on Capital Employed (ROCE) of firms • Impact of ICT on sales turnover of firms • Impact of ICT on sale per employee of firms • Impact of ICT on internal rate of return (IRR) of firms • Impact of ICT on economic profitability of firms • Impact of ICT on average net profit margin of firms • Impact of ICT on financial or accounting performance of firms	• Impact of ICT on entrepreneurial performance • Impact of ICT on improvement of external and internal communication of firms • Impact of ICT on sustainable competitive Advantage of firms • Impact of ICT on overall firm performance/success of enterprise • Impact of ICT on competitiveness of firms • Impact of ICT on export performance of firms • Impact of ICT on innovation performance of firms • Impact of ICT on efficiency of firms • Impact of ICT on perceived organizational performance of firms • Impact of ICT on domestic and export market expansion of firms • Impact of ICT on self-assessed measures of international performance of firms

		• Impact of ICT on cost saving of firms

N.B. The search process was repeated with all the synonymous words of ICT and also with different ICT tools for each option in the above table.

APPENDIX B: LIST OF PRIMARY STUDIES INCLUDED IN THE META-ANALYSIS

Sl.	Study
1.	Lopez-Nicolas, C., & Soto-Acosta, P. (2010). Analyzing ICT adoption and use effects on knowledge creation: An empirical investigation in SMEs. *International Journal of Information Management*, *30*(6), 521-528.
2.	Falk, M. (2005). ICT-linked firm reorganisation and productivity gains. *Technovation*, *25*(11), 1229-1250.
3.	Popa, S., Soto-Acosta, P., & Perez-Gonzalez, D. (2018). An investigation of the effect of electronic business on financial performance of Spanish manufacturing SMEs. *Technological Forecasting and Social Change*, *136*, 355-362.
4.	Jahanshahi, A. A., Rezaei, M., Nawaser, K., Ranjbar, V., & Pitamber, B. K. (2012). Analyzing the effects of electronic commerce on organizational performance: Evidence from small and medium enterprises. *African Journal of Business Management*, *6*(22), 6486-6496.
5.	Thimm, H. H., Rasmussen, K. B., & Gohout, W. (2016). Website quality and performance indicators including ratio numbers–A study of German and Danish SME companies. *Journal of Business*, *1*(3), 22-36.
6.	Trigueros-Preciado, S., Pérez-González, D., & Solana-González, P. (2013). Cloud computing in industrial SMEs: identification of the barriers to its adoption and effects of its application. *Electronic Markets*, *23*(2), 105-114.
7.	Luo, Y., & Bu, J. (2016). How valuable is information and communication technology? A study of emerging economy enterprises. *Journal of World Business*, *51*(2), 200-211.
8.	Steinfield, C., LaRose, R., Chew, H. E., & Tong, S. T. (2012). Small and medium-sized enterprises in rural business clusters: the relation between ICT adoption and benefits derived from cluster membership. *The information society*, *28*(2), 110-120.
9.	Bauer, T. D., Dehning, B., & Stratopoulos, T. C. (2012). The financial performance of global information and communication technology companies. *Journal of Information Systems*, *26*(2), 119-152.
10.	Castorena, O.H., Enríquez, L.A.,& González, M.(2014). The Influence of information Technology and communication Supply Chain management performance for greater sme manufacturing in Aguascalientes. International Journal of Business, 1(12), 382-396.
11.	Chew, H. E., Levy, M., & Ilavarasan, V. (2011). The limited impact of ICTs on microenterprise growth: A study of businesses owned by women in urban India. *Information Technologies & International Development*, *7*(4), pp-1.

12.	Hall, B. H., Lotti, F., & Mairesse, J. (2013). Evidence on the impact of R&D and ICT investments on innovation and productivity in Italian firms. *Economics of Innovation and New Technology*, *22*(3), 300-328.
14.	Torrent Sellens, J., & Díaz-Chao, Á. (2014). *ICT uses, innovation and SMEs productivity: Modeling direct and indirect effects in small local firms* (No. WP14-001). IN3 Working Paper Series.
15.	Cuevas-Vargas, H., Enríquez, L. A., Adame, M. G., &Servin, J. L. (2015). The use of ICTs and its relation with the competitiveness of Mexican SMEs. *European Scientific Journal*, *11*(13), 1857 – 7881.
16.	Nyandoro, C.K. (2016). Factors influencing information communication technology (ICT) acceptance and use in small and medium enterprises (SMEs) in Kenya (Doctoral dissertation, Capella University).
17.	Bunyasi, G. N. W., Bwisa, H., & Namusonge, G. (2014). Effect of access to business information on the growth of small and medium enterprises in Kenya. *International Journal of Business and Social Science*, *5*(10).
18.	Badran, M. F. (2014). Access and use of ICT in female-owned SMEs in selected Arab Countries and Brazil: A comparative study.
19.	Mfuh, W. F. K. (2009). *The impact of mobile telephony services on performance outcomes of micro-businesses in developing economies: with evidence from micro-business communities in Afghanistan and Cameroon* (Doctoral dissertation, University of Warwick).
20.	Supramaniam, M., & Kuppusamy, M. (2011). ERP vs BoB: Influence on Performance of SMEs in Malaysia. In *Proceedings of the International Conference on e-Learning, e-Business, Enterprise Information Systems, and e-Government (EEE)* (p. 1). The Steering Committee of The World Congress in Computer Science, Computer Engineering and Applied Computing (WorldComp).
21.	Matata, L., & Namusonge, G. S. (2015). Role Of Information And Communication Technology In Governance Of Micro And Small Enterprises In Makueni County, Kenya. *International journal of scientific & technology research*, *4*(6), 111-117.
22.	Chew, H. E., Ilavarasan, P. V., & Levy, M. R. (2010). The economic impact of information and communication technologies (ICTs) on microenterprises in the context of development. *The Electronic Journal of Information Systems in Developing Countries*, *44*(1), 1-19.
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25.	Giuri, P., Torrisi, S., & Zinovyeva, N. (2008). ICT, skills, and organizational change: evidence from Italian manufacturing firms. *Industrial and Corporate change*, *17*(1), 29-64.

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27.	Batenburg, R., &Constantiou, I. D. (2009). A European study of e-business maturity and ICT-benefits: Is there a conditional relationship?. In *ECIS* (pp. 2555-2566).
28.	Al-Momani, K., Noor, M., & Azila, N. (2009). E-service quality, ease of use, usability and enjoyment as antecedents of E-CRM performance: An empirical investigation in Jordan Mobile Phone Services. *The Asian Journal of Technology Management*, *2*(2), 50-64.
29.	Fadun, O. S. (2013). Information and Communication Technology (ICT) and insurance Companies profitability in Nigeria. *JABM JOURNAL of ACCOUNTING-BUSINESS & MANAGEMENT*, *20*(2).
30.	Thompson, P., Williams, R., & Thomas, B. (2013). Are UK SMEs with active web sites more likely to achieve both innovation and growth? Journal of Small Business and Enterprise Development, 20(4), 934–965.
31.	Alam, K., & Shahiduzzaman, M. (2015). Shaping our economic future: an e-impact study of small and medium enterprises in the Western Downs region, Queensland.
32.	Mbogo, M. (2010). The impact of mobile payments on the success and growth of micro-business: The case of M-Pesa in Kenya. *Journal of Language, Technology & Entrepreneurship in Africa*, *2*(1), 182-203.
33.	Dlodlo, N., & Mafini, C. (2014). The relationship between Internet marketing paybacks and firm productivity: Perspectives from Zimbabwean SMEs. *Mediterranean Journal of Social Sciences*, *5*(8), 21.
34.	Mohamed, M. M. (2014). *The contribution of information and Communication technologies (ICT) in the growth Of small and medium enterprises (smes) In Tanzania A case of urban district–Zanzibar* (Doctoral dissertation, Mzumbe University).
35.	Khattak, J.K., Khattak, M., Scholar, M.S., Akram, M.W. and Raza, K.(n.d.)Impact of Information Technology (IT) Infrastructure on Procurement Process Performance of SME's (An Empirical Study of SME's in Pakistan).International Journal of Economics, Business and Social Sciences,1(1),1-18.
36.	MohdSaifudin, A., Saud, M. B., & Bahaudin, A. Y. (2014). The mediating effect of MIS on warehousing HCM and efficiency in small and medium enterprises (SMEs).
37.	Motsoeneng, L. (2014). *Measuring the adoption of ICT levels and the perceived impact on performance within the SME manufacturing sector in South Africa* (Doctoral dissertation).

38.	Weru, M., & Mbugua, D. (2017).Effect of Information and Communication Technologies on competitiveness of manufacturing Small and Medium scale enterprises. *International Journal of Social Sciences and Information Technology*,3(3).
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91.	Gërguri-Rashiti, S., Ramadani, V., Abazi-Alili, H., Dana, L.P. &Ratten, V. (2017). ICT, innovation and firm performance: the transition economies context. *Thunderbird International Business Review*, 59(1), 93-102.
92.	Bertschek, I., Cerquera, D., & Klein, G. J. (2013). More bits–more bucks? Measuring the impact of broadband internet on firm performance. *Information Economics and Policy*, *25*(3), 190-203.
93.	Matteucci, N., O'Mahony, M., Robinson, C., & Zwick, T. (2005). Productivity, workplace performance and ICT: industry and firm-level evidence for Europe and the US. *Scottish Journal of Political Economy*, *52*(3), 359-386.
94.	Higón, D. A. (2011). The impact of ICT on innovation activities: Evidence for UK SMEs. *International Small Business Journal*, *30*(6), 684-699.
95.	Luftman, J., Lyytinen, K., & Zvi, T. B. (2017). Enhancing the measurement of information technology (IT) business alignment and its influence on company performance. *Journal of Information Technology*, *32*(1), 26-46.
96.	Bartel, A. P., & Sicherman, N. (1999). Technological change and wages: an interindustry analysis. *Journal of Political Economy*, *107*(2), 285-325.
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98.	Peñalver, A. J., Santos, J. A. C., Conesa, J. A., & Santos, M. C. (2018). Influence of Cooperation and Collaborative ICT in Knowledge Management.
99.	Hagsten, E., &Kotnik, P. (2017). ICT as facilitator of internationalisation in small-and medium-sized firms. *Small Business Economics*, *48*(2), 431-446.
100.	Singh, S., Sindhav, B., Eesley, D., & Bhowmick, B. (2018). Investigating the role of ICT intervention in grassroots innovation using structural equation modelling approach. *Sādhanā*, *43*(7), 104.

101.	Ahani, A., Rahim, N. Z. A., & Nilashi, M. (2017, July). Firm performance through social customer relationship management: Evidence from small and medium enterprises. In *2017 International Conference on Research and Innovation in Information Systems (ICRIIS)* (pp. 1-6). IEEE.
102.	Dahlberg, T., Kivijärvi, H., & Saarinen, T. (2017, January). Longitudinal study on the expectations of cloud computing benefits and an integrative multilevel model for understanding cloud computing performance. In *Proceedings of the 50th Hawaii International Conference on System Sciences*.
103.	Ghobakhloo, M., & Azar, A. (2018). Information technology resources, the organizational capability of lean-agile manufacturing, and business performance. *Information Resources Management Journal (IRMJ)*, *31*(2), 47-74.
104.	Gargallo Castel, A. F., & GalveGorriz, C. (2017). Family involvement and the impact of information and communication technology on performance. *Academia RevistaLatinoamericana de Administración*, *30*(1), 23-39.

APPENDIX C: SIGNED ETHICAL APPROVAL FORM

University of Essex

Application for Ethical Approval of Research Involving Human Participants

This application form must be completed for any research involving human participants conducted in or by the University. 'Human participants' are defined as including living human beings, human beings who have recently died (cadavers, human remains and body parts), embryos and foetuses, human tissue and bodily fluids, and human data and records (such as, but not restricted to medical, genetic, financial, personnel, criminal or administrative records and test results including scholastic achievements). Research must not commence until written approval has been received (from departmental Director of Research/Ethics Officer, Faculty Ethics Sub-Committee (ESC) or the University's Ethics Committee). This should be borne in mind when setting a start date for the project. Ethical approval cannot be granted retrospectively and failure to obtain ethical approval prior to data collection will mean that these data cannot be used.

Applications must be made on this form, and submitted electronically, to your departmental Director of Research/Ethics Officer. A signed copy of the form should also be submitted. Applications will be assessed by the Director of Research/Ethics Officer in the first instance, and may then passed to the ESC, and then to the University's Ethics Committee. A copy of your research proposal and any necessary supporting documentation (e.g. consent form, recruiting materials, etc) should also be attached to this form.

A full copy of the signed application will be retained by the department/school for 6 years following completion of the project. The signed application form cover sheet (two pages) will be sent to the Research Governance and Planning Manager in the REO as Secretary of the University's Ethics Committee.

1. **Title of project:**
   Impact of Networking and ICT on firm performance.

2. The title of your project will be published in the minutes of the University Ethics Committee. If you object, then a reference number will be used in place of the title.
   Do you object to the title of your project being published? Yes☒/ No ☐

3. This Project is: ☐ Staff Research Project ☒ Student Project

4. Principal Investigator(s) (students should also include the name of their supervisor):

Name:	Department:
Sharmin Nahar (student)	Management Science & Entrepreneurship Group, Essex Business School.
Dr. Abhijit Sengupta(1st supervisor)	Management Science & Entrepreneurship Group, Essex Business School.
M. Shamsul Karim (2nd supervisor)	Management Science & Entrepreneurship Group, Essex Business School.

5. **Proposed start date**: 20th July 2018

6. **Probable duration**: 3 months

7. Will this project be externally funded? Yes ☐ / No ☒
   If Yes,

8. What is the source of the funding?
   N/A

9. If external approval for this research has been given, then only this cover sheet needs to be submitted

External ethics approval obtained (attach evidence of approval) Yes ☐/ No ☒

Declaration of Principal Investigator:

The information contained in this application, including any accompanying information, is, to the best of my knowledge, complete and correct. I/we have read the University's *Guidelines for Ethical Approval of Research Involving Human Participants* and accept responsibility for the conduct of the procedures set out in this application in accordance with the guidelines, the University's *Statement on Safeguarding Good Scientific Practice* and any other conditions laid down by the University's Ethics Committee. I/we have attempted to identify all risks related to the research that may arise in conducting this research and acknowledge my/our obligations and the rights of the participants.

Signature(s): Sharmin Nahar

Name(s) in block capitals: SHARMIN NAHAR

Date: 13/06/2018

Supervisor's recommendation (Student Projects only):

I have read and approved the quality of both the research proposal and this application.

