THE ROLE OF TECHNOLOGY ORIENTATION AND BIG DATA ANALYTICS (BDA) ADOPTION ON THE BUSINESS PERFORMANCE AMONG MALAYSIAN SMES: MEDIATING ROLE OF COMPETITIVE ADVANTAGE

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DEPARTMENT OF INTERNATIONAL BUSINESS

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BY

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DECLARATION

I hereby declare that:

(1) This undergraduate FYP is the end result of my own work and that due acknowledgement
has been given in the references to ALL sources of information be they printed, electronic, or
personal.

(2) No portion of this FYP has been submitted in support of any application for any other
degree or qualification of this or any other university, or other institutes of learning.

(3) Sole contribution has been made by me in completing the FYP.

(4) The word count of this research report is __10486 words__

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DEDICATION

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LIST OF ABBREVIATIONS

BD	Big Data
BDA	Big Data Analytics
BDAA	Big Data Analytics Adoption
BP	Business Performance
CA	Competitive Advantage
CI	Confidence Interval
RBV	Resource-based View
SMEs	Small and Medium-sized Enterprises
SPSS	Statistical Package for Social Science
TO	Technology Orientation

PREFACE

The exponential growth of data in today's digital age has led to the emergence of big data, which presents new opportunities and challenges for businesses. Small and medium-sized enterprises (SMEs) play a crucial role in the economic growth and development of Malaysia. Despite their importance, SMEs face numerous challenges in today's highly competitive business environment. One of the key challenges is to leverage technology to enhance their business performance and stay ahead of their competitors. Existing studies are focusing on how major companies use their technological resources and capabilities to enhance their business performance, with little attention to SMEs. The big data analytics (BDA) adoption was also commonly found in major companies compared to SMEs. However, the BDA adoption is still in its early stage among Malaysian SMEs. The SMEs managers refuse to replace their conventional system with modern technologies that are enhanced by BDA.

In this research study, the researcher explores the role of technology orientation and big data analytics (BDA) adoption on business performance among Malaysian SMEs, with a focus on the mediation effect of SMEs competitive advantage. This research will contribute to the existing body of knowledge on SMEs.

ABSTRACT

The emergence of big data has revolutionized the way companies operate and make decisions. Big data refers to the large and complex data sets that are generated from various sources, including social media, customer interactions, and website. However, for SMEs in developing countries, such as in Malaysia, leveraging big data can be a daunting task. SMEs face several challenges in analysing big data, including lack of technical expertise, limited resources, and inadequate infrastructure. As a result, SMEs may not be able to fully realize the potential benefits of big data, including enhanced business performance and competitive advantage. Thus, this research "The role of technology orientation and big data analytics (BDA) adoption on business performance among Malaysian SMEs: Mediation role of competitive advantage" aims to investigate the role of technology orientation and BDA adoption on business performance among Malaysian SMEs in the service sector, with a focus on the mediating effect of competitive advantage.

The objective of this research is to examine the relationship between variables such as technology orientation, big data analytics (BDA) adoption, competitive advantage, and business performance of Malaysian SMEs. The theory applied in this research study is resource-based view (RBV) theory. The RBV theory aims to identify the role of technological resources and capabilities of SMEs on their competitive advantage and business performance. A quantitative research method was used to collect and analyse the data for this research. The key informant was the SMEs business owners and those with high-level management position that are knowledgeable about their company. While the unit of analysis is on the companies in which the respondents are representing.

CHAPTER 1: RESEARCH OVERVIEW

1.0 Introduction

This chapter gives an overview of the research topic, the role of technology orientation and big data analytics (BDA) adoption on the business performance among Malaysian SMEs. The research background discusses the emerging of data and the usefulness of BDA in companies. It also discusses the BDAA among companies and TO of a company. The research problem of this research includes previous studies have not adequately address company's resources and capabilities in affecting its BP. Additionally, the BDAA is still in its early stages among Malaysian SMEs. The research objectives and research questions intend to address the problem stated while research significance describes the purpose of this research.

1.1 Research Background

The rapid development of internet technology continues to yield vast quantities of data from a variety of sources, including databases, media, the cloud, the Web, and the Internet of Things (IoT). Big data (BD) refers to the collection of these sources, and companies are working to handle and analyse these enormous data sets to gain advantages. Recently, many scholars have identified BD as a source of achieving competitive advantage and superior performance (Behl, 2022). The demand for data analytics grows in conjunction with the growth of BD. Big data analytics (BDA) is the "*application of various analytical techniques to the diversify of big data to give actionable descriptive, predictive, and prescriptive outcomes*" (Lamba & Dubey, 2015, p. 51). By adopting BDA, companies can gain a better understanding of their customers, optimize their operations, and make data-driven decisions. Additionally, companies in the Asia Pacific region use BDA more frequently to accomplish their objectives. According to recent research conducted in this area, 82% of the data-driven companies who respond has important business benefits during the Covid-19 outbreak, including quicker

strategic decision-making and more effective stakeholder communication (Pook, 2020). Companies that are data-driven are more confident and resilient in their business operations than non-data-driven ones (Pook, 2020).

Companies can use a large amount of structured and unstructured data for almost real-time decision-making by utilising BDA. Given the advantages of BDA, numerous major companies adopt it for a range of uses, including forecasting market trends and analysing consumer behaviour to determine possibilities for enhancement (Lutfi et al., 2023). In the Malaysian context, small and medium-sized enterprises (SMEs) play a critical role in the economy, accounting for over 98% of businesses and contributing significantly to gross domestic product (GDP) (OECD, 2022). However, they are far behind in adopting new technologies, including BDA. The primary obstacles to BDAA among SMEs are the limited resources and lack of knowledge of BD (Nasrollahi et al., 2021). Malaysian SMEs owners need to be more aggressive in exploiting all their resources to develop a CA. Utilising current technologies and its capabilities are the strategies that can increase their competitiveness.

On the other hand, strategic orientation is the development of company behaviours that are able to create a sustainable CA in conjunction with company strategy (Yang et al., 2022). One of the strategic orientations is technology orientation, which is determined by the level of investment in research and development (R&D), the acquisition of new technologies, and the adoption of the most recent technology (Gatignon, 1997). TO is essential to boost profitability and improve a company's management effectiveness (Al-Idrus et al., 2020). Technology adoption also essential for companies in generating value, acquiring expertise and capability, and achieving CA. Nevertheless, relatively few research has taken into account the combination of traditional company resources and developing technology for CA (Purbawati & Budiatmo, 2021). Thus, this study examines the role of TO and BDAA of SMEs on CA and business performance in the Malaysian service sector.

1.2 Research Problem

Recent research indicates that there was lack of studies on the TO and BDAA as the firm's resources in leading to its CA (Chuah & Thurusamry, 2021; Park & Kim, 2021). In Del Vecchio's (2018) research, he addresses the advantages and drawbacks of BD for SMEs. Likewise, the study conducted by Chuah and Thurusamry (2021) identifies the difficulties for Malaysian SMEs in employing BDA. The research conducted by Park and Kim (2021) discover the determinants of BDA among Korean SMEs. Nonetheless, most of these studies focus on the benefits and effectiveness of BDA adoption and the difficulties that SMEs encounter while implementing BDA. Previous research has not adequately analysed how a SME's resources and capabilities affecting a company's performance. Since there is a lack of empirical study in this context, particularly in Malaysian SMEs in the service sector. This research aims to analyse on the relationship between TO and BDAA with SMEs' CA and BP.

BDAA is commonly be found in large companies in improving their organizational performance (Lutfi et al., 2023). However, the BDAA is still in its early stages among Malaysian SMEs (Hong & Ping, 2020). BDA is a new strategic business tool that enables companies to obtain useful insights for decision making toward better BP. Although most multinationals and larger companies may already be applying BDA to improve BP, many SMEs are still in the exploratory phase (Hong & Ping, 2020). The main problem is the decision-making authorities within a company do not wish to replace the conventional systems with new ones that are enhanced with latest technology like BDA (Akter & Wamba, 2019). SMEs managers are reluctant to adopt the latest technology since it is difficult for them to understand the contribution to the BP. This research intends to provide SMEs and managers an overview on the relationship between TO and BDAA with CA and BP.

1.3 Research Objectives

This research aims to apply the resource-based view (RBV) model to identify the effect of a company's resources and capabilities, namely TO & BDAA on its competitive advantage. The RBV model is a framework used to identify the strategic resources a company might use to obtain a long-term CA (Barney, 1991). This research also investigates the mediating role of competitive advantage between TO and SMEs' BP, as well as between BDAA and SMEs' BP. The specific research objectives of this research are as below:

1. To identify the relationship between technology orientation and competitive advantage.
2. To identify the relationship between BDA adoption and competitive advantage.
3. To identify the relationship between competitive advantage and business performance.
4. To identify the mediating role of competitive advantage on the relationship between technology orientation and business performance.
5. To identify the mediating role of competitive advantage on the relationship between BDA adoption and business performance.

1.4 Research Questions

To attain the research objectives, this research will address the following research questions:

1. What is the relationship between technology orientation and competitive advantage?
2. What is the relationship between BDA adoption and competitive advantage?
3. What is the relationship between competitive advantage and business performance?
4. Whether competitive advantage mediate the relationship of technology orientation and business performance?
5. Whether competitive advantage mediate the relationship of BDA adoption and business performance?

1.5 Research Significance

The participation of SMEs has significantly expanded over the past few decades in Malaysia, and they are regarded to be contributing significantly to the country's economic growth. Nonetheless, the adoption of innovative technologies and its contribution to a company's overall performance receives little research focus (Erkmen et al., 2020). The previous research lacks concentration because developed nations such as United States, France, and Australia contributed most of the research writing. However, fewer research has been done in developing nations like in Malaysia. This study provides a theoretical contribution of BDAA to CA in the context of Malaysian SMEs in the service sector since there is no article addressing this linkage. Based on this research, Malaysian SMEs able to understand how their resources and capabilities relate to both their CA and overall BP.

Besides, this study was significance to the business owners or managers of Malaysian SMEs. Managers, policymakers, and service providers will find the research helpful in understanding the importance of their technological resources and capabilities on their BP. Hence, SMEs managers can consider on developing their technological capability that will enhance their company's BP.

1.6 Conclusion

This chapter has discussed the background of the topic, problem statement, research objectives and research questions, as well as research significance.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

This chapter begins with a discussion on the underlying concept of this study, which is big data analytics (BDA) and technological orientation of a company. It will also discuss the theoretical framework applied in this study, the resource-based view (RBV) model to outline a new conceptual framework. Subsequently, the chapter reviews the independent variables (technology orientation, big data analytics (BDA) adoption), dependent variable (business performance), and mediator (competitive advantage). The following section develops the hypotheses about the relationship between the variables.

2.1 Big Data Analytics (BDA)

The emerging of digital technology such as social networks, mobile technology, e-commerce websites, search engines and others are creating enormous amounts of data (Boughouas et al., 2022). Big data is a broad term to characterise the volume and complexity of data, which play a significant role to understand the nature of many issues and enhance performance across many sectors. However, it is not possible for Malaysian SMEs owners to go through all data and make critical decisions for the improvement of their BP. Here comes the significance of BDA.

The term "big data analytics" (BDA) signifies the complex methods for analysing massive data that include data mining, visualisation, and sense-making (Sazu & Jahan, 2022). The methods are diverse, thus this research study the attainment of CA is based on company's TO and BDAA. Moreover, for converting BD into useful information, organizational resources like a data-driven culture and TO must exist. Owing to the significant operational and strategic advantages of BDA, it has evolved into a tool that assists companies operate at their most effective and efficient levels (Wrona & Reinecke, 2019). According to Muhammad (2022), the

resource-based view theory (RBV) can be used to assess all business values generated by BDA. Based on a company's attributes or the degree of the resources and capabilities it has for innovation, RBV describes the relationship between resources and capabilities with company performance.