Supervisor's signature: 15/06/2018

Outcome:

The departmental Director of Research (DoR) / Ethics Officer (EO) has reviewed this project and considers the methodological/technical aspects of the proposal to be appropriate to the tasks proposed. The DoR/ EO considers that the investigator(s) has/have the necessary qualifications, experience and facilities to conduct the research set out in this application, and to deal with any emergencies and contingencies that may arise.

This application falls under Annex B and is approved on behalf of the ESC ☒

This application is referred to the ESC because it does not fall under Annex B ☐

This application is referred to the ESC because it requires independent scrutiny ☐

Signature(s):

Name(s) in block capitals: Dr Danielle Tucker

Department: EBS

Date: 21.6.18

The application has been approved by the ESC ☐

The application has not been approved by the ESC ☐

The application is referred to the University Ethics Committee ☐

Signature(s):

Name(s) in block capitals:

Faculty:

Date:

APPENDIX D: SURVEY QUESTIONNAIRE IN ENGLISH

i) Participation Information Sheet

Dear Sir/Madam,

You are invited to participate in a study investigating the "Impact of ICT and Networking on the performance of enterprises in Bangladesh". The purpose of the study is to identify the impact of ICT and Networking on the performance of enterprises in Bangladesh.

As a participant, you will be mainly asked 3 set of questions (Demographic Questionnaire, ICT related Questionnaire, and Networking related Questionnaire). Participation will take approximately an hour of your time.

There are no known or anticipated risks associated with participation in this study. This study has been reviewed and received ethics clearance through the Research Ethics Board at the University of Essex. Data collected during this study will be stored in the password-protected personal computer of the investigators. Data will be kept for 10 years after which the data will be destroyed. Access to this data will be restricted to only the investigator (Sharmin Nahar) and her supervisors (Dr. Abhijit Sengupta and Dr. M. Shamsul Karim).

Participation in this study is voluntary. If you wish, you may decline to answer any questions or participate in any component of the study.

Results of this study may be published in professional journals and presented at conferences. Feedback about this study will be available to Sharmin Nahar. You can contact her on the email ID of sn16075@essex.ac.uk.

If you are harmed by taking part in this research project, there are no special compensation arrangements. Regardless of this, if you wish to complain, or have any concerns about any aspect of the way you have been treated during the course of this study then you should immediately inform the researcher and/or their supervisor (details below). If you are not satisfied with the response, you may contact the Essex Business School Research Ethics Officer, Dr. Danielle Tucker (dtucker@essex.ac.uk), or the University of Essex Research Governance and Planning Manager, Sarah Manning-Press (sarahm@essex.ac.uk) who will advise you further.

We would be very grateful for your participation in this study. If you need to contact us in future, please contact me (sn16075@essex.ac.uk) or my supervisors Dr. Abhijit Sengupta (asengua@essex.ac.uk) or Dr.Shamsul Karim (mskarim@essex.ac.uk).

Thank you for your assistance with this project. Please keep a copy of this form for your records.

Regards,

Sharmin Nahar

PhD Candidate

University of Essex

E-mail: sn16075@essex.ac.uk

ii) Consent Form

I, the undersigned, confirm that (please tick box as appropriate):

1.	I agree to participate in the research project, "Impact of Networking and ICT on firm performance", being carried out by *Sharmin Nahar.*	☐
2.	This agreement has been given voluntarily and without coercion.	☐
3.	I have been given full information about the study and contact details of the researcher.	☐
4.	If applicable, separate terms of consent for interviews, audio, video or other forms of data collection have been explained and provided to me.	☐
5.	The use of the data in research, publications, sharing and archiving has been explained to me.	☐
6.	I understand that other researchers will have access to this data only if they agree to preserve the confidentiality of the data and if they agree to the terms I have specified in this form.	☐
7.	I, along with the Researcher, agree to sign and date this informed consent form.	☐

Participant:

_____ _____ _____

Name of Participant Signature Date

Researcher:

_____ _____ _____

Name of Researcher Signature Date

iii) Questionnaire

QUESTIONNAIRE

Confidential

All information you provide is considered confidential; your name will not be included or, in any other way, associated with the data collected in the study. Furthermore, because our interest is in the average responses of the entire group of participants, you will not be identified individually in any way in written reports of this research. If in any case it is required to reveal any part or full information by any of the parties related to this survey, your prior written permission will be taken.

Direction: Please read all questions carefully: The Survey has been designed to facilitate easy answering: Answers require a tick and filling out information to indicate your appropriate response. Your patience is much appreciated.

PART 1:DEMOGRAPHIC INFORMATION:
I) PERSONAL INFORMATION:
1.1. Age:_____Years
1.2. Gender:
A. Female□
B. Male □
C. Others □

1.3. Level of Education:
A. Illiterate (Can't read and write) □
B. Primary (Grades 1-5)/PSC/equivalent□
C. Junior Secondary (Grades 6-8)/JSC/equivalent □
D. Secondary (Grades 9-10) / equivalent□
E. SSC (Grade 10 complete) /equivalent□
F. Higher Secondary (Grades 11-12) /equivalent□
G. HSC (Grade 12 complete) /equivalent□
H. Bachelor's Degree/equivalent□
I. Master's Degree/equivalent□
J. Master of Philosophy □
K. Doctoral Degree (PHD) □
Professional Degree (e.g. MBBS/Dental/ACCA/CA etc.)
M. Others □

1.4. Religion: _____
1.5. Marital Status_____
1.6. If married, occupation of spouse? _____
1.7. What is your father's occupation? _____
1.8. What is your mother's occupation? _____
1.9. Number of household family members (Family size): _____
1.10. Do you have children?
A. Yes (please mention the number) _____
B. No □

1.11. Do you have dependents (including children) who live with you?
A. Yes (please mention the number) _____
B. No □

1.12. Do you have help at home (e.g. maid, parents, etc.)?
A. Yes □
B. No □

1.13. How many hours per week do you dedicate to your business?_____

1.14. Monthly household income: _____

1.15. Monthly household expenditure: _____

II) CHARACTERISTICS OF ENTREPRENEURS AND THEIR ENTERPRISES:

2.1. Type of ownership:

A. Sole ownership □
B. Joint ownership □
C. Family business □
D. Cooperative □
E. E. Limited Liability Company □
F. F. Unlimited Liability Company □
G. Other (specify) _____

2.2. What percent of the business you own? _____%

2.3. To what extent you are involved in business decision making?

A. Fully
B. Majorly
C. Partially but not majorly
D. No involvement

2.4.Your enterprise can be classified as:

A. Business to Business (B2B) □
B. Business to Consumer (B2C) □
C. Both (B2B & B2C) □
D. Business to Government (B2G) □
E. Other (specify) _____

2.5.Kind of business:

A. Manufacturer □
B. Wholesaler □
C. Retailer □
D.Service
D. Business Services □
E.Other (specify) _____

2.6. What sector is your business in?

i. Beauty Salon □
ii. Restaurant□
iii. Handicrafts □
iv. Textile Boutique Shop (Fashion Houses)□
v. Agribusiness □
vi. ICT□
vii. Knitwear & Readymade Garments□
viii. Electronics and electrical □
ix. Software development □
x. Light engineering and metal-working □
xi. Leather-making and leather goods □
xii. Plastics and other synthetics □
xiii. Healthcare and diagnostics □
xiv. Educational services □
xv. Pharmaceuticals/cosmetics/toiletries □
xvi. Footwear □
xvii. Tourism (including Hotels and Boarding Houses)□
xviii. Data entry and data processing □
xix. Furniture □
xx. Ceramics □
xxi. Financing and Insurance □

xxii. Transport and Storage □
xxiii. Event Management □
xxiv. Outsourcing (including content makers) □
xxv. Broadcasting, advertising and media-related companies □
xxvi. Property, estate management and related companies □
xxvii. Energy
xxviii. Infrastructure
xxix. Other (specify) _____

2.7. What percent of your revenue comes from the following markets?
A. district market _____%
B. Inter-district market _____%
C. National markets _____%
D. International markets _____%

2.8. Mode of operation (please mention the percentage):
A. Offline _____%
B. Online_____%
C. Both _____%

2.9. Years of operation: _____

2.10. Number of employees in the enterprise? _____

2.11. How many of your family members work with you? _____

2.12. Annual revenue of the enterprise in the last 3 years:

2015	2016	2017

2.13.Net profit of the enterprise for the last 3 years:

2015	2016	2017

2.14. Have you started and run/are running other business/businesses before/after starting this business?
A. Yes □
B. No □

III) ECONOMIC BACKGROUND OF ENTREPRENEURS:
3.1. Do you have a personal bank account?
A) Yes □ B) No □

3.2. What was the source of your capital for starting your business?
(you can choose more than 1 option)
A. Personal savings □
B. Family support (Spouse or Parents) □
C. Borrowed from relatives or friends □
D. Bank Loan □
E. Micro-finance institutions/NGO's □
F. Money lenders □
G. Cooperatives □
H. Others (specify) _____

PART 2: ICT RELATED QUESTIONNAIRE

1. Which of the following ICT tools you use in your firm?

ICT Tools	Definition	**Please tick**
Mobile/telephony	Mobile/Telephony (e.g. Fixed telephone including PABX extension, Business mobile devices etc.)	
Computer /software/hardware	Computer (e.g. Desktop, Laptop etc.) /software/hardware	
Internet	Internet/Broadband	
Online Social Media and communication tools	Social Media/Internet communication tools like WhatsApp, Viber, Skype, Own website	
Specialized software	Enterprise Resource Planning (ERP) software, Customer relationship management (CRM) software	
Information Management System	Integrated Information management System(IMIS)/Other information tools like cloud computing	
e-commerce	e-commerce/e-business	
e-marketing	e-marketing	
Other ICT tools	(specify) _____	

2. Do you use mobile banking?

A) Yes □ B) No □

If yes, could you please specify the mobile banking service/services you use?_____

3. Do you have any online payment system for the customers?

A) Yes □ B) No □

If yes, please specify the percentage of online and offline payment:

	Percentage
a) Online payment, i.e. payment integrated in the ordering transaction (e.g. credit, debit card, direct debit authorisation, via 3rd party accounts)	
b) Offline payment, i.e. payment process is not included in the ordering transaction (e.g. cash on delivery, bank transfer, cheque payment, other non-online payment)	

4. Number of employees using ICT tools:

If you can't provide an estimate of the percentage of the total number of employees using ICT tools, Please indicate an actual value in the 3rd column:

ICT Tools	**Percentage of the total number of employees using ICT tools**	**Number of employees using ICT tool**
Fixed telephone including PABX extension		
Business mobile devices		
Desktop		
Laptop		
Internet		
Online Social Media and communication tools		
Specialized software (e.g. ERP, CRM etc.)		

Information management System (e.g. IMIS, cloud computing etc.)		
e-commerce		
e-marketing		
Other ICT tools(specify) _____		

5. How long have you been using ICT tools for business-related activities in your organization?

ICT tools	< 1 year	1–2years	2–3 years	3–4 years	4–5 years	>5 years
Fixed telephone including PABX extension						
Business mobile devices						
Desktop						
Laptop						
Internet						
Online Social Media and communication tools						
Specialized software (e.g. ERP, CRM etc.)						
Information management System (e.g. IMIS, cloud computing etc.)						
e-commerce						
e-marketing						
Other ICT tools(specify) _____						

6. Frequency of usage of the ICT tools:

ICT tools	**Never**	**Seldom**	**Sometimes**	**Often**	**Always**
Fixed telephone including PABX extension					
Business mobile devices					
Desktop					
Laptop					
Internet					
Online Social Media and communication tools					
Specialized software (e.g. ERP, CRM etc.)					
Information management System (e.g. IMIS, cloud computing etc.)					
e-commerce					
e-marketing					
Other ICT tools(specify) _____					

7. What is the purpose of using ICT in your firm?

Purpose		Please tick if it fits your usage (you can tick more than one options)				
		Never	**Seldom**	**Sometimes**	**Often**	**Always**
Administration	Organizing, arranging and coordinating meetings.					
Customer Relationship Management	Codesigning systems with customers.					
	Providing customers information to address queries regarding products and services.					
	Handling any customer complaints.					
Communication	Ensuring better communication and					

	coordination in managing operations and teams within the firm.					
	Ensuring enhanced communication with customers via email, video-conferencing, social media, live chat etc.					
	Ensuring enhanced communication with suppliers via email, video-conferencing, social media, live chat etc.					
Marketing and Sales	Promoting and advertising company's products, services, and capabilities.					
	Providing online product catalogue to customers and prospects.					
	Answering customer queries about product availability, order status, etc.					
	Allowing customers to place online orders.					
	Enabling online access to salespeople for product/price/performance information.					
	Enabling salespeople to transmit sales call related information					
	Providing online support to distributors/dealers.					
	Using Website visitor information for marketing and prospecting.					

	Tracking payment records.					
	Tracking of debts owed.					
	Making data storage manageable and less bulky.					
Training & Development	E-learning.					
	Using ICT tools as a training tools to teach new skills to employees.					
	Training new employees how a business operates.					
Purchase	Bidding on contracts.					
	To enable online purchase of parts/components from suppliers.					
	Selecting products or services from a set of options.					
	Online payments for bought items.					
Research (Market Research)	Gathering market related information on customers, competitors, and industry.					
	Exploring how to improve Price competitiveness by comparing with Industry Competitors.					
	Exploring how to improve Product quality by comparing with Industry Competitors.					
	Exploring how to increase Product variety by comparing with Industry Competitors.					
	Exploring how to improve Marketing support by comparing with Industry Competitors.					
	Exploring how to improve Customer service by comparing with Industry Competitors.					
	Exploring how to gain new technology/expertise.					
	Exploring how to build awareness and image overseas.					
	Realizing how to enter key markets abroad.					
	Realizing how to improve Sales growth.					
	Realizing how to improve market share position.					
	Realizing how to improve Profitability.					
Others (specify) _____						

8. Status of ICT capability in your firm:

		Strongly Disagree	**Disagree**	**Neither Agree nor Disagree**	**Agree**	**Strongly agree**
Internal use of ICT	ICT is used to access information (e.g. market and customer)					
	ICT is used to enable strategic planning					
	ICT is used to enable cost savings					
	ICT is used to enable competence/skills development for employees					
ICT for collaboration	ICT is used to maintain collaboration with existing business partners					
	ICT is used to establish business collaborations with new partners					
	ICT is used to enable work flexibility (e.g. work outside the office)					
ICT for communication	ICT is used to handle communication within the firm (e.g. intranet)					
	ICT is used to handle external communication with the firm's stakeholders (e.g. Extranet)					
	ICT is used to promote marketing activities					

9. General ICT knowledge and skills of employees:

Please mention the percentage for each ICT tool in column 2-6.

ICT tools	Very Low	Below Average	Average	Above Average	Very High
Fixed telephone including PABX extension					
Business mobile devices					
Desktop					
Laptop					
Internet					
Online Social Media and communication tools					
Specialized software (e.g. ERP, CRM etc.)					
Information management System (e.g. IMIS, cloud computing etc.)					
e-commerce					
e-marketing					
Other ICT tools(specify) _____					

10. Do you provide ICT related training to employees?

A. Yes **B.** No

If yes, please specify the type of training

ICT tools	Please tick the appropriate option
Fixed telephone including PABX extension	
Business mobile devices	
Desktop	
Laptop	
Internet	
Online Social Media and communication tools	
Specialized software (e.g. ERP, CRM etc.)	
Information management System (e.g. IMIS, cloud computing etc.)	
e-commerce	
e-marketing	
Other ICT tools(specify) _____	

11. ICT investments of the firm in the last 3 years:

ICT tools	2015	2016	2017
Fixed telephone including PABX extension			
Business mobile devices			
Desktop			
Laptop			
Internet			
Online Social Media and communication tools			
Specialized software (e.g. ERP, CRM etc.)			
Information management System (e.g. IMIS, cloud computing etc.)			
e-commerce			
e-marketing			
Other ICT tools(specify) _____			

12. In regards to ICT tools, how much does it plan to spend within the next 12 months?

ICT tools	Planned Budget for next 12 months
Fixed telephone including PABX extension	
Business mobile devices	
Desktop	
Laptop	
Internet	
Online Social Media and communication tools	
Specialized software (e.g. ERP, CRM etc.)	
Information management System (e.g. IMIS, cloud computing etc.)	
e-commerce	
e-marketing	
Other ICT tools(specify) _____	

13. What is your perceptions of payoff of ICT on overall firm performance in the last 3 years?

Payoff Category		Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly agree
	A high volume of sales.					
	High Profits.					

Profitability	High ROI (rate of return on investment).					
	High sales revenue.					
	High ROA (Return on Assets).					
Growth	Increase in productivity.					
	Increase in market share.					
	Increase in profit margin.					
	Increase in gross profit.					
	Increase in net profit.					
	Helped market expansion.					
	Helped Export Market Expansion.					
	Helped Import Market Expansion.					
	Achieved Sales Growth.					
Other performance measure	The increase of responsiveness.					
	The increase of quality assurance.					
	The increase of inventory turnover rate.					
	Development of new products, services and processes.					
	Improvement of product and service quality.					
	Improvement of external communication.					
	Improvement of coordination and internal communication.					
	Improving customer services through integrated processes.					
	Exploitation of network opportunities.					
	Penetration of new markets.					
	The increase of customer satisfaction.					
	Employees can work remotely.					
	Increased efficiency of marketing.					
	Reduction in costs.					
	Social recognition of activity.					
	The increase of operational efficiency.					
	The improvement of professional capability.					
	The increase of employee retention rate.					
	The positiveness of employee’s working attitude.					

PART 3: NETWORK RELATED QUESTIONNAIRE

1. **Which of the following networks do you use?** (Please tick at the relevant box if the network is formal/ informal in your case).

Network	Number	Category			Average number of contacts per month
		Formal	Informal	Semiformal	
Family/relatives					
Friends					
Acquaintances					
External service provider (solicitor/accountant/consultant/others)					
Employees					
Representatives of other business					
Bank representatives					
Customers					
Suppliers					
Business Partners					
Competitors					
Industry association members					
Members of professional bodies					
Representatives of Government agent/agencies					
Representatives of NGOs					
Others (please specify)……..					

2. **On which of the following online sites you have a profile? (**Please tick at the relevant box. You can choose more than 1 options)

Face-book	Link-edIn	Wha-tsApp	Vib-er	Twit-ter	Insta-gram	Mys-pace	Pinte-rest	Goo-gle+	Sky-pe	You-tube subsc riber	Em-ail	Other - (please specify)

3. How often do you use various online and offline networks for your business?

		Never	Rarely	Someti-mes	Often	Very Often
Social networking sites (e.g. FaceBook, Linked-In, Twitter, Myspace, Google+)	Family/relatives					
	Friends					
	Acquaintances					
	External service provider (solicitor/accountant/consultant/other s					
	Employees					
	Representatives of other business					
	Bank representatives					
	Customers					
	Suppliers					
	Business Partners					
	Competitors					
	Industry association members					
	Members of professional bodies					

	Representatives of Government agent/agencies					
	Representatives of NGOs					
	Others (please specify)……					
Instant Messaging and Audio and Video Chatting Platforms (e.g. Whats app, Viber, Imo, Skype)	Family/relatives					
	Friends					
	Acquaintances					
	External service provider (solicitor/accountant/consultant/others					
	Employees					
	Representatives of other business					
	Bank representatives					
	Customers					
	Suppliers					
	Business Partners					
	Competitors					
	Industry association members					
	Members of professional bodies					
	Representatives of Government agent/agencies					
	Representatives of NGOs					
	Others (please specify)……					
Photo sharing platforms (e.g. Instagram, Pinterest)	Family/relatives					
	Friends					
	Acquaintances					
	External service provider (solicitor/accountant/consultant/others					
	Employees					
	Representatives of other business					
	Bank representatives					
	Customers					
	Suppliers					
	Business Partners					
	Competitors					
	Industry association members					
	Members of professional bodies					
	Representatives of Government					
	Representatives of NGOs					
	Others (please specify)……					
	Family/relatives					
	Friends					

Video sharing platform like Youtube	Acquaintances					
	External service provider (solicitor/accountant/consultant/others					
	Employees					
	Representatives of other business					
	Bank representatives					
	Customers					
	Suppliers					
	Business Partners					
	Competitors					
	Industry association members					
	Members of professional bodies					
	Representatives of Government agent/agencies					
	Representatives of NGOs					
	Others (please specify)……					
Email	Family/relatives					
	Friends					
	Acquaintances					
	External service provider (solicitor/accountant/consultant/others					
	Employees					
	Representatives of other business					
	Bank representatives					
	Customers					
	Suppliers					
	Business Partners					
	Competitors					
	Industry association members					
	Members of professional bodies					
	Representatives of Government agent/agencies					
	Representatives of NGOs					
	Others (please specify)……					
Office Website	Family/relatives					
	Friends					
	Acquaintances					
	External service provider (solicitor/accountant/consultant/others					
	Employees					
	Representatives of other business					

	Bank representatives					
	Customers					
	Suppliers					
	Business Partners					
	Competitors					
	Industry association members					
	Members of professional bodies					
	Representatives of Government agent/agencies					
	Representatives of NGOs					
	Others (please specify)……					
Face to Face Meeting	Family/relatives					
	Friends					
	Acquaintances					
	External service provider (solicitor/accountant/consultant/others					
	Employees					
	Representatives of other business					
	Bank representatives					
	Customers					
	Suppliers					
	Business Partners					
	Competitors					
	Industry association members					
	Members of professional bodies					
	Representatives of Government agent/agencies					
	Representatives of NGOs					
	Others (please specify)……					
Interaction via Mobile/Telephone	Family/relatives					
	Friends					
	Acquaintances					
	External service provider (solicitor/accountant/consultant/others					
	Employees					
	Representatives of other business					
	Bank representatives					
	Customers					
	Suppliers					
	Business Partners					
	Competitors					

	Industry association members					
	Members of professional bodies					
	Representatives of Government agent/agencies					
	Representatives of NGOs					
	Others (please specify)……					
Events/ Exhibitions/trade fair	Family/relatives					
	Friends					
	Acquaintances					
	External service provider (solicitor/accountant/consultant/others					
	Employees					
	Representatives of other business					
	Bank representatives					
	Customers					
	Suppliers					
	Business Partners					
	Competitors					
	Industry association members					
	Members of professional bodies					
	Representatives of Government agent/agencies					
	Representatives of NGOs					
	Others (please specify)……					
Other (please specify) ……	Family/relatives					
	Friends					
	Acquaintances					
	External service provider (solicitor/accountant/consultant/others					
	Employees					
	Representatives of other business					
	Bank representatives					
	Customers					
	Suppliers					
	Business Partners					
	Competitors					
	Industry association members					
	Members of professional bodies					
	Representatives of Government agent/agencies					
	Representatives of NGOs					
	Others (please specify)……					

4. How many hours per month (on average) do you spend with your existing networks with whom you can discuss business matters?

Network	Category		Average number of hours per month
	Online	Offline	
Family/relatives			
Friends			
Acquaintances			
External service provider (solicitor/accountant/consultant/others)			
Employees			
Representatives of other business			
Bank representatives			
Customers			
Suppliers			
Business Partners			
Competitors			
Industry association members			
Members of professional bodies			
Representatives of Government agent/agencies			
Representatives of NGOs			
Others (please specify)……..			

5. How do you think, the following person and organizations were important for each step of your business.

(The steps are given in column 3, 4 & 5)? (Select and tick any whoever helped you for each phase/step, then rank importance (where 1=very important, 2= important, 3=Moderately Important, 4= Slightly Important and 5= Not Important)

Sl.		I. For your business Identification (skill training & about business opportunity)		ii. For initial capital & other material e.g.: money building, place)		iii. in running your business now (money shortage, Market subcontracting, technology, etc.)	
		Tick	Rank	Tick	Rank	Tick	Rank
a)	Family/relatives						
b)	Friends						
c)	Acquaintances						
d)	External service provider (solicitor/accountant/consultant/others)						
e)	Employees						
f)	Representatives of other business						
g)	Bank representatives						
h)	Customers						
i)	Suppliers						
J)	Business Partners						
k)	Competitors						
l)	Industry association members						
m)	Members of professional bodies						
n)	Representatives of Government agent/agencies						
o)	Representatives of NGOs						
p)	Others (please specify)……						

6. How frequently do you enable people in your network, who did not know each other previously, to connect directly for the following purposes?

Category	Never	Rarely	Sometimes	Often	Very Often
For business purpose					
for social purpose					
For sharing ideas					
For sharing knowledge					
For sharing opinion					
For sharing opportunities					
For advice					
For generating referrals					
For getting motivated					
For solving particular problems					
For any other purpose (please specify)……					

7. What are your perceptions of payoff of Networking on overall firm performance in the last 3 years?

Payoff Category		**Strongly Disagree**	**Disagree**	**Neither Agree Nor Disagree**	**Agree**	**Strongly agree**
Profitability	A high volume of sales.					
	High Profits.					
	High ROI (rate of return on investment).					
	High sales revenue.					
	High ROA (Return on Assets).					
Growth	Increase in productivity.					
	Increase in market share.					
	Increase in profit margin.					
	Increase in gross profit.					
	Increase in net profit.					
	Helped market expansion.					
	Helped Export Market Expansion.					
	Helped Import Market Expansion.					
	Achieved Sales Growth.					
Other performance measure	The increase of responsiveness.					
	The increase of quality assurance.					
	The increase of inventory turnover rate.					
	Development of new products, services and processes.					
	Improvement of product and service quality.					
	Improvement of external communication.					
	Improvement of coordination and internal communication.					
	Improving customer services through integrated processes.					

	Exploitation of network opportunities.					
	Penetration of new markets.					
	The increase of customer satisfaction.					
	Employees can work remotely.					
	Increased efficiency of marketing.					
	Reduction in costs.					
	Social recognition of activity.					
	The increase of operational efficiency.					
	The improvement of professional capability.					
	The increase of employee retention rate.					
	The aggressiveness of employee's working attitude.					

THANK YOU VERY MUCH FOR YOUR CO-OPERATION

APPENDIX E: SURVEY QUESTIONNAIRE IN BENGALI

ক) অংশগ্রহণের তথ্য পত্র

প্রিয় স্যার / ম্যাডাম,

"ব্যবসায়ের সাফল্যের পেছনে নেটওয়ার্কিং এবং আইসিটি প্রভাব "তদন্ত একটি অধ্যয়নে অংশগ্রহণের জন্য আমন্ত্রণ জানানো হয়। গবেষণার উদ্দেশ্য বাংলাদেশের উদ্যোক্তাদের কর্মক্ষমতা আইসিটি এবং নেটওয়ার্কিং প্রভাব চিহ্নিত করা হয়।

অংশগ্রহণকারী হিসাবে, আপনাকে প্রধানত তিন ধরণের প্রশ্নাবলীর (ডেমোগ্রাফিক প্রশ্নাবলী, আইসিটি সম্পর্কিত প্রশ্নাবলী, এবং নেটওয়ার্কিং সম্পর্কিত প্রশ্নাবলী) জিজ্ঞাসা করা হবে। অংশগ্রহণ করতে আপনার প্রায় এক ঘন্টা সময় লাগবে।

এই গবেষণায় অংশগ্রহণের ক্ষেত্রে কোনো জানা বা প্রত্যাশিত ঝুঁকি নেই।এই গবেষণাটি পর্যালোচনা করা হয়েছে এবং এসেক্স বিশ্ববিদ্যালয়ের গবেষণা সংক্রান্ত এথিক্স (নীতিমালা) বোর্ডের মাধ্যমে ক্লিয়ারেন্স গ্রহণ করা হয়েছে। এই গবেষণার সময় সংগৃহীত তথ্য অনুসন্ধানকারীদের পাসওয়ার্ড-সুরক্ষিত ব্যক্তিগত কম্পিউটারে সংরক্ষণ করা হবে। তথ্য ১০ বছরের জন্য রাখা হবে, যার পরে নষ্ট করা হবে। এই তথ্যের অ্যাক্সেস শুধুমাত্র তদন্তকারী (শারমিন নাহার) এবং তার সুপারভাইজার (ড: অভিজিৎ সেনগুপ্ত এবং ড: এম শামসুল করিম) এর মধ্যে সীমাবদ্ধ থাকবে।

এই গবেষণায় অংশগ্রহণ ইচ্ছার ওপর নির্ভর করে।আপনি যদি চান তবে কোনও প্রশ্নের উত্তর দিতে অথবা গবেষণার কোনও অংশে অংশগ্রহণ করতে প্রত্যাখ্যান করতে পারেন।

এই গবেষণার ফলাফল পেশাদার জার্নালগুলিতে প্রকাশিত হতে পারে এবং সম্মেলনগুলিতে উপস্থাপিত হতে পারে। এই গবেষণা সম্পর্কে প্রতিক্রিয়া পাওয়া যাবে শারমিন নাহারের কাছে। আপনি sn16075@essex.ac.uk এই ইমেল আইডিটিতে তার সাথে যোগাযোগ করতে পারেন।