Technologically oriented companies focus their resources on obtaining new and advanced technology as well as innovating new processes, products, and services. The pace of technological advancements within a certain industry may affect their adoption of new technologies (Al-Idrus, 2020). Therefore, section 2.3.1 of this research will explore the TO of SMEs in Malaysian service industry. On the contrary, BDA has a big impact on how well companies' success across industries (Muhammad, 2022). While service industry was more reliant on BDA in processing information (Song et al., 2021). Hence, this research reviews BDAA of SMEs in Malaysian service industry in section 2.3.2.

2.2 Underlying Theories

The underlying theories applies in this research was resource-based view (RBV) model. The following will discuss the theory of the RBV model.

2.2.1 Resource-based view (RBV) model

A resource-based view (RBV) theory highlights that the company as a whole, including all of its tangible and intangible resources, may be used to achieve CA (Peteraf, 1993). Resources comprise of all of the company's-controlled assets, capabilities, organizational procedures, knowledge, and learning components. The combination of these valuable, rare, inimitable, and non-substitutable resources develops a company's CA (Barney, 1991). According to RBV theory, different companies operate differently due to resource heterogeneity and immobility (Barney, 1991). Similarly, internal variables determine a company's CA and are the primary cause of differences across companies rather than external factors. Along with the RBV studies of Penrose (1959), they conclude that technology-related

resources and capabilities are a significant source of CA. This research attempts to scrutinize the theoretical relationship between TO and CA where TO is seen as a resource in companies and considered an intangible resource.

The combination of resources cannot adequately explain the ongoing importance of the CA. Researchers creates the core competence theory by focusing on the role of capabilities (Seddighi & Mathew, 2020). This theory illustrates that a company's capabilities combine its essential knowledge and skills as well as the resources it gathers over time (Ali et al., 2020). Capabilities facilitate the conversion of resources into desired outputs by increasing resource efficiency. Company's capabilities can use in boosting the BP by turning resources into desired outputs, which explains why companies with identical resources achieve various degrees of BP (Seddighi & Mathew, 2020). Technological capability is an intangible asset that is frequently challenging for rivals to imitate. A company's technological capability, such as BDAA, improves with the acquisition of new knowledge or skills, and hence enhance BP. The RBV theory highlights the significance for companies to focus on internal resources and capabilities in order to obtain a CA This research also attempts to examine the theoretical relationship between BDAA and CA where BDAA is seen as a capability in companies and also considered as an intangible resource.

2.3 Review of variables

2.3.1 Technology Orientation

Technology orientation is determined by the level of investment in research and development (R&D), the acquisition of new technologies, and the adoption of the most recent technology (Gatignon, 1997). It refers to companies' capability and willingness to adopt a technological perspective and apply it to the development and improvement of goods and services. SMEs that are technology-oriented can achieve better results in addressing and satisfying their customers' needs by utilising their technological expertise (Gatignon, 1997). A company's TO has a significant impact on its innovation capability and is seen as being a source of CA, and in turn, it can improve BP (Wang, 2022). Companies with a high TO perform better

in times of technological changes because they can quickly introduce new procedures, goods and services to meet consumer demand (Wang, 2022).

According to Zamani (2022), SMEs will only adopt new technology if the benefits exceed the limitations of current technology. IT infrastructure, which reflects a company's capability to implement information system, is important for strategic competitiveness (Yadegaridehkordi et al.,2020). However, SMEs usually lack IT resources, which limits their capability for data gathering and processing (Jiang et al., 2023). Adam and Alarifi's (2021) study found that the lack of IT experts is a significant obstacle for the majority of SMEs in achieving flexibility in the use of IT infrastructure. Consequently, this research aims to investigate the relationship between TO, CA, and BP of Malaysian SMEs in the service sector.

2.3.2 Big Data Analytics (BDA) Adoption

BDA adoption means the application of methods and technologies that can improve BP by analysing complex, large-scale data for various purposes (Hong & Ping, 2020).The literature reveals that companies may generally outperform the competitors by 5% in terms of productivity and 6% in terms of profitability by adopting BDA (Shahid & Sheikh, 2021). Companies have made significant investments in the adoption of BDA as a result of these potential advantages. The study of Sekli & Vega (2021) shows that employees resist to alter their work habits despite organisational efforts to adopt BDA. Some employees worry that BDA and associated tools may turn their knowledge and decision-making skills obsolete, which could result in them losing their jobs. According to Hagen (2021), employees who have been with a company for a longer period of time are less likely to trust new technologies and are more concern about being replaced.

Nonetheless, there have been more attempts to use BD in practice. With the assistance of BDA, many different industries employ BD to provide new information and enhance decision-making. For instance, researchers use BDA in the healthcare industry to investigate benefits and risks that are not apparent in clinical studies (Batko & Ślęzak, 2022). Big data usage becomes a significant tool for companies to outperform their rivals. With the BDAA, companies can develop new goods and services and upgrade existing business models based

on customer demand analysis (Mariani & Wamba, 2020). Thus, this research intends to analyse the relationship between BDAA, CA, and BP of Malaysian SMEs in the service sector.

2.3.3 Competitive Advantage

A company's ability to outperform its rivals is shown by its competitive advantage (Côrte-Real et al., 2020). The company's distinctive resources and capabilities are the source of a CA (Barney, 1991). Companies control the different resources that provide them a CA (Úbeda-García et al., 2021). In Wernerfelt's (1984) study, in order for companies to progress toward achieving CA, they must strike a strategic balance between the use of existing resources and the development of new ones. According to Ciampi et al. (2021), companies could not obtain CA from a single source and need to combine several sources to develop an expertise that could last for a while.

According to Barney (1991), a company gains CA when it employs a value creating strategy that is not employ by its competitors. Similarly, Porter (1980) suggests that a company can only obtains CA when the value it creates for customers is greater than the cost of creating such value. In this study, CArefers to the use of company resources to provide benefits for customers and improve BP.

2.3.4 Business Performance

Business performance is the capability of a company to achieve its goals, including high profits, favourable financial outcomes, high-quality products, a sizable market share, and long-term survival (Udriyah et al., 2019). It serves as a sign of how successfully a company achieves its goals. BP can be assessed qualitatively or quantitatively. It can be assessed by taking into account both financial and market aspects. In various research, competitive advantage is used to assess how well a company's BP (Meiyu et al., 2022; Yunus & Sijabat, 2021; Rahim & Zainuddin, 2019). Companies must enhance and keep up its CA in order to achieve superior BP.

According to a study by Raut et al. (2019), BDA can enhance companies' performance via boosting productivity, either tangible such as less paper reporting or intangible such as company reputation. BDA provides companies the opportunity to derive administrative information from the data. A company will therefore be able to enhance its BP if it adopts BDA. Companies that successfully adopt BDA are better able to transform data into information that can be distributed to each department of the company (Maroufkhani et al., 2020). Therefore, a company can improve its BP by adopting BDA in their operations.

2.4 Proposed Conceptual Framework

Drawing on the resource-based view (RBV) model, this study aims to investigate the impact of SMEs' resources and capabilities on its CA and BP. In this study, TO will be the company's technological resources, while BDAA is the company's capability. CA is the mediator between companies' resources and capabilities, with its BP. Figures 2.1 and 2.2 show the conceptual framework developed for this research study.

Figure 2.1: Conceptual Framework (Direct Relationship)
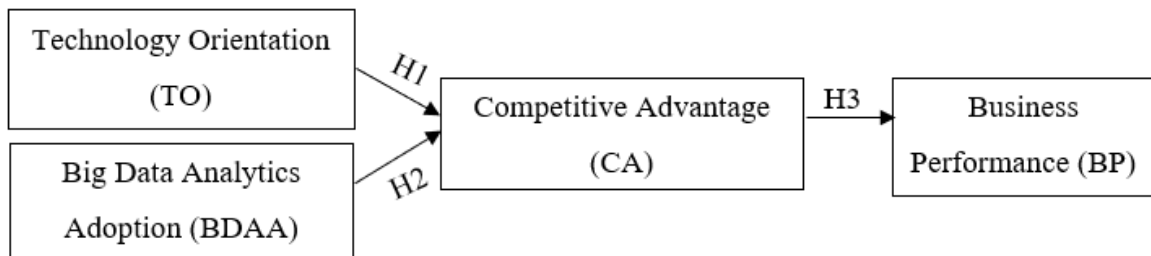
Figure 2.2: Conceptual Framework (Mediating Relationship)
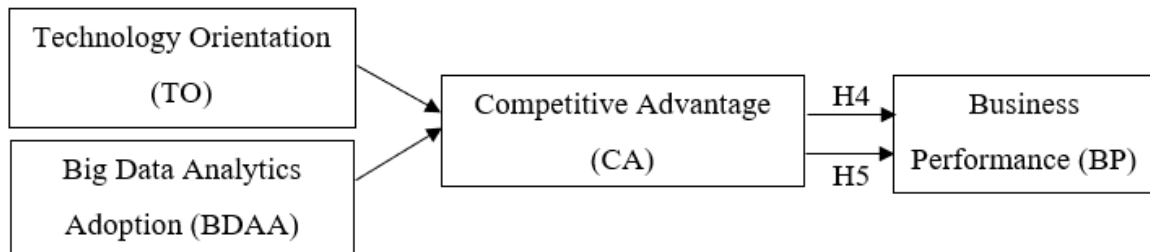
2.5 Development of Hypotheses

2.5.1 Technology Orientation and Competitive Advantage

Technologically oriented companies allocate their resources on obtaining new and advanced technologies as well as introducing new procedures, goods, and services despite the rapid technological changes may influence their adoption or development of new technologies (Al-Surmi et al., 2020). There is a positive relationship between TO and BP in earlier research (Aliyu et al., 2022; Putra & Setiawan, 2022). Although the value of TO towards innovation has been acknowledged, there is little emphasis on the link between TO and CA of SMEs.

When technology evolves rapidly, companies with a high TO operate better because they can launch new procedures, goods, and services to meet consumer demands (Al-Idrus, 2020). However, in order for SMEs to sustain a CA in the fast-paced Malaysian market, they must explore new technology (Wielgos et al., 2021). Companies that focus on technology will gain CA and, using this technology, they will be able to offer customers a wider range of innovative services (Al-Idrus, 2020). According to Verdecho et al. (2020), his research found that TO improves CA and company's sustainability in the face of upheavals. Consequently, this research hypothesises that:

H_1 : Technology orientation has a significant relationship with competitive advantage.

2.5.2 Big Data Analytics (BDA) Adoption and Competitive Advantage

The companies' distinctive resources and capabilities are the source of their CA (Barney, 1991). Big data analytics (BDA) refers to the capability or intangible resource that companies can use to increase their business value and performance. BDA can support decision-making by providing access to new information and potential opportunities, as well as real-time data for market analysis (RADY, 2021). There have been more initiatives to adopt BDA in practice nowadays and BDAA becomes a crucial tool for companies to outperform their rivals (Ganeshkumar et al., 2023).

Companies must implement effective information management and analytics since these practices can assist them in learning new knowledge and facilitate in taking advantage of potential opportunities (RADY, 2021). BDA has thus evolved into a strategy for companies to achieve CA in recent years. It helps companies increase the effectiveness of their daily operations, generate greater profit margins, and increase customer satisfaction (Dahiya et al., 2021). SMEs are growing more optimistic about the BDA technology, which is likely to change the way they conduct business (Giang & Liaw, 2022). Therefore, all the industry including the service sectors, should adopt BDA technology into their daily operations in order to acquire CA and improve overall BP. Thus, this research proposes the following hypotheses:

H_2 : BDA adoption has a significant relationship with competitive advantage.

2.5.3 Competitive Advantage and Business Performance

Competitive advantage gains a considerable attention since it affects a company's financial and market performance (Anwar & Shah, 2021). The research by Zaidi et al. (2019) suggests that IT and the Internet, in particular, may boost performance and competitiveness by obtaining a CA. Obtaining a CA also a prerequisite for a SME to outperform their competitors significantly. The RBV theory supports this viewpoint. RBV specifies that the resources and capabilities which are valuable and difficult to imitate are the primary sources and drivers of CA and superior performance (Barney, 1991). Technology orientation serve as a company's ability and willingness to develop technological mindset and utilise it in improving services (Gatignon & Xuereb, 1997). Companies who invest in R&D and employ new technologies will definitely have a CA (Danso et al., 2019). Similarly, AI-Idrus' (2020) study show that TO has a favourable impact on BP with average technological changes. Hence, SMEs with a relative level of TO and BDAA could obtain CA and positively affect the BP. Therefore, this research hypotheses that:

H_3 : Competitive advantage has a significant relationship with business performance.