এই গবেষণা প্রকল্পের অংশগ্রহণ দ্বারা যদি আপনি ক্ষতিগ্রস্ত হয়, কোন বিশেষ ক্ষতিপূরণের ব্যবস্থা নেই। এরপরও , যদি আপনি এই গবেষণার সময় আপনার সাথে আচরণের যে কোনও দিক সম্পর্কে অভিযোগ করতে চান বা আপনার কোনও উদ্বেগ থাকে তবে আপনাকে অবিলম্বে গবেষক এবং/অথবা তাদের সুপারভাইজারকে (বিস্তারিত বিবরণ নিচে প্রদত্ত) জানাতে পারেন।

যদি আপনি তাদের প্রদত্ত উত্তর নিয়ে সন্তুষ্ট না হন, তবে আপনি এসেক্স বিজনেস স্কুল এর গবেষণা বিষয়ক এথিক্স অফিসার ড: ড্যানিয়েল টাকার (dtucker@essex.ac.uk), বা এসেক্স ইউনিভার্সিটির গবেষণা বিষয়ক গভর্নেন্স অ্যান্ড পলিসি ম্যানেজার, সারা ম্যানিং-প্রেস (sarahm@essex.ac.uk) আপনাকে আরও পরামর্শ দিতে পারবে।

আপনি এই গবেষণায় অংশগ্রহণ করলে আমরা খুব কৃতজ্ঞ হব। যদি ভবিষ্যতে আমাদের সাথে যোগাযোগ করতে হয় তবে দয়া করে আমার (sn16075@essex.ac.uk) অথবা আমার সুপারভাইজার ড: অভিজিৎ সেনগুপ্ত (asengua@essex.ac.uk) অথবা ড: শামসুল করিম (mskarim@essex.ac.uk) সাথে যোগাযোগ করুন।

এই প্রকল্পের সাথে আপনার সহায়তার জন্য আপনাকে ধন্যবাদ। আপনার ব্যক্তিগত রেকর্ডের জন্য দয়া করে এই ফর্মটির একটি অনুলিপি রাখুন।

শুভেচ্ছা সহ,
শারমিন নাহার
পিএইচডি প্রার্থী
এসেক্স বিশ্ববিদ্যালয়
ই-মেইল: sn16075@essex.ac.uk

খ) অনুমতি (কনসেন্ট) সংক্রান্ত ফরম

আমি, নিচে স্বাক্ষরকারী, নিশ্চিত করছি যে (উপযুক্ত বক্সটিতে টিক চিহ্ন প্রদান করুন:

১.	আমি শারমিন নাহার দ্বারা পরিচালিত গবেষণা প্রকল্প, "ব্যবসায়ের সাফল্যের পেছনে নেটওয়ার্কিং এবং আইসিটি প্রভাব" অংশগ্রহণের জন্য সম্মত।	☐
২.	এই সম্মতিটি স্বেচ্ছায় এবং কোন প্রকার বলপ্রয়োগ ছাড়া দেওয়া হয়েছে ।	☐
৩.	আমাকে গবেষণা এবং গবেষক এর যোগাযোগের বিবরণ সম্পর্কে সম্পূর্ণ তথ্য দেওয়া হয়েছে।	☐
৪.	যদি প্রযোজ্য হয়, সাক্ষাতকার, অডিও, ভিডিও বা তথ্য সংগ্রহের অন্যান্য ফর্মের সম্মতির স্বতন্ত্র শর্তাদি ব্যাখ্যা করা হয়েছে এবং আমাকে প্রদান করা হয়েছে।	☐
৫.	গবেষণা, প্রকাশনা, ভাগ করা এবং সংরক্ষণাগারের তথ্য ব্যবহার সম্পর্কে ব্যাখ্যা করা হয়েছে।	☐
৬.	আমি বুঝি যে অন্যান্য গবেষকরা এই তথ্য অ্যাক্সেস করতে পারবেন শুধুমাত্র যদি তারা তথ্য গোপনীয়তা রক্ষা করতে সম্মত হন এবং যদি তারা এই ফর্মটিতে নির্দিষ্ট করা শর্তগুলির সাথে সম্মত হন তবে ।	☐
৭.	আমি এবং গবেষক এই সম্মতি সংক্রান্ত ফর্মে তারিখ সহ স্বাক্ষর প্রদান করতে সম্মত হয়েছি।	☐

অংশগ্রহণকারীগণ :

_____	_____	_____
অংশগ্রহণকারীর নাম	স্বাক্ষর	তারিখ

গবেষক:

_____	_____	_____
গবেষকের নাম	স্বাক্ষর	তারিখ

গ) জরিপ প্রশ্নাবলী

গোপনীয়

আপনার মতামত গুরুত্বপূর্ণ .....

আপনার প্রদত্ত সকল তথ্য গোপন বিবেচনা করা হবে; আপনার নাম গবেষণার কোথাও উল্লেখ করা হবে না। উপরন্তু, গবেষণায় ব্যবহৃত সমগ্র দলের কারণে আপনি এই গবেষণা লিখিত প্রতিবেদনে কোন ভাবেই পৃথকভাবে চিহ্নিত করা সম্ভব হবে না। এছাড়া, যদি এই জরিপে অথবা এই গবেষণার লিখিত প্রতিবেদনে আপনার সম্পর্কিত কোনো তথ্য প্রকাশ করার প্রয়োজন বোধ করা হয় তাহলে, আপনার লিখিত অনুমতি নিয়ে যাওয়া হবে।

দ্রষ্টব্য: আপনার নাম লেখার কোন প্রয়োজন নেই

<u>প্রথম অংশ: ডেমোগ্রাফিক তথ্য:</u>
<u>১)ব্যক্তিগত তথ্য:</u>
১.১) বয়স::_____বছর

১.২)লিঙ্গ:
অ) মহিলা □
আ)পুরুষ □
ই) অন্যান্য □

১.৩) শিক্ষার স্তর:
অ) অশিক্ষিত (পড়তে ও লিখতে পারবেন না)□ □
আ) প্রাথমিক (শ্রেণী ১-৫) / পিএসসি / সমমানের □
ই) জুনিয়র মাধ্যমিক (শ্রেণী৬-৮) / জেএসসি/সমমানের □□
ঈ) মাধ্যমিক (শ্রেণী ৯-১০) / সমমানের □
উ) এসএসসি (শ্রেণী ১০ সম্পূর্ণ)□
ঊ)উচ্চ মাধ্যমিক (গ্রেড ১১-১২) / সমমানের □
ঋ) এইচএসসি (শ্রেণী ১২ সম্পূর্ণ)□
এ) ব্যাচেলর ডিগ্রি / সমমানের □
ঐ) মাস্টার ডিগ্রি / সমমানের □
ও) এমফিল □
ঔ) ডক্টরাল ডিগ্রি (পিএইচডি)□
ক) পেশাগত ডিগ্রি (যেমন এমবিবিএস / ডেন্টাল / এসিসিএ / সিএ ইত্যাদি)□
খ) অন্যান্য □

১.৪) ধর্ম:_____

১.৫) বৈবাহিক অবস্থা:_____

১.৬) বিবাহিত হলে স্বামীর পেশা:_____

১.৭) পিতার পেশা: _____
১.৮) মায়ের পেশা: _____

১.৯)পরিবারের সদস্য সংখ্যা:_____

১.১০) আপনার কি সন্তান আছে কি?
অ) হ্যাঁ (সংখ্যা উল্লেখ করুন) _____
আ) না □

১.১১) আপনার পরিবারের কেউ (সন্তান সহ)কি আপনার ওপর নির্ভরশীল :
অ) হ্যাঁ (সংখ্যা উল্লেখ করুন) _____
আ) না □

১.১২) আপনাকে ঘরের কাজে কেউ কি সাহায্য করেন (যেমন গৃহকর্মী , মাতাপিতা ইত্যাদি)?

অ) হ্যাঁ □
আ) না □

১.১৩)প্রতি সপ্তাহে কত ঘন্টা আপনি আপনার ব্যবসার জন্য ব্যয় করেন?_____

১.১৪) আপনার পরিবারের মাসিক আয়:_____

১.১৫) আপনার পরিবারের মাসিক ব্যয়:_____

২)নারী উদ্যোক্তা এবং তাদের ব্যবসার বৈশিষ্ট:

২.১) মালিকানার প্রকার:
অ) একমাত্র মালিকানা □
আ) যৌথ মালিকানা □
ই) পারিবারিক মালিকানা □
ঈ) সমবায় □
উ) সসীম দায়সম্পন্ন কোম্পানি/সীমিত দায় কোম্পানি/লিমিটেড লায়াবিলিটি কোম্পানি □
ঊ)অসীম দায়সম্পন্ন কোম্পানি/ আনলিমিটেড লায়াবিলিটি কোম্পানি □
ঋ) অন্যান্য(উল্লেখ করুন)_____

২.২)ব্যবসায়ের কত অংশের আপনি মালিক? _____%

২.৩) আপনি আপনার ব্যবসা সংক্রান্ত সিদ্ধান্ত গ্রহণে কতটা জড়িত?
অ) সম্পূর্ণ □
আ) অধিকাংশ □

ই) আংশিক কিন্তু অধিকাংশ নয় □
ঈ) কোন ভাবে জড়িত নই □

২.৪)আপনার ব্যবসা কি ধরনের?
অ) ব্যবসায় থেকে ব্যবসা (B2B) □
আ) ব্যবসা থেকে ভোক্তা (B2C) □

ই) উভয় (B2B এবং B2C) □
ঈ) অন্যান্য(উল্লেখ করুন)_____

২.৫) ব্যবসায়ের ধরণ:
অ) প্রস্তুতকারক □
আ) পাইকারী বিক্রেতা □
ই) খুচরা বিক্রেতা □
ঈ) সেবা/সার্ভিস □
উ) ব্যবসা সেবা □
ঊ)অন্যান্য(উল্লেখ করুন)_____

২.৬) আপনার ব্যবসা কোন সেক্টর এ?
i. বিউটি পার্লার □
ii. রেস্তোরা □
iii. হস্তশিল্প □
iv. টেক্সটাইল বুটিক সপ (ফ্যাশন হাউজ) □
v. কৃষি বিষয়ক ব্যবসা □
vi. তথ্য ও যোগাযোগ প্রযুক্তি সম্পর্কিত □
vii. নিটওয়্যার এবং রেডিমেড গার্মেন্টস □
viii. ইলেক্ট্রনিক্স এবং ইলেকট্রিকাল □
ix. সফটওয়্যার ডেভেলপমেন্ট □
x. লাইট ইঞ্জিনিয়ারিং এবং ধাতুর (মেটাল) কাজ □

xi. চামড়া এবং চামড়াজাত পণ্য □
xii. প্লাস্টিক এবং অন্যান্য সিনথেটিক্স □
xiii. স্বাস্থ্যসেবা এবং ডায়াগনস্টিক্স □
xiv. শিক্ষাগত সেবা □
xv. ফার্মাসিউটিক্যালস / প্রসাধনী / প্রসাধন সামগ্রী □
xvi. পাদুকা □
xvii. পর্যটন (হোটেল এবং বোর্ডিং হাউস সহ)□
xviii. ডাটা এন্ট্রি এবং ডাটা প্রসেসিং□
xix. আসবাবপত্র □
xx. সিরামিক্স □
xxi. আর্থিক এবং বীমা □
xxii. পরিবহন এবং স্টোরেজ □
xxiii. ইভেন্ট ম্যানেজমেন্ট □
xxiv. আউটসোর্সিং (কন্টেন্ট মেকার সহ) □
xxv. সম্প্রচার, বিজ্ঞাপন এবং মিডিয়া সংক্রান্ত সংস্থা □
xxvi. সম্পত্তি, এস্টেট ব্যবস্থাপনা এবং সংশ্লিষ্ট কোম্পানি □
xxvii. এনার্জি □
xxviii. ইনফ্রাস্ট্রাকচার □
xxix. অন্যান্য(উল্লেখ করুন)_____

২.৭) আপনার আয়ের কোন শতাংশ নিম্নলিখিত বাজার থেকে আসে?
অ) জেলা বাজার _____%
আ) আন্ত-জেলা বাজার _____%
ই) জাতীয় বাজার _____%
ঈ) আন্তর্জাতিক বাজার _____%

২.৮) অপারেশন এর ধরন (শতাংশ উল্লেখ করুন):
অ)অফলাইন _____%
আ) অনলাইন _____%
ই) উভয় _____%

২.৯)ব্যবসার বয়স:_____

২.১০)ব্যবসার কর্মীদের সংখ্যা:_____

২.১১)আপনার পরিবারের কতজন সদস্য আপনার সাথে কাজ করেন ? _____

২.১২) এন্টারপ্রাইজ এর বার্ষিক আয় (গত তিন বছর) :

২০১৫	২০১৬	২০১৭

২.১৩) এন্টারপ্রাইজ এর নেট মুনাফা (গত তিন বছর) :

২০১৫	২০১৬	২০১৭

২.১৪) আপনি কি এই ব্যবসা শুরু করার আগে / পরে / চালানোর সময় অন্যান্য ব্যবসা চালাচ্ছেন/চালিয়েছেন?
অ) হ্যাঁ □
আ) না □□

৩)ব্যবসায়ীদের অর্থনৈতিক অবস্থা

৩.১) আপনার কি ব্যক্তিগত ব্যাঙ্ক অ্যাকাউন্ট আছে?
অ) হ্যাঁ □
আ) না □□

৩.২) আপনার ব্যবসা শুরু করার জন্য আপনার মূলধন এর উৎস কি ছিল?
(আপনি একের অধিক বিকল্প পছন্দ করতে পারেন)
অ) নিজের সঞ্চয় □
আ) পরিবার এর সহায়তা (স্বামী/স্ত্রী বা বাবা/মা) □
ই) আত্মীয় বা বন্ধুদের থেকে ধার করা □
ঈ) ব্যাংক ঋণ □
উ) ক্ষুদ্র ঋণ প্রতিষ্ঠান / এনজিও □
ঊ) মহাজন □
ঋ) সমবায় □
এ)অন্যান্য(উল্লেখ করুন)_____

দ্বিতীয় অংশ : আইসিটি সম্পর্কিত প্রশ্নাবলী:
১)নিচের সরঞ্জামগুলির মধ্যে আপনি কোনটি ব্যবহার করেন?