2.5.4 Mediating role of Competitive Advantage

The company's internal resource base is the element deciding the competitive advantage in small and medium-sized enterprises (SMEs) (Tukamuhabwa et al., 2021). A company makes use of its distinctive resources to deliver service that are more valuable to customers. Moreover, CA act as a crucial company resource that can enhance its BP. This can also be seen in Kiyabo & Isaga's (2020) study that CA positively affects BP. The research conducted by Julyanthry et al. (2022) have also shown a positive relationship between CA and BP of SMEs. Research on the mediating role of competitive advantage between TO, BDAA, and BP of SMEs are quite rare. Thus, researchers with similar background have contend that internal capabilities often mediate the relationship between IT capabilities of a company and its BP rather than having a direct impact on it (Somjai & Jermsittiparsert, 2019). Additionally, it is asserted that IT capabilities improve the connection between a company's resources and performance (Dwimahendrawan et al., 2022). Studies have also revealed that a company's CA is based on its use of information systems and IT capabilities (Kristoffersen et al., 2021).

Although big data makes a substantial contribution to the company's values, the interaction between BD and CA are still rarely discussed. The study on BDA has mainly concentrated on the role of big data capability and identified its direct effect on organizational performance. Maroufkhani et al. (2020) argued that adopting practice base view will build a more complete image of how BDA can be productivity leverage to deliver business value. On the basis of this assumption, it is predicted that CA can enhance the BP of SMEs and also act as a mediator between TO, BDAA, and the BP of SMEs. Thus, this study hypothesises that:

H_4 : Competitive advantage mediates the relationship between technology orientation and SMEs business performance.

H_5 : Competitive advantage mediates the relationship between BDA adoption and SMEs business performance.

2.6 Conclusion

Chapter 2 has discussed the previous studies that are related to the variables used in the proposed framework. The following Chapter 3 will discuss the research methodology for this research.

CHAPTER 3: METHODOLOGY

3.0 Introduction

In this chapter, the research methodology that will be employed in this research is developed after reviewing previous studies and discussions from various journals in chapter 2. The purpose of research methodology is to achieve the research objectives and resolve the research questions stated in chapter 1. This chapter covers the design of this research, sample design, data collecting technique, research instrument, construct measurement, data processing, and data analysis tool.

3.1 Research Design

To achieve the research objectives, this research applied the quantitative methods in analysing data. Quantitative methods are used to explore the relationship between variables since it can quantitatively and numerically represent the relationship through analysis (Hu et al., 2019). With this research method, researcher can understand the effect of a company's resource and capability on a company's competitive advantage and business performance.

To test the hypotheses, this research employed a sample of SMEs in the following industries: consulting, e-commerce, education, event, financing service, food & beverage (F&B), healthcare, hospitality, hotel, oil & gas, retail, telecommunications, and tourism. In order to apply a generalisation to the population of SMEs in the service industry, a variety of service fields were covered. This research will be conducted using survey questionnaire. The questionnaire will be distributed virtually to the SMEs in the service industry throughout Malaysia. Besides, descriptive research served as a basis for this research. Descriptive research design will be used to describe the characteristics of the variables under study (Bloomfield & Fisher, 2019). In this research, the effect of SMEs' resource and capability on their CA and BP will be analysed.

3.2 Sampling Design

A sampling design is a detailed procedure for choosing a representative sample from a particular population. In addition, researchers usually examine particular population or area of interest in order to gather specific information.

3.2.1 Target Population

The specific group of people from which researchers conduct their research and collect their data is known as target population (Li & Song, 2020). The target population for this research is the SMEs in Malaysia that were active in the service industry and registered under Suruhanjaya Syarikat Malaysia (SSM). It is also recognised that only SME businesses that are registered under SSM may be referred to as small and medium-sized enterprises (SMEinfo, 2021). This will increase the reliability and credibility of data collected. Since the research is focused on the topic of degree of technology innovation of the company, it required potential respondents from participating SMEs to be owners of the company or from higher levels of the management hierarchy. To attain this, a demographic question about the respondent's position in the company was included in the survey. The answer to this specific question determines whether the respondent was qualified for the study and helped to eliminate responses from lower-level employees who have limited access to company's critical information. This research was analysing on the TO, BDAA, CA, and BP of a company, but the data was collected from the key informants since they are the ones who knows their company well.

3.2.2 Sampling Technique

This research applied a judgemental sampling technique. This is a non-probability sampling technique which yields a sample that can be logically regarded as representative of the population. This sampling method is adopted to choose a representative sample based on the researcher's judgement (Teoh & Kee, 2020). In this research, the target respondents are the

SME business owner, CEO, senior manager, director, or manager who are willing to contribute the information based on their knowledge and experience. The target respondents of this research have the access to their company's daily operation data and information. Therefore, they will have a better understanding regarding the degree of TO and BDAA in their company.

3.2.3 Sample size

The number of participants that fill out questionnaires as part of a research study is known as the sample size (Sekaran & Bougie, 2019). It served as a representation of the target population. An excessively large sample size is unnecessary, and a smaller sample would have insufficient data to address the primary research objective (Andrade, 2020). Hence, the minimum sample size required for this research was determined by the sample size calculator, G-Power software. According to the result by the G-Power analysis, the minimum sample size for this research was 77 samples. Thus, a minimum of 77 respondents were required to take part in this research. The G-Power test result is as shown in Figure 3.1 below. According to the guideline by Roscoe (1975), a sample size larger than 30 and less than 500 is most appropriate for majority of research. Hence, this research will collect a total of 200 responses to generate more generalisable findings. Among the collected 200 questionnaires, 60 was invalid. With 58 respondents held an executive position in their company, and their company's full-time employees has exceeded 3 people. Another 2 responses are not considered as SMEs since it has a company size of more than 75 full-time employees. These responses are discarded and the remaining 140 will be analysed.

Figure 3.1: G-Power Test Result
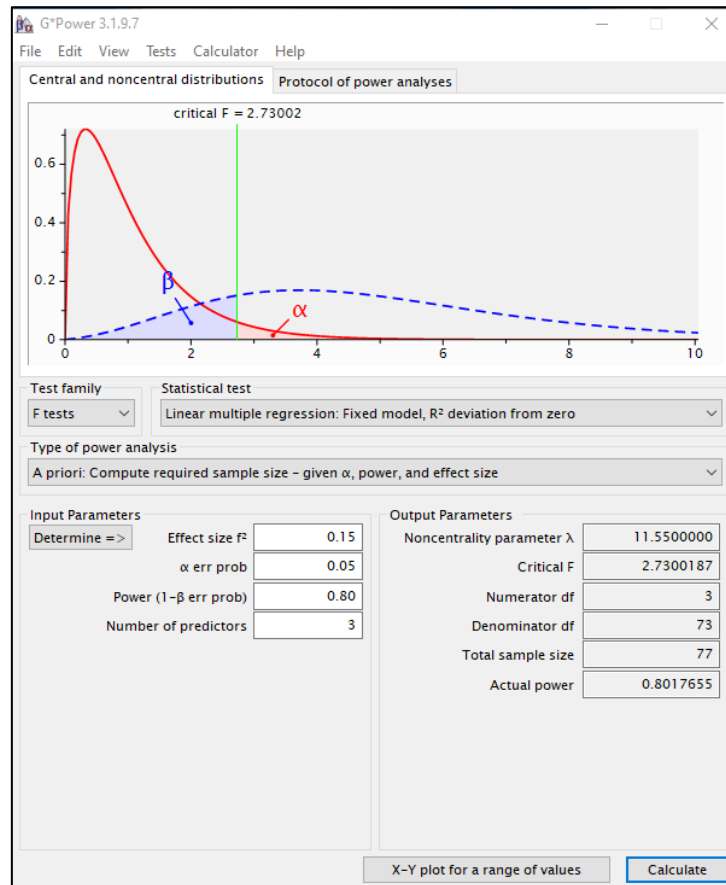
Source: Developed for the research

3.3 Data Collection Method

3.3.1 Primary Data

The data for this research will be collected through primary data. Primary data referred to the data researchers obtained through surveys, interviews, and experiment especially for analysing and resolving the current research problem (Sekaran & Bougie, 2019). This research will collect data from SMEs in Malaysia service sector via a Google form questionnaire. The questionnaire was distributed online through e-commerce platform and social media to collect

responses from the SMEs' owners. These individuals held high degrees of responsibility, and
their viewpoints were likely to affect the strategic choices and decisions of their companies. In
short, the questionnaire was developed in line with the hypotheses of this research.

3.4 Research Instrument

Research instrument is referred to the method used to acquire, quantify, and evaluate
data that related to the research topic (Saunders et al., 2019). The research instrument employed
in this research was a questionnaire. This questionnaire will be generated in Google form and
distributed to target respondents through online platforms.

3.4.1 Questionnaire Design

The questionnaire contained 3 sections and a total of 31 questions. These questions
were designed to learn how the SMEs' resource and capability affect its CA and BP.
Respondents will be asked for personal information in Section A of the questionnaire, including
their gender, age, education, position in the company, and so on. In Section B, there will be 3
subsections comprise of technology orientation, BDA adoption, and competitive advantage.
Whereas the dependent variable, business performance will be asked in Section C.

Both Section B and Section C applied the 5-point Likert scale. Respondents can specify
how strongly they agree or disagree with a question or statement using the Likert scale (Mcleod,
2023).

3.4.2 Pre-Test

A pre-test is a small-scale pilot study or test measures of a survey instrument or
questionnaire to assess its validity and reliability before it is applied to the actual research (Roth,
2022). It is used to check for any potential problems with the instrument and make necessary
adjustments before employing it in the research. A pre-test is often carried out on a small group
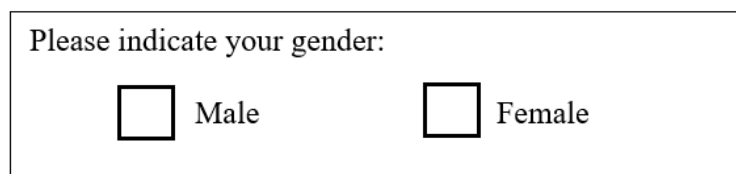
of people who represent the research's target population (Roth, 2022). The survey instrument is given to the target respondents during the test, researchers will then analyse the existence of any problems like unclear or confusing questions, language clarity, and the flow of the questionnaire. Researchers also collect feedbacks when conducting the pre-test to ensure the questionnaire is valid, reliable, and appropriate for use. The pre-test of this research was conducted with 3 academics and 2 industrials. The feedbacks collected has been analysed and adjustment are made on the questionnaire before distributing.

3.5 Construct Measurement

3.5.1 Nominal Scale

Nominal scale labelled the different types of information for identification purposes (Sekaran & Bougie, 2019). It depends on being recognised and does not indicate value. It only considered qualitative variables and make no comparisons between others information. Therefore, nominal scale questions are used to classify respondents instead of collecting statistical data. The nominal scale of measurement was applied in the questionnaire as below.

Figure 4.2: Nominal Scale

Source: Developed for the research

3.5.2 Ordinal Scale

Ordinal scale allowed for the ranking of data according to their relative position on a scale, but without indicating the magnitude of differences between them (Sekaran & Bougie, 2019). Ordinal scale measures the order or rank of something, rather than the exact numerical difference between two groups. For example, age group of 25 to 34 is better than age group of 18 to 24. However, the ordinal scale does not show how much the age group is better than another. The following figure shows how the questionnaire used ordinal scale measurement.