আইসিটি সরঞ্জাম/ টুল	সংজ্ঞা	নিচের বিকল্প অনুযায়ী টিক চিহ্ন (√)প্রদান করুন|
মোবাইল / টেলিফোনি	মোবাইল / টেলিফোনি (যেমন **PABX** এক্সটেনশন সহ ল্যান্ডফোন, ব্যবসা প্রতিষ্ঠানের মোবাইল ডিভাইস ইত্যাদি)	
কম্পিউটার / সফ্টওয়্যার / হার্ডওয়্যার	কম্পিউটার (যেমন ডেস্কটপ, ল্যাপটপ ইত্যাদি) / সফটওয়্যার / হার্ডওয়্যার	
ইন্টারনেট	ইন্টারনেট / ব্রডব্যান্ড	
অনলাইন সামাজিক মিডিয়া এবং যোগাযোগ সরঞ্জাম	সোশ্যাল মিডিয়া / ইন্টারনেট যোগাযোগের সরঞ্জাম যেমন হোয়াটসঅ্যাপ,ভাইবার স্কাইপ, নিজস্ব ওয়েবসাইট ইত্যাদি	
বিশেষায়িত সফটওয়্যার	এন্টারপ্রাইজ রিসোর্স পরিকল্পনা (ইআরপি) সফ্টওয়্যার, কাস্টমার রিলেশনশিপ ম্যানেজমেন্ট/গ্রাহক সম্পর্ক ব্যবস্থাপনা (সিআরএম) সফ্টওয়্যার	
ইনফরমেশন ম্যানেজমেন্ট সিস্টেম	ইন্টিগ্রেটেড ইনফরমেশন ম্যানেজমেন্ট সিস্টেম (আইএমআইএস) / অন্যান্য তথ্য টুলস যেমন ক্লাউড কম্পিউটিং	
ই-কমার্স	ই-কমার্স / ই ব্যবসা	
ই-মার্কেটিং	ই-মার্কেটিং	
অন্যান্য আইসিটি সরঞ্জাম	উল্লেখ করুন_____	

২)আপনি কি মোবাইল ব্যাংকিং ব্যবহার করেন?
অ) হ্যাঁ □ **আ)** না □

যদি হ্যাঁ, আপনি কি মোবাইল ব্যাঙ্কিং পরিষেবা / পরিষেবাগুলি ব্যবহার করেন তা উল্লেখ করতে পারেন?
_____

৩) আপনার গ্রাহকদের জন্য আপনার প্রতিষ্ঠানে কোন অনলাইন পেমেন্ট সিস্টেম আছে?
অ) হ্যাঁ □ **আ)** না □

যদি হ্যাঁ, দয়া করে অনলাইন এবং অফলাইন পরিশোধের শতাংশ উল্লেখ করুন:

	শতকরা হার
ক) অনলাইন পেমেন্ট, অর্থ পরিশোধের সাথে অর্ডার লেনদেন একীকরণ অর্থায়ন (যেমন ক্রেডিট, ডেবিট কার্ড, তৃতীয় পক্ষের অ্যাকাউন্টের মাধ্যমে সরাসরি ডেবিট অনুমোদন)|	
খ) অফলাইন অর্থ পরিশোধ যেখানে অর্থ প্রদান লেনদেনের ক্ষেত্রে পেমেন্ট প্রক্রিয়া অন্তর্ভুক্ত না হয় (যেমন, প্রদানোত্তর পরিশোধ/ ক্যাশ অন ডেলিভারি, ব্যাংক ট্রান্সফার, চেক প্রদান, অন্যান্য নন-অনলাইন পেমেন্ট)|	

৪)আপনার প্রতিষ্ঠানে আইসিটি সরঞ্জাম ব্যবহার করেন এমন কর্মচারীদের সংখ্যা:

যদি আপনি আইসিটি সরঞ্জাম ব্যবহার করেন এমন কর্মীদের শতাংশের একটি অনুমান প্রদান করতে না পারেন, দয়া করে ৩য় কলামে একটি প্রকৃত মান নির্দেশ করুন:

আইসিটি সরঞ্জাম/টুল	**আইসিটি সরঞ্জাম/টুল ব্যবহার করে এমন কর্মচারীদের সংখ্যা**	**আইসিটি সরঞ্জাম ব্যবহার করে এমন কর্মীদের মোট শতাংশ**
PABX এক্সটেনশন সহ/ ছাড়া ল্যান্ডফোন		
ব্যবসা প্রতিষ্ঠানের মোবাইল ডিভাইস		
ডেস্কটপ		
ল্যাপটপ		
ইন্টারনেট		
অনলাইন সামাজিক মিডিয়া এবং যোগাযোগ সরঞ্জাম		
বিশেষায়িত সফটওয়্যার (যেমন ইআরপি, সিআরএম ইত্যাদি)		
ইনফরমেশন ম্যানেজমেন্ট সিস্টেম (যেমন আইএমআইএস, ক্লাউড কম্পিউটিং ইত্যাদি)		
ই-কমার্স		
ই-মার্কেটিং		
অন্যান্য আইসিটি সরঞ্জাম (উল্লেখ করুন)_____		

৫) আপনার প্রতিষ্ঠানের ব্যবসা-সম্পর্কিত কার্যক্রমের জন্য আপনি কতদিন ধরে আইসিটি টুল ব্যবহার করছেন?

আইসিটি সরঞ্জাম/টুল	**< ১ বছর**	**১-২ বছর**	**২-৩ বছর**	**৩-৪ বছর**	**৪-৫ বছর**	**>৫ বছর**
PABX এক্সটেনশন সহ/ ছাড়া ল্যান্ডফোন						
ব্যবসা প্রতিষ্ঠানের মোবাইল ডিভাইস						
ডেস্কটপ						
ল্যাপটপ						
ইন্টারনেট						
অনলাইন সামাজিক মিডিয়া এবং যোগাযোগ সরঞ্জাম						

বিশেষায়িত সফটওয়্যার (যেমন ইআরপি, সিআরএম ইত্যাদি)						
ইনফরমেশন ম্যানেজমেন্ট সিস্টেম (যেমন আইএমআইএস, ক্লাউড কম্পিউটিং ইত্যাদি)						
ই-কমার্স						
ই-মার্কেটিং						
অন্যান্য আইসিটি সরঞ্জাম (উল্লেখ করুন)_____						

৬)আইসিটি সরঞ্জাম ব্যবহার সংক্রান্ত পরিসংখ্যান:

আইসিটি সরঞ্জাম/টুল	কখনও না	কদাচিৎ	মাঝেমাঝে	প্রায়	সবসময়
PABX এক্সটেনশন সহ/ ছাড়া ল্যান্ডফোন					
ব্যবসা প্রতিষ্ঠানের মোবাইল ডিভাইস					
ডেস্কটপ					
ল্যাপটপ					
ইন্টারনেট					
অনলাইন সামাজিক মিডিয়া এবং যোগাযোগ সরঞ্জাম					
বিশেষায়িত সফটওয়্যার (যেমন ইআরপি, সিআরএম ইত্যাদি)					
ইনফরমেশন ম্যানেজমেন্ট সিস্টেম (যেমন আইএমআইএস, ক্লাউড কম্পিউটিং ইত্যাদি)					
ই-কমার্স					
ই-মার্কেটিং					
অন্যান্য আইসিটি সরঞ্জাম (উল্লেখ করুন)_____					

৭) আপনার প্রতিষ্ঠানে আইসিটি ব্যবহার করার উদ্দেশ্য কি?

উদ্দেশ্য		নিচের বিকল্প অনুযায়ী টিক চিহ্ন (√)প্রদান করুন (আপনি একের অধিক বিকল্প পছন্দ করতে পারেন)				
		কখনও না	কদাচিৎ	মাঝেমাঝে	প্রায়	সবসময়
প্রশাসন	মিটিং আয়োজন,সংগঠন , এবং সমন্বয়।					
গ্রাহকদের সাথে সম্পর্ক ব্যবস্থাপনা	গ্রাহকদের সাথে একত্রে সিস্টেম ডিজাইন করা ।					
	গ্রাহকদের পণ্য এবং সেবা সংক্রান্ত জিজ্ঞাসাবাদের উত্তর সরবরাহ করা।					
	গ্রাহকের অভিযোগ এর প্রেক্ষিতে ব্যবস্থা গ্রহণ করা।					

যোগাযোগ	প্রতিষ্ঠানের অপারেশন এবং দল পরিচালনায় ভাল যোগাযোগ এবং সমন্বয় নিশ্চিত করা।					
	ইমেল, ভিডিও কনফারেন্সিং, সামাজিক মিডিয়া, লাইভ চ্যাট ইত্যাদির মাধ্যমে গ্রাহকদের সাথে উন্নত যোগাযোগ নিশ্চিত করা।					
	ইমেল, ভিডিও কনফারেন্সিং, সোশ্যাল মিডিয়া, লাইভ চ্যাট ইত্যাদির মাধ্যমে সাপ্লায়ারদের সাথে উন্নত যোগাযোগ নিশ্চিত করা।					
মার্কেটিং এন্ড সেলস (বিপণন এবং বিক্রয়)	কোম্পানী এর পণ্য, পরিষেবা, এবংস ক্ষমতা সংক্রান্ত প্রচার এবং বিজ্ঞাপন।					
	বিদ্যমান এবং সম্ভাব্য গ্রাহকদের অনলাইন পণ্য সংক্রান্ত ক্যাটালগ প্রদান।					
	পণ্যের প্রাপ্যতা, অর্ডার স্ট্যাটাস, ইত্যাদি সম্পর্কে গ্রাহক প্রশ্নের উত্তর প্রদান।					
	গ্রাহকদের অনলাইন অর্ডার প্রদানের ব্যবস্থা করা।					
	পণ্য / দাম / পারফরম্যান্সের জন্য বিক্রয় কর্মীদের অনলাইন অ্যাক্সেস নিশ্চিত করা ।					
	বিক্রয় সংক্রান্ত কল সম্পর্কিত তথ্য প্রচার করাতে বিক্রয় কর্মীদের সক্ষম করা।					
	পরিবেশকদের / ডিলারদের অনলাইন সহায়তা প্রদান করা।					
	বিপণন (মার্কেটিং) এবং প্রসপেকটিং এর জন্য ওয়েব সাইট পরিদর্শকদের তথ্য ব্যবহার করা।					
	পেমেন্ট রেকর্ড ট্র্যাকিং করা।					
	ঋণ পরিশোধের ট্র্যাকিং করা।					
	তথ্য সংগ্রহ পরিচালনাযোগ্য এবং ছোট করা।					
প্রশিক্ষণ ও উন্নয়ন	ই-লার্নিং।					
	কর্মীদের নতুন দক্ষতা শেখানোর সরঞ্জাম হিসাবে আইসিটি টুলস ব্যবহার করা।					
	ব্যবসা পরিচালনা সংক্রান্ত নতুন কর্মচারী প্রশিক্ষণ।					
ক্রয়	চুক্তির উপর বিডিং করা।					
	সাপ্লায়াদের কাছ থেকে অংশ / উপাদান অনলাইনে ক্রয় নিশ্চিত করতে।					
	বিকল্পগুলির একটি সেট থেকে পণ্য বা সেবা নির্বাচন।					
	কেনা সামগ্রীর জন্য অনলাইন পেমেন্ট।					

গবেষণা (বাজার সংক্রান্ত গবেষণা)	গ্রাহকদের, প্রতিযোগীদের এবং শিল্পের বাজার সম্পর্কিত তথ্য সংগ্রহ করা।					
	প্রতিযোগীদের সঙ্গে তুলনা করে মূল্য সংক্রান্ত প্রতিযোগিতার উন্নতির উপায় অনুসন্ধান করা।					
	প্রতিযোগীদের সঙ্গে তুলনা করে পণ্যের গুণমান উন্নত করার পদ্ধতি আবিষ্কার।					
	প্রতিযোগীদের সাথে তুলনা করে পণ্যের বৈচিত্র্য কিভাবে বাড়ানো যায় তা অনুসন্ধান করা।					
	প্রতিযোগীদের সঙ্গে তুলনা করে মার্কেটিং সংক্রান্ত সহায়তা উন্নত করার ব্যাপারে অনুসন্ধান করা।					
	প্রতিযোগীদের সঙ্গে তুলনা করে গ্রাহক পরিষেবা উন্নত করার ব্যাপারে অনুসন্ধান করা।					
	কীভাবে নতুন প্রযুক্তি / দক্ষতা অর্জন করা যায় তা অনুসন্ধান করা।					
	প্রতিষ্ঠানের পণ্য বা সেবা সম্পর্কে বিদেশে সচেতনতা এবং সুনাম তৈরী করা।					
	বিদেশের গুরুত্বপূর্ণ বাজারে কীভাবে প্রবেশ করতে হবে তা অনুসন্ধান করা।					
	বিক্রী বৃদ্ধি কিভাবে করতে হবে তা অনুসন্ধান করা।					
	বাজার শেয়ারের (মার্কেট শেয়ারের) অবস্থানের উন্নতি কিভাবে করতে হবে তা অনুসন্ধান করা।					
	লাভজনকতার উন্নতি কিভাবে করতে হবে তা অনুসন্ধান করা।					
অন্যান্য (উল্লেখ করুন)____						

৮)আপনার প্রতিষ্ঠানে আইসিটি সক্ষমতার অবস্থা:

		দৃঢ়ভাবে অসম্মত	**অসম্মত**	**নিরপেক্ষ**	**সম্মত**	**দৃঢ়ভাবে সম্মত**
আইসিটি এর অভ্যন্তরীণ ব্যবহার	তথ্য অ্যাক্সেস করতে (যেমন, বাজার এবং গ্রাহক) আইসিটি ব্যবহার করা হয়।					
	কৌশলগত পরিকল্পনা সক্ষম করার জন্য					

	আইসিটি ব্যবহার করা হয়।					
	আইসিটি সঞ্চয়ে সক্ষম করতে ব্যবহার করা হয়।					
	কর্মীদের যোগ্যতা / দক্ষতা বিকাশের জন্য আইসিটি ব্যবহার করা হয়।					
সহযোগিতার জন্য আইসিটি	বিদ্যমান ব্যবসায়িক অংশীদারদের সাথে সহযোগিতা বজায় রাখার জন্য আইসিটি ব্যবহার করা হয়।					
	নতুন অংশীদারদের সাথে ব্যবসা সহযোগিতা প্রতিষ্ঠার জন্য আইসিটি ব্যবহার করা হয়।					
	কাজে পরিবর্তনযোগ্যতা বৃদ্ধির জন্য আইসিটি ব্যবহার করা হয় যেমন), অফিসের বাইরে কাজ(।					
যোগাযোগের জন্য আইসিটি	প্রতিষ্ঠানের মধ্যে যোগাযোগ রক্ষার জন্য আইসিটি ব্যবহার করা হয় (যেমন,ইন্ট্রানেট এর ব্যবহার)।					
	আইসিটি ফার্মের স্টেকহোল্ডারদের সঙ্গে বহিরাগত যোগাযোগ পরিচালনা করতে ব্যবহৃত হয় যেমন), এক্সট্র্যানেট(।					
	আইসিটি বিপণন (মার্কেটিং) কার্যক্রম প্রচার করতে ব্যবহৃত হয়।					

৯) প্রতিষ্ঠানের কর্মীদের আইসিটি বিষয়ক সাধারণ জ্ঞান এবং দক্ষতা:

কলাম ২-৬ এ প্রতিটি আইসিটি টুলের শতাংশ উল্লেখ করুন।

আইসিটি সরঞ্জাম/টুল	**খুব কম**	**বিলো অ্যাভারেজ (গড়ের নিচে)**	**অ্যাভারেজ (মাঝামাঝি)**	**এবাভ অ্যাভারেজ (গড়ের ওপরে)**	**অত্যন্ত বেশী**
PABX এক্সটেনশন সহ/ ছাড়া ল্যান্ডফোন					
ব্যবসা প্রতিষ্ঠানের মোবাইল ডিভাইস					

ডেস্কটপ					
ল্যাপটপ					
ইন্টারনেট					
অনলাইন সামাজিক মিডিয়া এবং যোগাযোগ সরঞ্জাম					
বিশেষায়িত সফটওয়্যার (যেমন ইআরপি, সিআরএম ইত্যাদি)					
ইনফরমেশন ম্যানেজমেন্ট সিস্টেম (যেমন আইএমআইএস, ক্লাউড কম্পিউটিং ইত্যাদি)					
ই-কমার্স					
ই-মার্কেটিং					
অন্যান্য আইসিটি সরঞ্জাম (উল্লেখ করুন)_____					

১০)আপনি কি কর্মীদের আইসিটি সংক্রান্ত প্রশিক্ষণ প্রদান করেন?