Figure 5.3: Ordinal Scale

Source: Developed for the research

3.5.3 Interval Scale

A variable measured on an interval scale was similar to how ordinal scales provide information about greater or superiority, but with equal space between each value (Sekaran & Bougie, 2019). One of the instruments used to measure interval scales in this research was the Likert scale. It was used in this questionnaire to assess each item in the Section B and Section C. The application of interval scale measurement in the questionnaire is shown as below.

Figure 6.4: Interval Scale

No.	*Item*	*Strongly Disagree*				*Strongly Agree*
TO1	My company tend to adopt up-to-date technologies.	1	2	3	4	5

Source: Developed for the research

3.6 Data Processing

Data processing is the process of turning raw data into information that generate valuable insight. The raw data was gathered, cleaned, organised, processed, and examined before being presented in a readable way. The questionnaire will be used to collect data and information related to the research. Researchers may understand and utilise the data by turning it into usable representations like graphs, charts, or reports.

3.6.1 Data Checking

Data checking is the method of ensuring that all the questions stated in the questionnaire have been answered by the respondents. The information gathered could be inaccurate if the respondent does not answer all the questions. Data checking is a step to ensure that the information gathered is accurate and increase the reliability of the data gathered.

3.6.2 Data Editing

Data editing is the phase to be carried out after the respondents completed the questionnaire. This phase comprised of checking, reviewing, and modifying the data in order to reduce potential bias. Data editing need to be conducted to prevent information inaccuracy resulting from the inadequate information provided by the respondents.

3.6.3 Data Coding

The process of assigning a numerical code that a computer can recognise for various answers to a question is known as data coding. Each code in the same question only represents one perspective, which is subsequently input into a computer in numerical form to convert words into numbers. It is essential to code the data in the questionnaire in order to enhance the analytical results of the questionnaire.

3.7 Proposed Data Analysis Tool

Data analysis is the procedure of gathering, modelling, and analysing data to generate insights that enhance decision-making (Calzon, 2021). In this research, 200 questionnaires were sent to the respondents, with only the valid questionnaires being evaluated. The IBM Statistical Package and Social Science (SPSS) version 27.0 will be used to analyse the collected data. The processed data will be integrated into the software for data editing, data transformation, statistical analysis, and report generating by using SPSS. Besides, a procedure named the "PROCESS macro" must be added to the SPSS software in order to analyse the mediating effect of competitive advantage.

3.7.1 Descriptive Analysis

Descriptive analysis is a concise summary that reflects the broadest range of information from the responses gathered from the respondents (Sharma, 2019). The information will be presented graphically, such as in bar charts or pie charts, to make it easier to understand. Descriptive analysis can assist in identifying and classifying the responses by providing summary of the data. Since Section A of the questionnaire was designed to focus on demographic information, descriptive analysis will be employed to examine the characteristics of the respondents in this research.

3.7.2 Scale Measurement

3.7.2.1 Reliability Test

A reliability test indicates the extent of error-free a test measure is. According to Sekaran & Bougie (2019), the reliability test can be used to assess the stability and consistency of the research findings. Cronbach's alpha was applied in this research to identify the internal consistency of the data collected. It provided measurement for internal consistency by having

a number between 0 and 1. Furthermore, the alpha value will increase if the variables are interrelated. The value of Cronbach's alpha in assessing data consistency is shown in Table 3.1.

Table 3.1: Cronbach's Alpha Coefficient Size

Strength of Association	Alpha Coefficient Range
Poor	$\alpha < 0.6$
Moderate	$0.6 \leq \alpha < 0.7$
Good	$0.7 \leq \alpha < 0.8$
Very Good	$0.8 \leq \alpha < 0.9$
Excellent	$\alpha \geq 0.9$

Source: Sekaran and Bougie (2019).

3.7.3 Inferential Analysis

Inferential analysis is a method used to generalize the findings from a small sample size to a larger population (Sharma, 2019). It enabled researchers to draw conclusions or make assumptions about a larger population based on the samples analysed. Inferential analysis is commonly used to examine the relationship between variables within a sample in order to make generalisations that represent the population (Calvello, 2020). Computer-specific SPSS was applied in this research to analyse the data collected.

3.7.3.1 Pearson Correlation Coefficient

The Pearson correlation coefficient (r) is a tool used to determine the relationship or association between two variables (Turney, 2022). The r value is always expressed between -1 and 1. Besides, the correlation coefficient shows how strongly and in what direction the two variables are related. As the coefficient's absolute value increases, the correlation between the variables increased. While the positive and negative signs signified the positive relationship or negative relationship between the two variables. Hence, correlation analysis will be applied to

analyse the direct relationship between independent variables and mediator, as well as between mediator and dependent variable.

Table 3.2: Size of the Correlation Coefficient and its Interpretation

Correlation Strength	Interpretation
± 0.91 to ± 1.00	Very Strong
± 0.71 to ± 0.90	High
± 0.41 to ± 0.70	Moderate
± 0.21 to ± 0.40	Relationship is small yet strong
0.00 to ± 0.20	Small, virtually insignificant

Source: Hair, Money and Samouel (2007).

3.7.3.3 Mediation Analysis via PROCESS Macro

The PROCESS macro model 4 created by Andrew Hayes was applied to examine the mediating effect of CA on the relationship of TO with BP, as well as on the relationship of BDAA with BP. PROCESS macro is a statistical tool used for conditional process analysis, mediation analysis, and moderation analysis (Fawad, 2023). In a mediation analysis, the PROCESS macro can be used to test the size and significance of the indirect effect of the independent variables on the dependent variable through mediator. The regression result explaining the relationship between TO, BDAA, CA and BP were also discovered using the mediation analysis.

Table 3.3: Statistical test used to measure hypothesis

Hypothesis	Statistical Test
H_1 : Technology orientation has a positive relationship with SMEs competitive advantage.	Pearson Correlation
H_2 : BDA adoption has a positive relationship with SMEs competitive advantage.	Pearson Correlation
H_3 : SMEs competitive advantage has a positive relationship with business performance.	Pearson Correlation
H_4 : SMEs competitive advantage plays a mediating role in the relationship between technology orientation and SMEs business performance.	Mediation Analysis via PROCESS macro
H_5 : SMEs competitive advantage plays a mediating role in the relationship between BDA adoption and SMEs business performance.	Mediation Analysis via PROCESS macro

3.8 Conclusion

In summary, this chapter thoroughly discussed the methodology that will be applied in this research. The data collected from the questionnaire will be analysed and examined further in Chapter 4.

CHAPTER 4: DATA ANALYSIS

4.0 Introduction

In this chapter, the data collected through the questionnaire will be analysed thoroughly. This chapter will first describe key informants' demographic profile and their company profile in descriptive analysis. The subsequent section will discuss the result of the hypothesis testing.

4.1 Descriptive Analysis

This part will analyse both key informants' demographic profile and the company profile. Section 4.1.1.1 until 4.1.1.4 are the responses on the key informant demographic profile, subsequently is the company profile that they are representing. The respondents' demographic profile includes gender, age, education, and job title. While the company profile includes field of services, type of market for the company, company size based on sales turnover per annum, company age, and number of full-time employees.

4.1.1 Key Informant Demographic Profile

4.1.1.1 Gender

Table 1.1: Gender

Gender	Frequency	Percentage (%)
Male	72	51
Female	68	49
Total	140	100

Figure 4.1: Gender
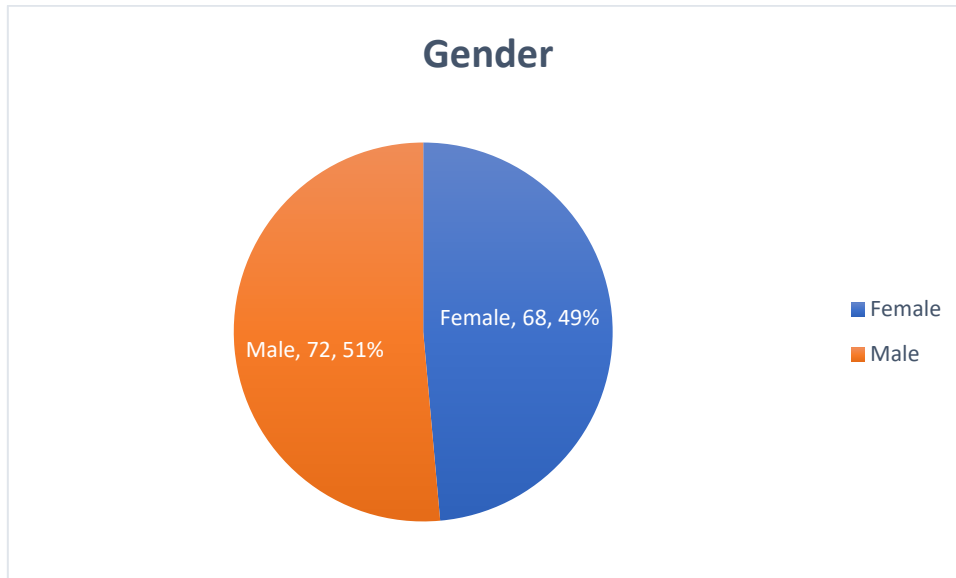
Source: Developed for the research

Table 4.1 and Figure 4.1 show the gender of the respondents. There is a total of 140 respondents, with 72 of male respondents (51%) and 68 of female respondents (49%) respectively. The number of female respondents is almost equal to the number of male respondents.

4.1.1.2 Age

Table 2.2: Age

Age	Frequency	Percentage (%)
18 - 24 years old	19	13
25 - 34 years old	29	21
35 - 44 years old	29	21
45 - 54 years old	28	20
55 years old and above	35	25
Total	140	100

Figure 4.2: Age
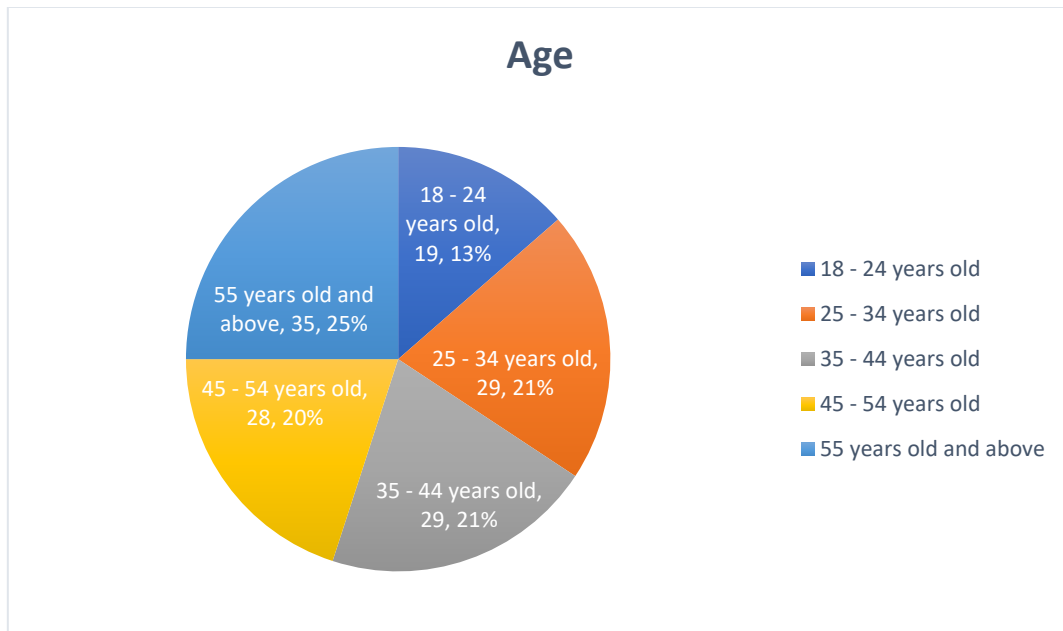
Source: Developed for the research

Table 4.2 and Figure 4.2 demonstrate that the largest age group is 55 years old and above, accounting for 35 respondents (25%) out of 140 respondents. Subsequently, 19 respondents (13%) between the age of 18-24. The number of respondents for 25-34 age group and 35-44 age group are same, with a 29 respondents (21%) respectively. The remaining 28 respondents (20%) were between the 45-54 age group.

4.1.1.3 Education

Table 3.3: Education

Education	Frequency	Percentage (%)
Bachelor's degree	97	69
Diploma	11	8
Foundation	1	1
High School	6	4
Master/PhD	25	18
Total	140	100

Figure 4.3: Education
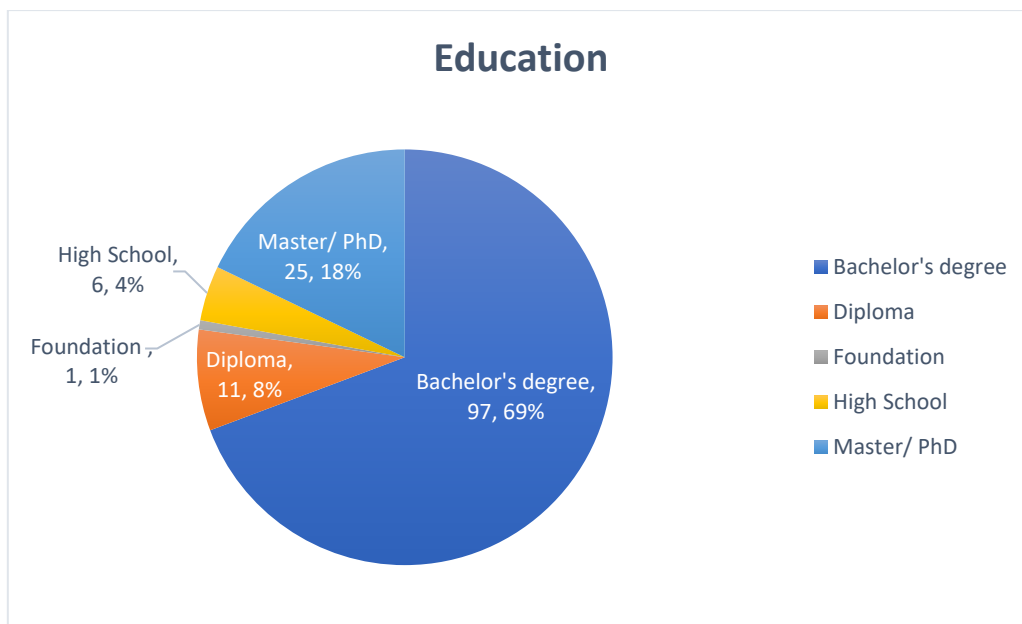
Source: Developed for the research

Table 4.3 and Figure 4.3 reveal the education level of the respondents. 97 of the respondents (69%) have an education level of bachelor's degree. Followed by the education level of diploma, which consists of 11 respondents (8%). Besides, the foundation and high school have 1 respondent (1%) and 6 respondents (4%) respectively. The remaining 25 respondents (18%) are holding an education level of master/PhD.

4.1.1.4 Job Title

Table 4.4: Job Title

Job Title	Frequency	Percentage (%)
Business Owner	44	31
CEO	20	14
Senior Manager/ Director	26	19
Manager	48	34
Executive	2	2
Total	140	100

Figure 4.4: Job Title
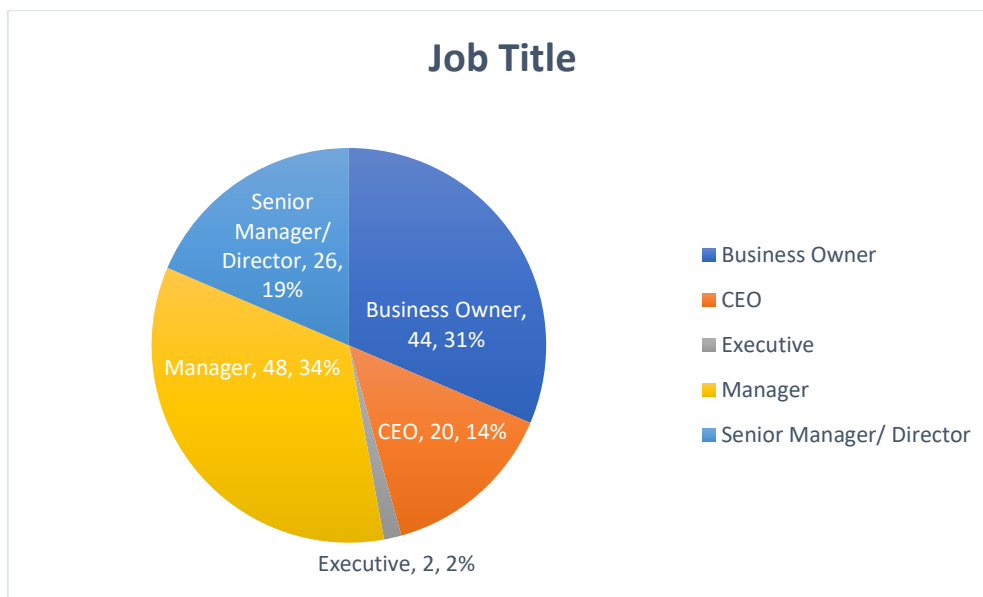
Source: Developed for the research

Table 4.4 and Figure 4.4 indicate the job title of the respondents. Majority of the respondents held a manager position in their company, accounting for 48 respondents (34%). There were 44 respondents (31%) are business owner of their own company, and 20 respondents (14%) are the chief executive officer (CEO) of their company. In addition, there

were 26 respondents (19%) are senior manager or director in their company, while only 2
respondents (2%) held an executive position.

4.1.2 Company Profile

4.1.2.1 Field of Services

Table 5.5: Field of Services

Field of Services	Frequency	Percentage (%)
Consulting	19	11
E-commerce	29	17
Education	10	6
Event	13	7
Financing Service	28	16
Food & Beverage (F&B)	29	17
Healthcare	9	5
Hospitality	3	2
Hotel	10	6
Oil & Gas	1	1
Retail	16	9
Telecommunications	4	2
Tourism	2	1
Total	173	100

Figure 4.5: Field of Services

Field of Services

Field	Value
Tourism	2
Telecommunications	4
Retail	16
Oil & Gas	1
Hotel	10
Hospitality	3
Healthcare	9
Food & Beverage (F&B)	29
Financing Service	28
Event	13
Education	10
E-commerce	29
Consulting	19
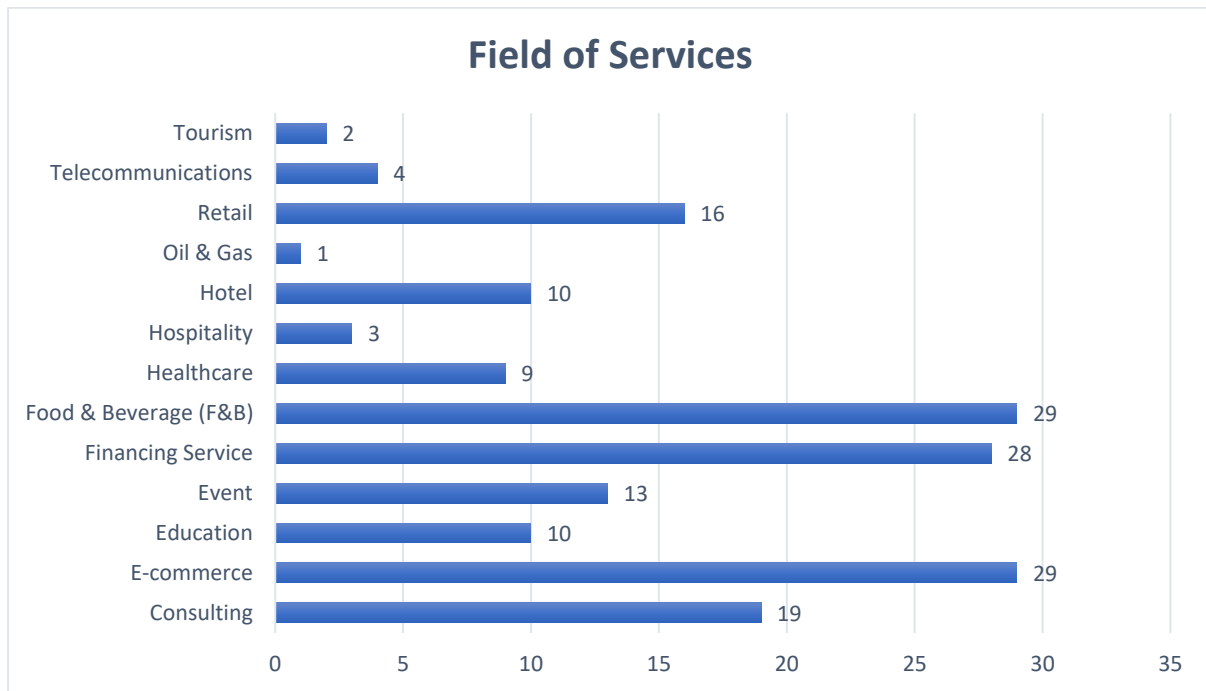
Source: Developed for the research

Table 4.5 and Figure 4.5 present the different field of services that companies are involved in. The total responses will exceed 140 since this is a multiple response question. Food & beverage (F&B) and e-commerce sector record the highest percentage, with 29 companies each. Moreover, 28 companies are in financing service, 19 companies involved in consulting, 16 companies are in retail, and 13 respondents involved in event sector. There are 10 companies involved in both the hotel and education sectors. The remaining 19 companies are from other field of services.

4.1.2.2 Type of Market for the Company

Table 6.6: Type of Market for the Company

Type of Market for the Company	Frequency	Percentage (%)
Business-to-business (B2B)	60	37
Business-to-consumer (B2C)	101	63
Total	161	100

Figure 4.6: Type of Market for the Company
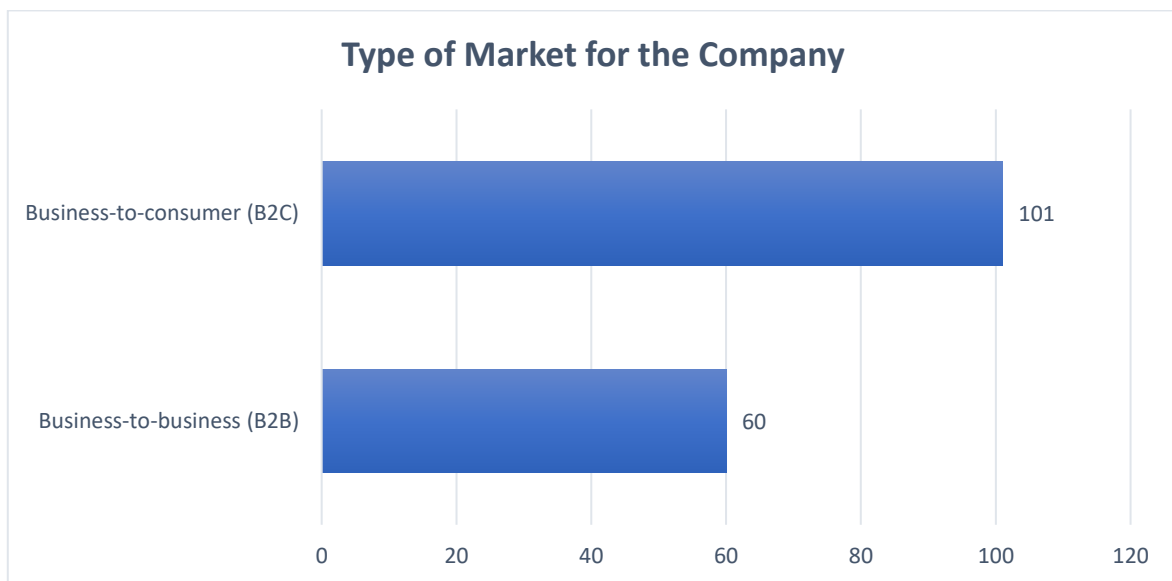
Source: Developed for the research

Table 4.6 and Figure 4.6 display the type of market the companies involved. The total responses collected was 161 since this is also a multiple response question. There are 101 companies (63%) engaged in business-to-consumer (B2C) market, while 60 companies (37%) engaged in business-to-business (B2B) market.