অ) হ্যাঁ □ **আ)** না □

যদি হ্যাঁ, তবে প্রশিক্ষনের ধরন উল্লেখ করুন

আইসিটি সরঞ্জাম/টুল	উপযুক্ত বিকল্পটিতে টিক চিহ্ন (√)প্রদান করুন
PABX এক্সটেনশন সহ/ ছাড়া ল্যান্ডফোন	
ব্যবসা প্রতিষ্ঠানের মোবাইল ডিভাইস	
ডেস্কটপ	
ল্যাপটপ	
ইন্টারনেট	
অনলাইন সামাজিক মিডিয়া এবং যোগাযোগ সরঞ্জাম	
বিশেষায়িত সফটওয়্যার (যেমন ইআরপি, সিআরএম ইত্যাদি)	
ইনফরমেশন ম্যানেজমেন্ট সিস্টেম (যেমন আইএমআইএস, ক্লাউড কম্পিউটিং ইত্যাদি)	
ই-কমার্স	
ই-মার্কেটিং	
অন্যান্য আইসিটি সরঞ্জাম (উল্লেখ করুন)_____	

১১) গত ৩ বছরে ব্যবসায়ের আইসিটি খাতে বিনিয়োগ:

আইসিটি সরঞ্জাম/টুল	২০১৫	২০১৬	২০১৭
PABX এক্সটেনশন সহ/ ছাড়া ল্যান্ডফোন			
ব্যবসা প্রতিষ্ঠানের মোবাইল ডিভাইস			
ডেস্কটপ			
ল্যাপটপ			
ইন্টারনেট			
অনলাইন সামাজিক মিডিয়া এবং যোগাযোগ সরঞ্জাম			
বিশেষায়িত সফটওয়্যার (যেমন ইআরপি, সিআরএম ইত্যাদি)			
ইনফরমেশন ম্যানেজমেন্ট সিস্টেম (যেমন আইএমআইএস, ক্লাউড কম্পিউটিং ইত্যাদি)			
ই-কমার্স			

ই-মার্কেটিং			
অন্যান্য আইসিটি সরঞ্জাম (উল্লেখ করুন)_____			

১২)আইসিটি খাতে আগামী ১২ মাসে আপনাদের বাজেট কত?

আইসিটি সরঞ্জাম/টুল	আগামী ১২ মাসের জন্য পরিকল্পিত বাজেট
PABX এক্সটেনশন সহ/ ছাড়া ল্যান্ডফোন	
ব্যবসা প্রতিষ্ঠানের মোবাইল ডিভাইস	
ডেস্কটপ	
ল্যাপটপ	
ইন্টারনেট	
অনলাইন সামাজিক মিডিয়া এবং যোগাযোগ সরঞ্জাম	
বিশেষায়িত সফটওয়্যার (যেমন ইআরপি, সিআরএম ইত্যাদি)	
ইনফরমেশন ম্যানেজমেন্ট সিস্টেম (যেমন আইএমআইএস, ক্লাউড কম্পিউটিং ইত্যাদি)	
ই-কমার্স	
ই-মার্কেটিং	
অন্যান্য আইসিটি সরঞ্জাম (উল্লেখ করুন)_____	

১৩) আপনার মতে আইসিটি এর ব্যবহার আপনার প্রতিষ্ঠানের গত তিন বছরের সার্বিক ফলাফলের ওপরের কতটুকু প্রভাব রেখেছে?

ফলাফলের ওপর প্রভাব		দৃঢ়ভাবে অসম্মত	অসম্মত	নিরপেক্ষ	সম্মত	দৃঢ়ভাবে সম্মত
প্রফিটেবিলিটি (লাভজনকতা)	উচ্চ বিক্রয়					
	উচ্চ লাভ/মুনাফা					
	উচ্চ **ROI** (বিনিয়োগে ফেরত হার)					
	উচ্চ বিক্রয় রেভিনিউ (রাজস্ব)					
	উচ্চ **ROA** (সম্পদ ফেরত)					
বৃদ্ধি (গ্রোথ)	উৎপাদনশীলতা (প্রোডাক্টিভিটি) বৃদ্ধি					
	মার্কেট শেয়ার বৃদ্ধি					
	প্রফিট (মুনাফা) মার্জিন বৃদ্ধি					
	মোট মুনাফা (গ্রস প্রফিট) বৃদ্ধি					
	নেট মুনাফা (প্রফিট) বৃদ্ধি					
	বাজার সম্প্রসারণে (মার্কেট এক্সপানশন)সাহায্য করে।					
	রপ্তানি বাজার সম্প্রসারণে (মার্কেট এক্সপানশন)সাহায্য করে।					
	আমদানি বাজার সম্প্রসারণে (মার্কেট					

	এক্সপানশন)সাহায্য করে।					
	বিক্রয়ের গ্রোথ অর্জন					
ফলাফলের অন্যান্য সূচক	প্রতিক্রিয়া (রেস্পন্সিভনেস)বৃদ্ধি					
	গুণমান নিশ্চিতকরণ এর বৃদ্ধি					
	ইনভেন্টরি টার্নওভার হার বৃদ্ধি।					
	নতুন পণ্য, সেবা এবং প্রসেসের উন্নয়ন					
	পণ্য এবং সেবার মানের উন্নতি।					
	বহিরাগত (এক্সটার্নাল) যোগাযোগ এর উন্নতি।					
	সমন্বয় এবং অভ্যন্তরীণ যোগাযোগের উন্নতি।					
	সমন্বিত প্রক্রিয়ার মাধ্যমে গ্রাহক সেবার উন্নতি।					
	নেটওয়ার্ক জনিত সুযোগের সদ্ব্যবহার ।					
	নতুন বাজারের অনুপ্রবেশ ।					
	গ্রাহক সন্তুষ্টি বৃদ্ধি ।					
	কর্মচারীরা দূরবর্তী অবস্থান থেকে কাজ করতে পারেন।					
	মার্কেটিংএ বৃদ্ধি দক্ষতা ।					
	খরচ কমানো ।					
	ব্যবসায়ের সামাজিক স্বীকৃতি লাভ ।					
	অপারেশনাল দক্ষতা বৃদ্ধি ।					
	পেশাদার (প্রফেশনাল) ক্ষমতার উন্নতি।					
	কর্মচারী ধরে রাখার হার বৃদ্ধি।					
	কর্মীদের কাজের মনোভাবের ইতিবাচক পরিবর্তন ।					

তৃতীয় অংশ : নেটওয়ার্ক সংশ্লিষ্ট প্রশ্নাবলী

১) আপনি নিম্নলিখিত নেটওয়ার্কের কোনটি ব্যবহার করেন? (আপনার ক্ষেত্রে আনুষ্ঠানিক (ফর্মাল)/অনানুষ্ঠানিক (ইনফরমাল) যদি হয় তাহলে সংশ্লিষ্ট বক্সে টিক চিহ্ন দিন)।

নেটওয়ার্ক	সংখ্যা	শ্রেণী			প্রতি মাসে যোগাযোগের গড় সংখ্যা
		আনুষ্ঠানিক (ফর্মাল)	অনানুষ্ঠানিক (ইনফরমাল)	আধা-আনুষ্ঠানিক (সেমিফর্মাল)	
পারিবার/আত্মীয় স্বজন					
বন্ধুরা					
পরিচিতজন					
বাহ্যিক পরিষেবা প্রদানকারী (সলিসিটর/ অ্যাকাউন্ট্যান্ট/পরামর্শদাতা(কন্সাল্ট্যান্ট)/ অন্যান্য)					
কর্মচারীবৃন্দ					
অন্যান্য ব্যবসার প্রতিনিধি					
ব্যাংকের প্রতিনিধিরা					
গ্রাহকবৃন্দ					
সাপ্লায়ারবৃন্দ					
ব্যবসায় অংশীদারগণ					
প্রতিযোগীরা					
শিল্প সমিতির (ইন্ডাস্ট্রি এসোসিয়েশন)সদস্যবৃন্দ					
পেশাদার (প্রফেশনাল)সংস্থাগুলির সদস্যবৃন্দ					
সরকারি এজেন্ট / সংস্থার প্রতিনিধি					
এনজিও প্রতিনিধি					
অন্যান্য (উল্লেখ করুন)					

২)নিম্নলিখিত কোন অনলাইন সাইটগুলিতে আপনার প্রোফাইল আছে? (প্রাসঙ্গিক বাক্সে টিক চিহ্ন করুন। আপনি ১ টিরও বেশি বিকল্প নির্বাচন করতে পারেন)

ফেস-বুক	লিংকড -ইন	হোয়াটসঅ্যাপ	ভাইবার	টুইটার	ইনস্টাগ্রাম	মাই-স্পেস	পিন্টারেস্ট	গুগল+	স্কাইপ	ইউটিউব সাবস্ক্রাইবার	অন্যান্য (উল্লেখ করুন)

৩)আপনার ব্যবসার জন্য আপনি কতবার অনলাইন এবং অফলাইন নেটওয়ার্ক ব্যবহার করেন?

		কখনও না	কদাচিৎ	মাঝেমাঝে	প্রায়	সবসময়
সোশ্যাল নেটওয়ার্কিং	পারিবার/আত্মীয় স্বজন					
	বন্ধুরা					
	পরিচিতজন					
	বাহ্যিক পরিষেবা প্রদানকারী (সলিসিটর/ অ্যাকাউন্ট্যান্ট/পরামর্শদাতা (কন্সাল্ট্যান্ট)/ অন্যান্য)					
	কর্মচারীবৃন্দ					

সাইট (যেমন ফেসবুক, লিংকড ইন, টুইটার, মাই স্পেস, গুগল+)	অন্যান্য ব্যবসার প্রতিনিধি					
	ব্যাংকের প্রতিনিধিরা					
	গ্রাহকবৃন্দ					
	সাপ্লায়ারবৃন্দ					
	ব্যবসায় অংশীদারগণ					
	প্রতিযোগীরা					
	শিল্প সমিতির (ইন্ডাস্ট্রি এসোসিয়েশন)সদস্যবৃন্দ					
	পেশাদার (প্রফেশনাল)সংস্থাগুলির সদস্যবৃন্দ					
	সরকারি এজেন্ট / সংস্থার প্রতিনিধি					
	এনজিও প্রতিনিধি					
	অন্যান্য (উল্লেখ করুন) _____					
ইনস্ট্যান্ট মেসেজিং এবং অডিও এবং ভিডিও চ্যাটিং প্ল্যাটফর্ম (যেমন,হোয়াট সঅ্যাপ,ভাইবার,ইমো, স্কাইপ)	পারিবার/আত্মীয় স্বজন					
	বন্ধুরা					
	পরিচিতজন					
	বাহ্যিক পরিষেবা প্রদানকারী (সলিসিটর/ অ্যাকাউন্ট্যান্ট/পরামর্শদাতা (কন্সাল্ট্যান্ট)/ অন্যান্য)					
	কর্মচারীবৃন্দ					
	অন্যান্য ব্যবসার প্রতিনিধি					
	ব্যাংকের প্রতিনিধিরা					
	গ্রাহকবৃন্দ					
	সাপ্লায়ারবৃন্দ					
	ব্যবসায় অংশীদারগণ					
	প্রতিযোগীরা					
	শিল্প সমিতির (ইন্ডাস্ট্রি এসোসিয়েশন)সদস্যবৃন্দ					
	পেশাদার (প্রফেশনাল)সংস্থাগুলির সদস্যবৃন্দ					
	সরকারি এজেন্ট / সংস্থার প্রতিনিধি					
	এনজিও প্রতিনিধি					
	অন্যান্য (উল্লেখ করুন) _____					
ফটো শেয়ারিং প্ল্যাটফর্ম (যেমন ইনস্টাগ্রাম, পিন্টারেস্ট)	পারিবার/আত্মীয় স্বজন					
	বন্ধুরা					
	পরিচিতজন					
	বাহ্যিক পরিষেবা প্রদানকারী (সলিসিটর/ অ্যাকাউন্ট্যান্ট/পরামর্শদাতা (কন্সাল্ট্যান্ট)/ অন্যান্য)					
	কর্মচারীবৃন্দ					
	অন্যান্য ব্যবসার প্রতিনিধি					
	ব্যাংকের প্রতিনিধিরা					
	গ্রাহকবৃন্দ					
	সাপ্লায়ারবৃন্দ					
	ব্যবসায় অংশীদারগণ					
	প্রতিযোগীরা					