4.1.2.3 Company Size based on Sales Turnover per annum

Table 7.7: Company Size based on Sales Turnover per annum

Company Size based on Sales Turnover per annum	Frequency	Percentage (%)
Micro (Sales turnover of <RM300K)	40	29
Small (Sales turnover of RM300K – < RM3 Million)	62	44
Medium (Sales turnover of RM3 Million - < RM20 Million)	38	27
Total	140	100

Figure 4.7: Company Size based on Sales Turnover per annum
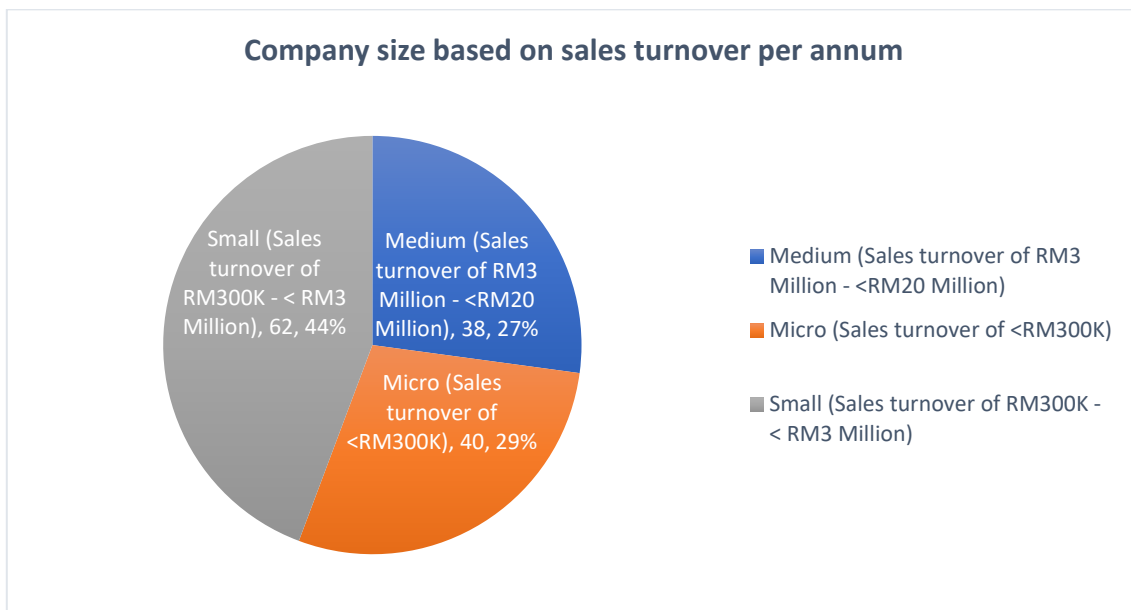
Source: Developed for the research

According to Table 4.7 and Figure 4.7, majority of the company's size (44%) is small company size with a sales turnover of RM300,000 to less than RM3 million. 40 companies (29%) are a micro company size with a sales turnover of less than RM300,000. 38 of the companies (27%) are medium sized with a sales turnover of RM3 million to less than RM20 million.

4.1.2.4 Company Age

Table 8.8: Company Age

Years of Company Establishment (Years)	Frequency	Percentage (%)
1 – 10	109	78
11 – 20	13	9
21 – 30	14	10
> 30	4	3
Total	140	100

Figure 4.8: Company Age
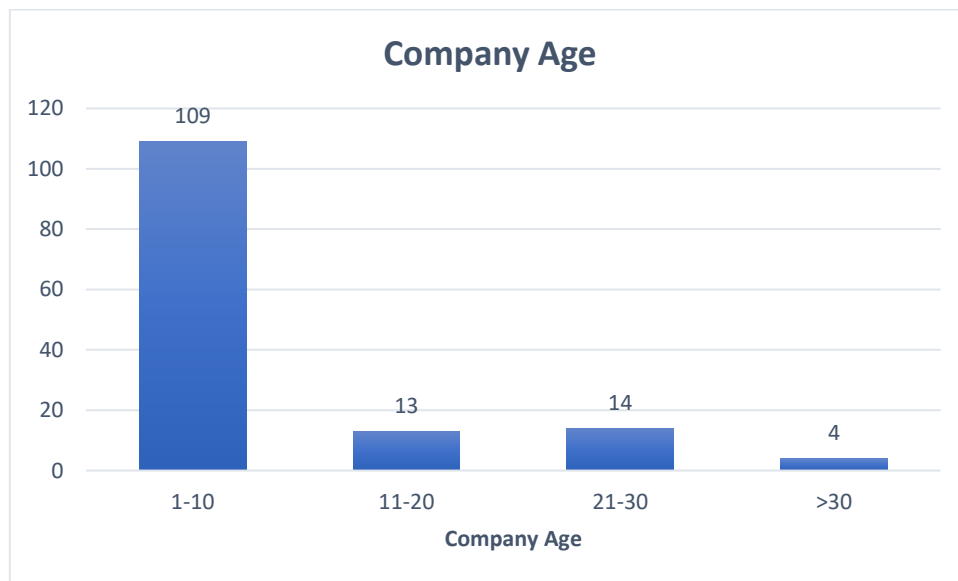
Source: Developed for the research

Table 4.8 and Figure 4.8 illustrate the company age. There are 109 companies (78%) has been around for 1 to 10 years and 13 companies (9%) are between 11 to 20 years. While 14 companies (10%) are between 21 to 30 years. However, only 4 companies (2.9%) have been around for over 30 years.

4.1.2.5 Number of Full-time Employees

Table 9.9: Number of Full-time Employees

Number of Full-time Employees	Frequency	Percentage (%)
< 5	12	9
5 – 29	47	33
30 – 75	81	58
Total	140	100

Figure 4 9: Number of Full-time Employees
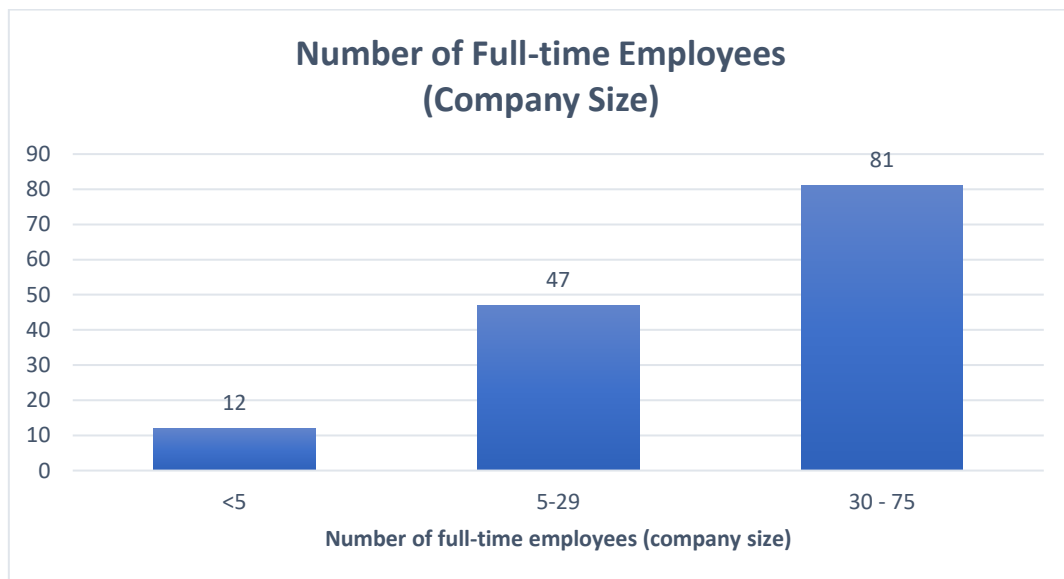
Source: Developed for the research

Table 4.9 and Figure 4.9 illustrate the number of full-time employees in the responded company. 12 companies (9%) have less than 5 full-time employees, and they were categorised as micro company size according to the SME definition set by Malaysian SME Corp's. In addition, 47 companies (33%) have 5 to 29 full-time employees, indicating they are small

company. 81 companies (58%) have 30 to 75 full-time employees, meaning they are medium-sized company.

4.1.3 Central Tendencies Measurement of Constructs

Table 10.10: Descriptive Statistics

No.	Variable	N	Mean	Standard Deviation
1.	Technology Orientation (TO)	140	4.163	0.809
2.	Big Data Analytics Adoption (BDAA)	140	4.101	0.853
3.	Competitive Advantage (CA)	140	4.110	0.871
4.	Business Performance (BP)	140	4.202	0.836
	Valid	140		

Source: Developed for the research

Table 4.10 shows that, majority of respondents agreed with the statements of business performance which result in the greatest mean value of 4.202. However, big data analytics (BDA) adoption has the lowest mean value of 4.101. Whereas the mean value for technology orientation and competitive advantage are 4.163 and 4.110 respectively. On the contrary, the standard deviation of competitive advantage is the greatest among all variables, with a value of 0.871 while the technology orientation has the lowest standard deviation value of 0.809.

4.2 Scale Measurement

4.2.1 Reliability Test

Table 11.11: Reliability Test (N = 140)

Variable	No. of Item	Cronbach's Alpha (α)
Technology Orientation (TO)	5	0.773
Big Data Analytics Adoption (BDAA)	6	0.854
Competitive Advantage (CA)	5	0.808
Business Performance (BP)	6	0.785

Source: Developed for the research

The reliability test includes a total of 22 items derived from the questionnaire in this research. According to table 4.11, a total of 4 variables has an alpha coefficient greater than 0.7, indicating that all variables have a good internal consistency reliability (Sekaran & Bougie, 2019). Table 4.11 exhibits that the BDAA has the highest alpha coefficient of 0.854 with a strong association. Followed by the CA which has a good strength of association with an alpha coefficient of 0.808. While the alpha value for BP and TO had a moderate association of 0.785 and 0.773 respectively.

4.3 Inferential Analysis

4.3.1 Pearson Correlation Coefficient

Table 12.12: Pearson's Correlation Analysis

		Technology Orientation (TO)	BDA Adoption (BDAA)	Competitive Advantage (CA)	Business Performance (BP)
TO	Pearson Correlation (r)	1			
	Sig. (2-tailed) (p)				
	N	140			
BDAA	Pearson Correlation (r)	0.660**	1		
	Sig. (2-tailed) (p)	< 0.001			
	N	140	140		
CA	Pearson Correlation (r)	0.703**	0.563**	1	
	Sig. (2-tailed) (p)	< 0.001	< 0.001		
	N	140	140	140	
BP	Pearson Correlation (r)	0.665**	0.688**	0.568**	1
	Sig. (2-tailed) (p)	< 0.001	< 0.001	< 0.001	
	N	140	140	140	140

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

Source: Developed for the research

Table 4.12 illustrate the Pearson correlation coefficient results of this research, which reveal that all the variables are correlated with each other. The association is statistically significant, if the p-value is equal or less than 0.05 (Saunders et al., 2019).

According to the result, TO is positively related with CA. Hence, if the degree of TO of a company is high, its CA increases as well. The Pearson correlation of 0.703 was more than 0.70. As a result, the association between TO and CA is regarded as good. Additionally, the p-value was <0.001, indicating that the relationship between TO and CA is significant. Therefore, H_1 is supported.

Similarly, BDAA is also positively linked with CA, with a correlation coefficient value of 0.563. Therefore, the greater the degree of BDAA in a company, the greater its CA. The correlation coefficient of 0.563 is between the range of $\pm$ 0.41 to $\pm$ 0.70. Thus, there is a moderate relationship between BDAA of a company and its CA. The p-value was lower than the 0.05, signifying that the correlation between the BDAA and CA of SMEs is significant. Hence, H_2 is supported.

Lastly, CA is significantly associated with BP of SMEs, with a positive correlation value of 0.568. Therefore, when CA of SMEs improves, its BP improves as well. The correlation coefficient of 0.568 falls somewhere between $\pm$ 0.41 to $\pm$ 0.70. Consequently, there is also a moderate relationship between CA and BP. The p-value was smaller than 0.05, indicating that the relationship between CA and BP of a company were significant. Thus, H_3 is supported.