	শিল্প সমিতির (ইন্ডাস্ট্রি এসোসিয়েশন)সদস্যবৃন্দ					
	পেশাদার (প্রফেশনাল)সংস্থাগুলির সদস্যবৃন্দ					
	সরকারি এজেন্ট / সংস্থার প্রতিনিধি					
	এনজিও প্রতিনিধি					
	অন্যান্য (উল্লেখ করুন) _____					
ভিডিও শেয়ারিং প্ল্যাটফর্ম যেমন ইউটিউব	পারিবার/আত্মীয় স্বজন					
	বন্ধুরা					
	পরিচিতজন					
	বাহ্যিক পরিষেবা প্রদানকারী (সলিসিটর/ অ্যাকাউন্ট্যান্ট/পরামর্শদাতা (কন্সাল্ট্যান্ট)/ অন্যান্য)					
	কর্মচারীবৃন্দ					
	অন্যান্য ব্যবসার প্রতিনিধি					
	ব্যাংকের প্রতিনিধিরা					
	গ্রাহকবৃন্দ					
	সাপ্লায়ারবৃন্দ					
	ব্যবসায় অংশীদারগণ					
	প্রতিযোগীরা					
	শিল্প সমিতির (ইন্ডাস্ট্রি এসোসিয়েশন)সদস্যবৃন্দ					
	পেশাদার (প্রফেশনাল)সংস্থাগুলির সদস্যবৃন্দ					
	সরকারি এজেন্ট / সংস্থার প্রতিনিধি					
	এনজিও প্রতিনিধি					
	অন্যান্য (উল্লেখ করুন) _____					
ইমেইল	পারিবার/আত্মীয় স্বজন					
	বন্ধুরা					
	পরিচিতজন					
	বাহ্যিক পরিষেবা প্রদানকারী (সলিসিটর/ অ্যাকাউন্ট্যান্ট/পরামর্শদাতা (কন্সাল্ট্যান্ট)/ অন্যান্য)					
	কর্মচারীবৃন্দ					
	অন্যান্য ব্যবসার প্রতিনিধি					
	ব্যাংকের প্রতিনিধিরা					
	গ্রাহকবৃন্দ					
	সাপ্লায়ারবৃন্দ					
	ব্যবসায় অংশীদারগণ					
	প্রতিযোগীরা					
	শিল্প সমিতির (ইন্ডাস্ট্রি এসোসিয়েশন)সদস্যবৃন্দ					
	পেশাদার (প্রফেশনাল)সংস্থাগুলির সদস্যবৃন্দ					
	সরকারি এজেন্ট / সংস্থার প্রতিনিধি					

	এনজিও প্রতিনিধি					
	অন্যান্য (উল্লেখ করুন) _____					
অফিসের ওয়েবসাইট	পারিবার/আত্মীয় স্বজন					
	বন্ধুরা					
	পরিচিতজন					
	বাহ্যিক পরিষেবা প্রদানকারী (সলিসিটর/ অ্যাকাউন্ট্যান্ট/পরামর্শদাতা (কন্সাল্ট্যান্ট)/ অন্যান্য)					
	কর্মচারীবৃন্দ					
	অন্যান্য ব্যবসার প্রতিনিধি					
	ব্যাংকের প্রতিনিধিরা					
	গ্রাহকবৃন্দ					
	সাপ্লায়ারবৃন্দ					
	ব্যবসায় অংশীদারগণ					
	প্রতিযোগীরা					
	শিল্প সমিতির (ইন্ডাস্ট্রি এসোসিয়েশন)সদস্যবৃন্দ					
	পেশাদার (প্রফেশনাল)সংস্থাগুলির সদস্যবৃন্দ					
	সরকারি এজেন্ট / সংস্থার প্রতিনিধি					
	এনজিও প্রতিনিধি					
	অন্যান্য (উল্লেখ করুন) _____					
ফেস-টু-ফেস মিটিং (সামনা সামনি মিটিং)	পারিবার/আত্মীয় স্বজন					
	বন্ধুরা					
	পরিচিতজন					
	বাহ্যিক পরিষেবা প্রদানকারী (সলিসিটর/ অ্যাকাউন্ট্যান্ট/পরামর্শদাতা (কন্সাল্ট্যান্ট)/ অন্যান্য)					
	কর্মচারীবৃন্দ					
	অন্যান্য ব্যবসার প্রতিনিধি					
	ব্যাংকের প্রতিনিধিরা					
	গ্রাহকবৃন্দ					
	সাপ্লায়ারবৃন্দ					
	ব্যবসায় অংশীদারগণ					
	প্রতিযোগীরা					
	শিল্প সমিতির (ইন্ডাস্ট্রি এসোসিয়েশন)সদস্যবৃন্দ					
	পেশাদার (প্রফেশনাল)সংস্থাগুলির সদস্যবৃন্দ					
	সরকারি এজেন্ট / সংস্থার প্রতিনিধি					
	এনজিও প্রতিনিধি					
	অন্যান্য (উল্লেখ করুন) _____					
	পারিবার/আত্মীয় স্বজন					
	বন্ধুরা					
	পরিচিতজন					

মোবাইল / টেলিফোন এর মাধ্যমে ইন্টারঅ্যাকশন	বাহ্যিক পরিষেবা প্রদানকারী (সলিসিটর/ অ্যাকাউন্ট্যান্ট/পরামর্শদাতা (কন্সাল্ট্যান্ট)/ অন্যান্য)					
	কর্মচারীবৃন্দ					
	অন্যান্য ব্যবসার প্রতিনিধি					
	ব্যাংকের প্রতিনিধিরা					
	গ্রাহকবৃন্দ					
	সাপ্লায়ারবৃন্দ					
	ব্যবসায় অংশীদারগণ					
	প্রতিযোগীরা					
	শিল্প সমিতির (ইন্ডাস্ট্রি এসোসিয়েশন)সদস্যবৃন্দ					
	পেশাদার (প্রফেশনাল)সংস্থাগুলির সদস্যবৃন্দ					
	সরকারি এজেন্ট / সংস্থার প্রতিনিধি					
	এনজিও প্রতিনিধি					
	অন্যান্য (উল্লেখ করুন) _____					
ইভেন্ট / প্রদর্শনী / বাণিজ্য মেলা (ট্রেড ফেয়ার)	পারিবার/আত্মীয় স্বজন					
	বন্ধুরা					
	পরিচিতজন					
	বাহ্যিক পরিষেবা প্রদানকারী (সলিসিটর/ অ্যাকাউন্ট্যান্ট/পরামর্শদাতা (কন্সাল্ট্যান্ট)/ অন্যান্য)					
	কর্মচারীবৃন্দ					
	অন্যান্য ব্যবসার প্রতিনিধি					
	ব্যাংকের প্রতিনিধিরা					
	গ্রাহকবৃন্দ					
	সাপ্লায়ারবৃন্দ					
	ব্যবসায় অংশীদারগণ					
	প্রতিযোগীরা					
	শিল্প সমিতির (ইন্ডাস্ট্রি এসোসিয়েশন)সদস্যবৃন্দ					
	পেশাদার (প্রফেশনাল)সংস্থাগুলির সদস্যবৃন্দ					
	সরকারি এজেন্ট / সংস্থার প্রতিনিধি					
	এনজিও প্রতিনিধি					
	অন্যান্য (উল্লেখ করুন) _____					
অন্যান্য (উল্লেখ	পারিবার/আত্মীয় স্বজন					
	বন্ধুরা					
	পরিচিতজন					
	বাহ্যিক পরিষেবা প্রদানকারী (সলিসিটর/ অ্যাকাউন্ট্যান্ট/পরামর্শদাতা (কন্সাল্ট্যান্ট)/ অন্যান্য)					
	কর্মচারীবৃন্দ					
	অন্যান্য ব্যবসার প্রতিনিধি					
	ব্যাংকের প্রতিনিধিরা					

করুন) _____	গ্রাহকবৃন্দ					
	সাপ্লায়ারবৃন্দ					
	ব্যবসায় অংশীদারগণ					
	প্রতিযোগীরা					
	শিল্প সমিতির (ইন্ডাস্ট্রি এসোসিয়েশন)সদস্যবৃন্দ					
	পেশাদার (প্রফেশনাল)সংস্থাগুলির সদস্যবৃন্দ					
	সরকারি এজেন্ট / সংস্থার প্রতিনিধি					
	এনজিও প্রতিনিধি					
	অন্যান্য (উল্লেখ করুন) _____					

৪) আপনার বিদ্যমান নেটওয়ার্কগুলির সাথে প্রতি মাসে (গড়) কত ঘন্টা ব্যয় করেন , যার সাথে আপনি ব্যবসায়িক বিষয় নিয়ে আলোচনা করতে পারেন?

নেটওয়ার্ক	শ্রেণী		প্রতি মাসে গড় ঘন্টার সংখ্যা
	অনলাইন	অফলাইন	
পারিবার/আত্মীয় স্বজন			
বন্ধুরা			
পরিচিতজন			
বাহ্যিক পরিষেবা প্রদানকারী (সলিসিটর/ অ্যাকাউন্ট্যান্ট/পরামর্শদাতা(কন্সাল্ট্যান্ট)/ অন্যান্য)			
কর্মচারীবৃন্দ			
অন্যান্য ব্যবসার প্রতিনিধি			
ব্যাংকের প্রতিনিধিরা			
গ্রাহকবৃন্দ			
সাপ্লায়ারবৃন্দ			
ব্যবসায় অংশীদারগণ			
প্রতিযোগীরা			
শিল্প সমিতির (ইন্ডাস্ট্রি এসোসিয়েশন)সদস্যবৃন্দ			
পেশাদার (প্রফেশনাল)সংস্থাগুলির সদস্যবৃন্দ			
সরকারি এজেন্ট / সংস্থার প্রতিনিধি			
এনজিও প্রতিনিধি			
অন্যান্য (উল্লেখ করুন)			

৫) আপনার মতে আপনার ব্যবসায়ের প্রতিটি ধাপের জন্য নিম্নোক্ত ব্যক্তি এবং প্রতিষ্ঠানগুলি গুরুত্বপূর্ণ ছিল?

(ধাপগুলি ৩, ৪ এবং ৫ নং কলামে দেওয়া আছে)? (যে কেউ আপনাকে প্রতিটি ধাপের জন্য সাহায্য করে সেটি নির্বাচন করুন এবং টিক চিহ্ন করুন, তারপর গুরুত্ব অনুযায়ী রেট করুন (যেখানে ১ = অত্যন্ত গুরুত্বপূর্ণ, ২ = গুরুত্বপূর্ণ, ৩ = সামান্য গুরুত্বপূর্ণ, ৪ = সামান্য গুরুত্বপূর্ণ এবং ৫ = গুরুত্বপূর্ণ নয়)

নং		i)আপনার ব্যবসা সনাক্তকরনের জন্য(দক্ষতা প্রশিক্ষণ এবং ব্যবসায় সম্পর্কিত সুযোগ)		ii) প্রাথমিক মূলধন & অন্যান্য উপাদান যেমন: টাকা বিল্ডিং, স্থান)		iii) এখন আপনার ব্যবসা চালানোর জন্য (টাকার ঘাটতি, বাজার সুবকন্ট্রাকটিং , প্রযুক্তি, ইত্যাদি)	
		টিক	ক্রম	টিক	ক্রম	টিক	ক্রম

অ)	পারিবার/আত্মীয় স্বজন						
আ)	বন্ধুরা						
ই)	পরিচিতজন						
ঈ)	বাহ্যিক পরিষেবা প্রদানকারী (সলিসিটর/ অ্যাকাউন্ট্যান্ট/পরামর্শদাতা (কন্সাল্ট্যান্ট)/ অন্যান্য)						
উ)	কর্মচারীবৃন্দ						
ঊ)	অন্যান্য ব্যবসার প্রতিনিধি						
ঋ)	ব্যাংকের প্রতিনিধিরা						
এ)	গ্রাহকবৃন্দ						
ঐ)	সাপ্লায়ারবৃন্দ						
ও)	ব্যবসায় অংশীদারগণ						
ঔ)	প্রতিযোগীরা						
ক)	শিল্প সমিতির (ইন্ডাস্ট্রি এসোসিয়েশন)সদস্যবৃন্দ						
খ)	পেশাদার (প্রফেশনাল)সংস্থাগুলির সদস্যবৃন্দ						
গ)	সরকারি এজেন্ট / সংস্থার প্রতিনিধি						
ঘ)	এনজিও প্রতিনিধি						
চ)	অন্যান্য (উল্লেখ করুন) _____						

৬) আপনি কত বার আপনার নেটওয়ার্কে লোকেদের সক্ষম করেন একে অন্যের সাথে সরাসরি সংযুক্ত করতে যারা আগে একে অপরকে জানত না:

শ্রেণী	কখনও না	কদাচিৎ	মাঝেমাঝে	প্রায়	সবসময়
ব্যবসার উদ্দেশ্যে					
সামাজিক উদ্দেশ্যে					
ধারণা (আইডিয়া) শেয়ার করার জন্য					
জ্ঞান শেয়ার করার জন্য					
মতামত শেয়ার করার জন্য					
সুযোগ শেয়ার করার জন্য					
উপদেশের জন্য					
রেফারেল উৎপাদনের জন্য					
প্রেরণা পাওয়ার জন্য					
বিশেষ সমস্যা সমাধানের জন্য					
অন্য কোন উদ্দেশ্যে (দয়া করে নির্দিষ্ট করুন)					

৭) আপনার মতে নেটওয়ার্কিং আপনার প্রতিষ্ঠানের গত তিন বছরের সার্বিক ফলাফলের ওপরের কতটুকু প্রভাব রেখেছে?