4.3.2 Mediation Analysis via PROCESS Macro

Table 13.13: Total, Direct, and Indirect effect of TO on BP

Total effect of TO on BP						
	Effect (*B*)	SE	t	p	LLCI	ULCI
	0.658	0.063	10.461	< 0.001	0.534	0.783
Direct effect of TO on BP						
	Effect (*B*)	SE	t	p	LLCI	ULCI
	0.520	0.087	5.970	< 0.001	0.348	0.693
Indirect effect of TO on BP						
	Effect (*B*)	BootSE	BootLLCI	BootULCI		
MV	0.138	0.084	-0.005	0.324		

Source: Developed for the research

A mediation analysis was conducted to examine the mediating effect of CA on TO of the company with its BP, as well as on BDAA of the company with its BP. Hayes' PROCESS macro model 4 with 5,000 bootstrapping was implemented to analyse the mediating effect of

CA. According to Table 4.13, the total effect of the model was positive and significant. The direct effect of TO on BP was positive ($B = 0.520$, $SE = 0.087$, $p < 0.001$) and significant at 95% CI [0.348, 0.693]. The total effect of TO on BP was positive ($B = 0.658$, $SE = 0.063$, $p < 0.001$) and significant as well at 95% CI [0.534, 0.783]. However, the indirect effect of TO on BP is positive ($B = 0.138$, $SE = 0.084$) but not significant at 95% CI [-0.005, 0.324]. Thus, there was no mediation effect, H_4 is not supported.

Table 14.14: Total, Direct, and Indirect effect of BDAA on BP

Total effect of BDAA on BP						
	Effect (B)	SE	t	p	LLCI	ULCI
	0.614	0.055	11.131	< 0.001	0.505	0.723
Direct effect of BDAA on BP						
	Effect (B)	SE	t	p	LLCI	ULCI
	0.481	0.064	7.532	< 0.001	0.355	0.608
Indirect effect of BDAA on BP						
	Effect (B)	BootSE	BootLLCI	BootULCI		
MV	0.133	0.047	0.054	0.242		

Source: Developed for the research

On the contrary, Table 4.14 demonstrate total, direct, and indirect effect of BDAA on BP. The direct effect of BDAA on BP is positive ($B = 0.481$, $SE = 0.064$, $p < 0.001$) and significant at 95% CI [0.355, 0.608]. Meanwhile, indirect effect of BDAA on BP is positive ($B = 0.133$, $SE = 0.047$) and statistically significant at 95% CI [0.054, 0.242]. The total effect of BDAA on BP also positive ($B = 0.614$, $SE = 0.055$, $p < 0.001$) and significant at 95% CI [0.505, 0.723]. Hence, CA partially mediated the relationship between BDAA and BP, H_5 is supported.

Based on the 95% confidence intervals, the direct, indirect, and total effect were statistically significant if they did not include zero (Ray et al., 2021). The findings suggested that the CA do not mediate the relationship between TO and BP, and partially mediated the relationship between BDAA and BP.

4.4 Conclusion

This chapter discussed the data analysis result. Descriptive analysis described the demographic profile of the respondents. The result from Pearson correlation analysis and mediation analysis using PROCESS macro also presented. The discussion of findings for the results will be further discussed in Chapter 5.

CHAPTER 5: DISCUSSION, CONCLUSION, AND IMPLICATIONS

5.0 Introduction

This chapter will discuss the findings on the analysis results in chapter 4. The key findings and implications of the research are also covered in this chapter. Also, this chapter will outline certain limitations and recommendations to serve as a foundation for future research.

5.1 Summary of Statistical Analysis

5.1.1 Descriptive Analysis

A total of 140 valid responses were collected for this research. Female respondents account for 49% of all respondents, following by male respondents who accounts for 51%. Majority of the respondents are 55 years old and above (25%) and the largest group of respondents (69%) holding the education level of bachelor's degree. Most of the respondents' job title is manager (34%).

The company profile was collected based on the information provided by the key informants since they are knowledgeable about their company. Majority of the companies involved in the food & beverage (F&B) and e-commerce sector, both accounting for 17%. When it comes to type of market for the company, 63% of the companies involved in business-to-consumer (B2C) market. Furthermore, 44% of the companies was categorised as small company size with sales of RM300k to less than RM3 million per annum. While for the company age, majority of the companies (78%) has been around for 1 to 10 years. If categorise company size based on the number of full-time employees, most of the companies (58%) were medium-sized with 30 to 75 full-time employees.

5.1.2 Scale Measurement

5.1.2.1 Reliability Test

In this research, the independent variable of TO has the lowest Cronbach's alpha value of 0.773. Meanwhile BDAA has a higher Cronbach's alpha value of 0.854. The Cronbach's alpha coefficient for the dependent variable, BP in this research is 0.785, indicating a high level of reliability. The Cronbach's alpha value for mediator, CA is 0.808.

5.1.3 Inferential Analysis

Table 5.1: Summarized Hypothesized Relationship

Hypothesis	Findings	Decision
H_1 : Technology orientation has a significant relationship with SMEs competitive advantage.	r = 0.703 p-value < 0.001	Supported
H_2 : BDA adoption has a significant relationship with SMEs competitive advantage.	r = 0.563 p-value < 0.001	Supported
H_3 : SMEs competitive advantage has a significant relationship with business performance.	r = 0.568 p-value < 0.001	Supported
H_4 : SMEs competitive advantage mediates the relationship between technology orientation and SMEs business performance.	B = 0.138 SE = 0.084 95% CI [-0.005, 0.325]	Not Supported
H_5 : SMEs competitive advantage mediates the relationship between BDA adoption and SMEs business performance.	B = 0.133 SE = 0.047 95% CI [0.056, 0.239]	Supported

Note. B = unstandardized regression coefficient; *SE* = standard error; CI = confidence interval.

5.1.3.1 Pearson's Correlation Coefficient Analysis

According to the result in Table 4.12, all independent variables have a positive relationship with the mediator, while mediator has a positive relationship with the dependent variable. TO and BDAA of a SME are both significantly correlated with CA, with correlation coefficients of 0.703 and 0.563 respectively. In addition, CA of SMEs has a significant relationship with BP, with a positive correlation value of 0.568. Thus, H_1, H_2, H_3 are supported.

5.1.3.2 Mediation Analysis via PROCESS macro

According to the findings, CA does not mediate the relationship between TO of a company with its BP since it crosses a zero. The confidence interval for the indirect effect includes zero [-0.005,0.324], the mediation effect was not statistically significant. CA do not mediate the relationship between TO on the BP. However, the confidence interval for the total effect of the model does not include zero [0.534, 0.783]. This imply that there is a direct effect of TO on BP of a SME. Since the indirect effect was not statistically significant, hence H_4 is not supported.

On the contrary, CA of a SME mediate the relationship between BDAA and BP. The confidence interval for the indirect effect does not include zero [0.056, 0.239], this indicates that CA is statistically significant in explaining the relationship between BDAA of a SME with its BP. Since both the direct effect [0.355, 0.608] and indirect effect [0.056, 0.239] are statistically significant, CA partially mediated the relationship between BDAA of a SME on its BP. Thus, H_5 is supported.

5.2 Discussions of Major Findings

5.2.1 Relationship between Technology Orientation and Competitive Advantage

H_1 : *Technology orientation has a significant relationship with competitive advantage.*

The correlation coefficient between TO and CA is 0.703, indicating a strong correlation between the two variables. H_1 is supported because the p-value is lower than 0.05. Hence, TO of a company is positively affecting SMEs' CA. SMEs have a positive orientation towards technology has a significant effect on their CA. This result is supported by previous studies (Putra & Darmawan, 2022; Yang et al., 2022; Al-Idrus et al., 2020). The result is similar with the past studies of Borodako et al. (2022), which indicates that TO enhances CA of a company. According to the research of Al-Idrus et al. (2020), companies with TO will gain CA and may provide customers with a wider range of products and services. Therefore, the services and image of the company is better than its competitors. The research of Putra & Darmawan (2022) found that the more optimally the present technology is oriented, the greater the CA of a company. This means the greater the degree of technological knowledge and capabilities of a SME, the greater its CA. This research also supports the findings of Yang et al. (2022), which found that there is positive and significant influence of TO on CA and sustainability of SMEs. This is because TO is the long-term resources within a SME. Hence, TO is a significant aspect in this research.

5.2.2 Relationship between Big Data Analytics (BDA) Adoption and Competitive Advantage

H_2 : *BDA adoption has a significant relationship with competitive advantage.*

The correlation coefficient (r) between BDAA and CA is 0.563, which signifies a moderate association between the two variables. Meanwhile, BDAA has a p-value < 0.001 which also lower than alpha value of 0.05. Thus, the hypothesis is supported. SMEs with BDAA also has a significant effect on their CA. This finding is similar to the research by

Moumtzidis et al. (2022), companies with BDAA will gain a CA through lowering costs, providing new products and services, and enhancing decision-making. According to the research by Waqas et al. (2021), BDAA might be valuable capabilities that top management can use effectively in achieving a CA. Additionally, Al-Nimri & Altarawaneh's (2020) study demonstrate that companies adopting BDA achieve CA by gaining valuable insights of their customers. This means that SMEs in the Malaysian service sector able to improve customer satisfaction and increase market share by adopting BDA.

5.2.3 Relationship between Competitive Advantage and Business Performance

H_3 *: Competitive advantage has a significant relationship with business performance.*

This hypothesis is supported because the p-value is lower than alpha value of 0.05. The correlation coefficient (0.568) is higher than 0.50, which indicate a moderate association between the two variables. SMEs with a CA able to achieve superior performance. This result is in accordance with the research of Chen et al. (2021), which found that the CA through applications of technological innovation directly affected the performance of the company. Hence, the CA achieved through technological capability can lead to superior performance in SMEs. Such findings also conformed to the research of Rahim & Zainuddin (2019) that conclude that a CA is positively relative to firm performance. Moreover, this finding can be proven by the research from Asad et al. (2022) who concluded that the attainment of CA can be expected to lead to higher performance.

5.2.4 Competitive Advantage as a Mediator

5.2.4.1 Relationship between Technology Orientation, Competitive Advantage, and Business Performance

H_4 : Competitive advantage mediates the relationship between technology orientation and business performance.

This hypothesis is not supported since the confidence interval of indirect effect crosses a zero [-0.005, 0.324]. This result indicates that CA did not significantly mediate the relationship between TO and BP. A possible reason to this is the majority of the companies are already involved in the technology-based service sectors such as e-commerce and financing service sector. They applied technology not to obtain CA, but because it was necessary to run their operations. According to Rahim and Zainuddin (2019), companies which have achieved superior performance but have not developed CA, it is expected that CA was not necessary for them to perform better than their competitors. Therefore, companies can still achieve superior performance without CA.

5.2.4.2 Relationship between BDA Adoption, Competitive Advantage, and Business Performance

H_5 : Competitive advantage mediates the relationship between BDA adoption and business performance.

This hypothesis is supported where indirect effect has a coefficient value of 0.133 and, lower and upper limit confidence interval of 0.054 and 0.242, indicating a statistically significant relationship between BDAA of SMEs with its BP. Both direct and indirect effect of BDAA on BP are positive and significant, therefore the CA partially mediated the relationship between the two variables. This result supports the findings of past studies (Hong & Ping, 2020; Nasrollahi et al., 2021). According to the research by Hong and Ping (2020), BDAA has a positive impact on SMEs' performance since it enables companies to design products and services that provide customers superior value and differentiate them apart from their competitors. BDAA enable SMEs to achieve CA through innovation and improve its BP as

well. The research by Nasrollahi et al. (2021) highlights there is a significant and positive impact of BDA on SMEs' BP. BDA creates many strategic and profitable opportunities for SMEs in the Malaysian service sector to achieve superior performance.