ফলাফলের ওপর প্রভাব		দৃঢ়ভাবে অসম্মত	অসম্মত	নিরপেক্ষ	সম্মত	দৃঢ়ভাবে সম্মত
প্রফিটেবিলিটি (লাভজনকতা)	উচ্চ বিক্রয়					
	উচ্চ লাভ/মুনাফা					
	উচ্চ **ROI** (বিনিয়োগে ফেরত হার)					

	উচ্চ বিক্রয় রেভিনিউ (রাজস্ব)					
	উচ্চ **ROA** (সম্পদ ফেরত)					
বৃদ্ধি (গ্রোথ)	উৎপাদনশীলতা (প্রোডাক্টিভিটি) বৃদ্ধি					
	মার্কেট শেয়ার বৃদ্ধি					
	প্রফিট (মুনাফা) মার্জিন বৃদ্ধি					
	মোট মুনাফা (গ্রস প্রফিট) বৃদ্ধি					
	নেট মুনাফা (প্রফিট) বৃদ্ধি					
	বাজার সম্প্রসারণে (মার্কেট এক্সপানশন)সাহায্য করে।					
	রপ্তানি বাজার সম্প্রসারণে (মার্কেট এক্সপানশন)সাহায্য করে।					
	আমদানি বাজার সম্প্রসারণে (মার্কেট এক্সপানশন)সাহায্য করে।					
	বিক্রয়ের গ্রোথ অর্জন					
ফলাফলের অন্যান্য সূচক	প্রতিক্রিয়া (রেস্পন্সিভনেস)বৃদ্ধি					
	গুণমান নিশ্চিতকরণ এর বৃদ্ধি					
	ইনভেন্টরি টার্নওভার হার বৃদ্ধি।					
	নতুন পণ্য, সেবা এবং প্রসেসের উন্নয়ন					
	পণ্য এবং সেবার মানের উন্নতি।					
	বহিরাগত (এক্সটার্নাল) যোগাযোগ এর উন্নতি।					
	সমন্বয় এবং অভ্যন্তরীণ যোগাযোগের উন্নতি।					
	সমন্বিত প্রক্রিয়ার মাধ্যমে গ্রাহক সেবার উন্নতি।					
	নেটওয়ার্ক জনিত সুযোগের সদ্ব্যবহার ।					
	নতুন বাজারের অনুপ্রবেশ ।					
	গ্রাহক সন্তুষ্টি বৃদ্ধি ।					
	কর্মচারীরা দূরবর্তী অবস্থান থেকে কাজ করতে পারেন।					
	মার্কেটিংএ বৃদ্ধি দক্ষতা ।					
	খরচ কমানো ।					
	ব্যবসায়ের সামাজিক স্বীকৃতি লাভ ।					
	অপারেশনাল দক্ষতা বৃদ্ধি ।					
	পেশাদার (প্রফেশনাল) ক্ষমতার উন্নতি।					

	কর্মচারী ধরে রাখার হার বৃদ্ধি।					
	কর্মীদের কাজের মনোভাবের ইতিবাচক পরিবর্তন।					

আপনার সহযোগিতার জন্য আপনাকে অনেক ধন্যবাদ।

APPENDIX F: INFORMATION ON FIELD RESEARCHERS

Enumerator	Name	Educational Background	Current Occupation	Experience
1	Faria Wahab	A Postgraduate Degree holder in Business from the National University of Bangladesh	Freelance Researcher	She has worked in several research projects.
2	Kausar Ahmed Rabbe	A Graduate Degree holder in Business from the National University of Bangladesh	Freelance Researcher	He has worked in several data collection projects.

APPENDIX G: THE REGRESSION EQUATIONS USED IN THIS CHAPTER

Direct or Indirect Effect	Sample	Model	Equation
Direct	Whole (both male and female)	1	$\text{Business performance} = \beta_0 + \beta_1 \text{ Location of the SME} + \beta_2 \text{ Education of the entrepreneur} + \beta_3 \text{ Occupation of father} + \beta_4 \text{ Involvement of family members in business} + \beta_5 \text{ Hours spent in business} + \beta_6 \text{ Involvement in other biz} + \beta_7 \text{ Firm age} + \beta_8 \text{ Start-up capital} + \beta_9 \text{ ICT training} + \beta_{10} \text{ Frequency of ICT usage} + \beta_{11} \text{ ET skills of employees} + \beta_{12} \text{ Agribusiness Sector} + \beta_{13} \text{ Beauty salon Sector} + \beta_{14} \text{ Handicrafts Sector} + \beta_{15} \text{ Retailer / Grocery Shop Sector} + \beta_{16} \text{ Broadcasting, advertising and event management Sector} + \beta_{17} \text{ Infrastructure Sector} + \beta_{18} \text{ Outsourcing Sector} + \beta_{19} \text{ ICT Sector} + \beta_{20} \text{ Educational \&Consultancy Services Sector} + \beta_{21} \text{ Restaurant \& Catering service Sector} + \beta_{22} \text{ Knitwear \& Readymade Garments Sector} + \beta_{23} \text{ Healthcare \& Pharmaceuticals Sector} + \beta_{24} \text{ Textile Boutique Shop Sector} + \beta_{25} \text{ Other Sectors} + \beta_{26} \text{ Use of GPTs} + u_1$

Direct	Whole (both male and female)	2	$\text{Business performance} = \beta_0 + \beta_1 \text{ Location of the SME} + \beta_2 \text{ Education of the entrepreneur} + \beta_3 \text{ Occupation of father} + \beta_4 \text{ Involvement of family members in business} + \beta_5 \text{ Hours spent in business} + \beta_6 \text{ Involvement in other biz} + \beta_7 \text{ Firm age} + \beta_8 \text{ Start-up capital} + \beta_9 \text{ ICT training} + \beta_{10} \text{ Frequency of ICT usage} + \beta_{11} \text{ ET skills of employees} + \beta_{12} \text{ Agribusiness Sector} + \beta_{13} \text{ Beauty salon Sector} + \beta_{14} \text{ Handicrafts Sector} + \beta_{15} \text{ Retailer / Grocery Shop Sector} + \beta_{16} \text{ Broadcasting, advertising and event management Sector} + \beta_{17} \text{ Infrastructure Sector} + \beta_{18} \text{ Outsourcing Sector} + \beta_{19} \text{ ICT Sector} + \beta_{20} \text{ Educational \& Consultancy Services Sector} + \beta_{21} \text{ Restaurant \& Catering service Sector} + \beta_{22} \text{ Knitwear \& Readymade Garments Sector} + \beta_{23} \text{ Healthcare \& Pharmaceuticals Sector} + \beta_{24} \text{ Textile Boutique Shop Sector} + \beta_{25} \text{ Other Sectors} + \beta_{26} \text{ Use of GPTs} + \beta_{27} \text{ Use of ETs} + u_1$
Direct	Whole (both male and female)	3	$\text{Business performance} = \beta_0 + \beta_1 \text{ Location of the SME} + \beta_2 \text{ Education of the entrepreneur} + \beta_3 \text{ Occupation of father} + \beta_4 \text{ Involvement of family members in business} + \beta_5 \text{ Hours spent in business} + \beta_6 \text{ Involvement in other biz}$

			$+\beta_7$ Firm age $+\beta_8$ Start−up capital $+\beta_9$ ICT training $+\beta_{10}$ Frequency of ICT usage $+\beta_{11}$ ET skills of employees $+\beta_{12}$ Agribusiness Sector $+\beta_{13}$ Beauty salon Sector $+\beta_{14}$ Handicrafts Sector $+\beta_{15}$ Retailer / Grocery Shop Sector $+\beta_{16}$ Broadcasting, advertising and event management Sector $+\beta_{17}$ Infrastructure Sector $+\beta_{18}$ Outsourcing Sector $+\beta_{19}$ ICT Sector $+\beta_{20}$ Educational &Consultancy Services Sector $+\beta_{21}$ Restaurant & Catering service Sector $+\beta_{22}$ Knitwear & Readymade Garments Sector $+\beta_{23}$ Healthcare & Pharmaceuticals Sector $+\beta_{24}$ Textile Boutique Shop Sector $+\beta_{25}$ Other Sectors $+\beta_{26}$ Use of GPTs $+\beta_{27}$ Use of ETs $+\beta_{28}$ Sex of the Entrepreneur$+u_1$
Direct	Whole (both male and female)	4	Business performance $=\beta_0+\beta_1$ Location of the SME $+\beta_2$ Education of the entrepreneur $+\beta_3$ Occupation of father $+\beta_4$ Involvement of family members in business $+\beta_5$ Hours spent in business $+\beta_6$ Involvement in other biz $+\beta_7$ Firm age $+\beta_8$ Start−up capital $+\beta_9$ ICT training $+\beta_{10}$ Frequency of ICT usage $+\beta_{11}$ ET skills of employees $+\beta_{12}$ Agribusiness Sector $+\beta_{13}$ Beauty salon Sector

			$+\beta_{14}$ Handicrafts Sector $+\beta_{15}$ Retailer / Grocery Shop Sector $+\beta_{16}$ Broadcasting, advertising and event management Sector $+\beta_{17}$ Infrastructure Sector $+\beta_{18}$ Outsourcing Sector $+\beta_{19}$ ICT Sector $+\beta_{20}$ Educational &Consultancy Services Sector $+\beta_{21}$ Restaurant & Catering service Sector $+\beta_{22}$ Knitwear & Readymade Garments Sector $+\beta_{23}$ Healthcare & Pharmaceuticals Sector $+\beta_{24}$ Textile Boutique Shop Sector $+\beta_{25}$ Other Sectors $+\beta_{26}$ Use of GPTs $+\beta_{27}$ Use of ETs $+\beta_{28}$ Sex of the Entrepreneur $+\beta_{29}$ ICT Collaboration Capabilities $+u_1$
Direct	Whole (both male and female)	5	Business performance $=\beta_0+\beta_1$ Location of the SME $+\beta_2$ Education of the entrepreneur $+\beta_3$ Occupation of father $+\beta_4$ Involvement of family members in business $+\beta_5$ Hours spent in business $+\beta_6$ Involvement in other biz $+\beta_7$ Firm age $+\beta_8$ Start – up capital $+\beta_9$ ICT training $+\beta_{10}$ Frequency of ICT usage $+\beta_{11}$ ET skills of employees $+\beta_{12}$ Agribusiness Sector $+\beta_{13}$ Beauty salon Sector $+\beta_{14}$ Handicrafts Sector $+\beta_{15}$ Retailer / Grocery Shop Sector $+\beta_{16}$ Broadcasting, advertising and event management Sector

			$+\beta_{17}$ Infrastructure Sector $+\ \beta_{18}$ Outsourcing Sector $+\ \beta_{19}$ ICT Sector $+\ \beta_{20}$ Educational &Consultancy Services Sector $+\ \beta_{21}$ Restaurant & Catering service Sector $+\ \beta_{22}$ Knitwear & Readymade Garments Sector $+\beta_{23}$ Healthcare & Pharmaceuticals Sector $+\ \beta_{24}$ Textile Boutique Shop Sector $+\ \beta_{25}$ Other Sectors $+\ \beta_{26}$ Use of GPTs $+\beta_{27}$ Use of ETs $+\beta_{28}$ ICT Collaboration Capabilities $+\ \beta_{29}$ Sex of the Entrepreneur $+\beta_{30}\left(\text{ICT Collaboration Capabilities}\right)\left(\text{Sex of the Entrepreneur}\right)+u_1$
Indirect	Whole (both male and female)	1	ICT Collaboration Capabilities $=\beta_0\ +\beta_1$ Location of the SME $+\ \beta_2$ Education of the entrepreneur $+\ \beta_3$ Investment in ICT $+\ \beta_4$ Start $-$ up capital $+\ \beta_5$ ICT training $+\ \beta_6$ Firm age $+\beta_7$ Number of employees $+\beta_8$ Sex of the Entrepreneur $+\ \beta_9$ Use of GPTs $+u_1$
Indirect	Whole (both male and female)	2	ICT Collaboration Capabilities $=\beta_0\ +\beta_1$ Location of the SME $+\ \beta_2$ Education of the entrepreneur $+\ \beta_3$ Investment in ICT $+\ \beta_4$ Start $-$ up capital $+\ \beta_5$ ICT training $+\ \beta_6$ Firm age $+\beta_7$ Number of employees $+\beta_8$ Sex of the Entrepreneur $+\ \beta_9$ Use of GPTs $+\ \beta_{10}$ Use of ETs $+u_1$

Direct	Male	1	$\text{Business performance} = \beta_0 + \beta_1 \text{ Location of the SME} + \beta_2 \text{ Investment in ICT} + \beta_3 \text{ Start-up capital} + \beta_4 \text{ ICT training} + \beta_5 \text{ Firm age} + \beta_6 \text{ Hours spent in business} + \beta_7 \text{ Number of employees} + u_1$
Direct	Male	2	$\text{Business performance} = \beta_0 + \beta_1 \text{ Location of the SME} + \beta_2 \text{ Investment in ICT} + \beta_3 \text{ Start-up capital} + \beta_4 \text{ ICT training} + \beta_5 \text{ Firm age} + \beta_6 \text{ Hours spent in business} + \beta_7 \text{ Number of employees} + \beta_8 \text{ Use of ETs} + u_1$
Direct	Male	3	$\text{Business performance} = \beta_0 + \beta_1 \text{ Location of the SME} + \beta_2 \text{ Investment in ICT} + \beta_3 \text{ Start-up capital} + \beta_4 \text{ ICT training} + \beta_5 \text{ Firm age} + \beta_6 \text{ Hours spent in business} + \beta_7 \text{ Number of employees} + \beta_8 \text{ Use of ETs} + \beta_9 \text{ ICT Collaboration Capabilities} + u_1$
Direct	Female	1	$\text{Business performance} = \beta_0 + \beta_1 \text{ Location of the SME} + \beta_2 \text{ Investment in ICT} + \beta_3 \text{ Start-up capital} + \beta_4 \text{ ICT training} + \beta_5 \text{ Firm age} + \beta_6 \text{ Hours spent in business} + \beta_7 \text{ Number of employees} + u_1$
Direct	Female	2	$\text{Business performance} = \beta_0 + \beta_1 \text{ Location of the SME} + \beta_2 \text{ Investment in ICT} + \beta_3 \text{ Start-up capital} + \beta_4 \text{ ICT training} + \beta_5 \text{ Firm age} + \beta_6 \text{ Hours spent in business}$

			$+\beta_7$ Number of employees $+\beta_8$ Use of ETs $+u_1$
Direct	Female	3	Business performance $=\beta_0+\beta_1$ Location of the SME $+\beta_2$ Investment in ICT $+\beta_3$ Start−up capital $+\beta_4$ ICT training $+\beta_5$ Firm age $+\beta_6$ Hours spent in business $+\beta_7$ Number of employees $+\beta_8$ Use of ETs $+\beta_9$ ICT Collaboration Capabilities $+u_1$
Indirect	Female	1	ICT Collaboration Capabilities $=\beta_0+\beta_1$ Location of the SME $+\beta_2$ Investment in ICT $+\beta_3$ Start−up capital $+\beta_4$ ICT Training $+\beta_5$ Firm age $+\beta_6$ Hours spent in business $+\beta_7$ Number of employees $+u_1$
Indirect	Female	2	ICT Collaboration Capabilities $=\beta_0+\beta_1$ Location of the SME $+\beta_2$ Investment in ICT $+\beta_3$ Start−up capital $+\beta_4$ ICT Training $+\beta_5$ Firm age $+\beta_6$ Hours spent in business $+\beta_7$ Number of employees $+\beta_8$ Use of ETs $+u_1$

Table 3.6: The regression equations used in this chapter

APPENDIX H: RESULTS OF PRINCIPAL COMPONENT ANALYSIS WITH VARIMAX ROTATION

Principal components with varimax rotation	
Item	**Network centrality**
Biz	0.872
Social	0.857
Ideas	0.934
Knowledge	0.939
Opinion	0.860
Opportunities	0.925
Advice	0.873
Referral	0.850
Motivation	0.906
Solution	0.879
Others	0.263
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.	