5.3 Implications of the Study

5.3.1 Theoretical Implications

This research applies the resource-based view (RBV) framework to investigate the relationship between TO, BDAA, CA, and BP. The first problem statement implied the lack of studies on TO and BDAA as a company's resources and capabilities in leading to its CA and BP. Since there is a lack of empirical study, this research proposes a research model to examine the outcome of TO and BDAA on both CA and BP in the context of SMEs in Malaysian service sector. The findings of this research have found certain relationship between the variables and contributed to the existing body of knowledge. Thus, this research addresses the first problem statement.

In addition, SMEs are different from large companies in terms of the availability of resources and capabilities. The second problem statement illustrates that BDA adoption is still in its early stages among Malaysian SMEs and the SMEs' managers lack knowledge on how their company's resources and capabilities could improve their performance. This research proposes a conceptual model by drawing on the RBV theory to explain the effect of SMEs' resources and capabilities on its CA and BP. The research findings support well with the RBV theory, which provides a better understanding of the technological resources and capabilities that leads to CA and positively affect BP of SMEs. Therefore, the second problem statement has also been addressed.

5.3.2 Practical Implications

From a practical perspective, this research makes some implications for SMEs in the Malaysian service sector. The findings of this research may assist SMEs in Malaysia service sector realize the significance of TO and BDAA on their BP. SMEs in Malaysia service sector should focus on developing their TO to remain competitive in the modern digital economy. For instance, they may invest in BDA technologies like NoSQL Database that will improve their business performance. This encourages policymakers in Malaysia to invest in technological institutions and centres that support SMEs in various industries. The existence of a technology fund that SMEs can access to is a step forward in boosting Malaysian market's innovation level. Similarly, SMEs should consider adopting big data analytics (BDA) to gain a comprehensive insight on customers preferences, market trends, and their business operations. This can help SMEs in Malaysia service sector to make data-driven decisions and identify new business opportunities. Furthermore, Malaysian SMEs need to be aware of technological changes within the service industry in order to be actively participate in new process or service improvements and survive in a changing market environment.

This research findings conclude that SMEs could develop a CA by leveraging their technological resources and capabilities. The CA obtained can in turn positively affect BP of SMEs. However, SMEs with high level of TO may result in superior performance without a CA. This indicates to the SMEs' managers and business owners that companies with high technological capabilities will directly result in positive BP.

5.4 Limitations of the Study

There are a few limitations which might affect the findings of the research. First limitation is the unbalance company age collected. From Table 4.8, there are 109 companies out of the collected 140 are having the company age of 1 to 10 years. It may be inefficient because the analysis was based on modern companies which started their business in the digital era. It has limited the findings because different company age groups will have different perspective.

Besides, there is a limited amount of time for researcher to collect data. The data collection period for this research was 2 weeks, which is insufficient for researchers to collect more responses.

There is also a limitation to the variables of study. This research draws on the RBV model in explaining the relationship between variables. Both TO and BDAA are the resources and capabilities of SMEs that will lead to a CA. The resources of a company consist of other variables aside from TO and BDAA.

5.5 Recommendations for Future Research

After identifying the study's limitations, several recommendations can be provided to improve the quality of future research. In future research, the researcher should balance the quantity of data collected from different company age group. This can assist the researcher in exploring further into the research's findings and producing a more generalisable results.

In addition, future researchers should consider a longer time period for data collection. They can extend the period for collecting data to a few months such as 3 months. This will increase the responses collected from different states of Malaysia.

Furthermore, future researchers can include more variables such as entrepreneurial orientation, market orientation, and customer orientation when planning research in this context. The researchers will have a more comprehensive view of RBV theory in obtaining CA and enhancing performance of SMEs.

5.6 Conclusion

In this study, all findings answered the research question and addressed the problem statement. The hypotheses are tested and only H_1, H_2, H_3, and H_5 are supported, H_4 was not supported. This chapter summarises the descriptive and inferential analysis. Furthermore, the limitations and recommendations are discussed in this research to improve the quality of future research. I hope the recommendations made will assist future researchers in carrying out more extensive studies on the role of resources and capabilities on BP of SMEs in Malaysian service sector.

To sum up, since there is a lack of empirical study in the context of SMEs, this research draws on the RBV theory to examine the effect of technological resources and capabilities of SMEs (TO and BDAA) on CA and BP. Previous studies were done on the major companies which may not addressed the concern of SMEs managers on the importance of developing their technological orientation and capabilities. This research provides an overview for the SMEs managers on the effect of technological resources and capabilities on their CA and BP. The research findings indicated a positive relationship between TO, BDAA and CA. The findings also shown that CA partially mediated the effect of BDAA on BP of SMEs, but it does not mediate the effect of TO on BP.

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APPENDICES

Appendix A: Survey Questionnaire

UNIVERSITI TUNKU ABDUL RAHMAN
FACULTY OF ACCOUNTANCY AND MANAGEMENT
BACHELOR OF INTERNATIONAL BUSINESS (HONOURS)
FINAL YEAR PROJECT

The Role of Technology Orientation and Big Data Analytics (BDA) Adoption on the Business Performance among Malaysian SMEs: Mediating Role of Competitive Advantage

Dear Respondents,

Good day! I am Seow Lai Yeow, a final year student pursuing Bachelor of International Business (Hons) at Universiti Tunku Abdul Rahman (UTAR). I am conducting a research on "The Role of Technology Orientation and Big Data Analytics (BDA) Adoption on the Business Performance among Malaysian SMEs". I would like to invite you to participate in this survey.

This questionnaire will take you around 10 to 15 minutes to complete. This questionnaire consists of three sections, and you must complete all of them. Please be informed that your response will be kept PRIVATE and CONFIDENTIAL and used exclusively for academic purpose under the Personal Data Protection Act (PDPA) 2010.

Should you have any further question, kindly contact me through: seowlaiyeow@gmail.com Your participation is much appreciated.

By submitting or providing your personal data to UTAR, you had consented and agreed for your personal data to be used for academic purpose, your responses will be kept PRIVATE and CONFIDENTIAL.

- o I hereby understood, consented and agreed per notice above.
- o I disagree, my personal data will not be processed.

Section A: Demographic Profile

Please choose one answer for each of the following questions:

1.Gender

- o Male
- o Female

2. Age

- o 18-24 years
- o 25-34 years
- o 35-44 years
- o 45-54 years
- o 55 years and above

3. Education

- o High school
- o Diploma
- o Bachelor's degree
- o Master
- o PhD
- o Others: _____ (please specify)

4. Job Title:

- o Business Owner
- o CEO
- o Senior Manager
- o Executive
- o Others: _____ (please specify)

5. Field of Services

- o Consulting
- o E-commerce
- o Education
- o Financing service
- o Food & Beverage (F&B)
- o Healthcare
- o Hotel
- o Retail
- o Telecommunications
- o Tourism
- o Others: _____ (please specify)

6. The market for your company is

- o Business-to-business (B2B)
- o Business-to-consumer (B2C)

7. Company size based on sales turnover per annum

- o Micro (Sales turnover of <RM300K)
- o Small (Sales turnover of RM300K - < RM3 Million)
- o Medium (Sales turnover of RM3 Million - <RM20 Million)

8. Years of company establishment (e.g. 3 years): _____ years

9. Number of full-time employees (Company size): _____ employees

Section B: Independent Variables and Mediator

Please rate the following statements on a scale of 1 to 5:

[Strongly Disagree (SD) = 1, Disagree (D) = 2, Neutral (N) = 3, Agree (A) = 4,

Strongly Agree (SA) = 5]

Technology Orientation

Statements	1	2	3	4	5
1. My company tend to adopt up-to-date technologies (eg. cloud computing).	○	○	○	○	○
2. My company purchases and uses technologies (eg. cloud computing) to position itself ahead of competitors.	○	○	○	○	○
3. My company is often the first to try out new technologies.	○	○	○	○	○
4. My company frequently improves the management of internal operating processes.	○	○	○	○	○
5. My company tend to invest in future forecasted technologies.	○	○	○	○	○

Big Data Analytics (BDA) Adoption

Statements	1	2	3	4	5
1. My company has used Big Data Analytics (BDA) to enable faster access to data.	○	○	○	○	○
2. My company has used Big Data Analytics (BDA) to improve data management.	○	○	○	○	○
3. My company has used Big Data Analytics (BDA) to improve data accuracy.	○	○	○	○	○
4. My company has used Big Data Analytics (BDA) to reduce operating costs.	○	○	○	○	○
5. My company has used Big Data Analytics (BDA) to enhance employee productivity.	○	○	○	○	○
6. My company has used Big Data Analytics (BDA) to improve customer relations.	○	○	○	○	○

Competitive Advantage

Statements	1	2	3	4	5
1. My company's services are better than the competitors.	○	○	○	○	○
2. My company's R&D capabilities are better than the competitors.	○	○	○	○	○
3. My company's managerial capabilities are better than the competitors.	○	○	○	○	○
4. My company's profitability is better than the competitors.	○	○	○	○	○
5. My company's image is better than the competitors.	○	○	○	○	○

Section C: Business Performance

Please rate the following statements on a scale of 1 to 5:

[Strongly Disagree (SD) = 1, Disagree (D) = 2, Neutral (N) = 3, Agree (A) = 4,

Strongly Agree (SA) = 5]

Over the past 3 years, my company has performed better than the major competitor in the following areas:

Statements	1	2	3	4	5
1. Increasing profitability	○	○	○	○	○
2. Reducing operating costs	○	○	○	○	○
3. Growing profit	○	○	○	○	○
4. Responding rapidly to market demand	○	○	○	○	○
5. Increasing customer satisfaction	○	○	○	○	○
6. Decreasing service delivery time	○	○	○	○	○

Appendix B: SPSS Output

1. Output of Key Informants' Demographic Profile

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	68	48.6	48.6	48.6
	Male	72	51.4	51.4	100.0
	Total	140	100.0	100.0	

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18 - 24 years old	19	13.6	13.6	13.6
	25 - 34 years old	29	20.7	20.7	34.3
	35 - 44 years old	29	20.7	20.7	55.0
	45 - 54 years old	28	20.0	20.0	75.0
	55 years old and above	35	25.0	25.0	100.0
	Total	140	100.0	100.0	

Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Bachelor's degree	96	68.6	68.6	68.6
	Diploma	11	7.9	7.9	76.4
	Foundation	1	.7	.7	77.1
	High School	6	4.3	4.3	81.4
	Master/ PhD	25	17.9	17.9	99.3
	No study	1	.7	.7	100.0
	Total	140	100.0	100.0	

Job Title:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Business Owner	44	31.4	31.4	31.4
	CEO	20	14.3	14.3	45.7
	Executive	2	1.4	1.4	47.1
	Manager	48	34.3	34.3	81.4
	Senior Manager/ Director	26	18.6	18.6	100.0
	Total	140	100.0	100.0	

2. Output of Company Profile

$FieldOfServices Frequencies

		Responses		Percent of Cases
		N	Percent	
Field Of Services label[a]	Consulting	19	11.0%	13.6%
	E-commerce	29	16.8%	20.7%
	Education	10	5.8%	7.1%
	Event	13	7.5%	9.3%
	Financing service	28	16.2%	20.0%
	Food & Beverage (F&B)	29	16.8%	20.7%
	Healthcare	9	5.2%	6.4%
	Hospitality	3	1.7%	2.1%
	Hotel	10	5.8%	7.1%
	Oil & Gas	1	0.6%	0.7%
	Retail	16	9.2%	11.4%
	Telecommunications	4	2.3%	2.9%
	Tourism	2	1.2%	1.4%
Total		173	100.0%	123.6%

$MarketForCompany Frequencies

		Responses		Percent of Cases
		N	Percent	
Market For Company label[a]	Business-to-business (B2B)	60	37.3%	42.9%
	Business-to-consumer (B2C)	101	62.7%	72.1%
Total		161	100.0%	115.0%

Company size based on sales turnover per annum

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Medium (Sales turnover of RM3 Million - <RM20 Million)	38	27.1	27.1	27.1
	Micro (Sales turnover of <RM300K)	40	28.6	28.6	55.7
	Small (Sales turnover of RM300K - < RM3 Million)	62	44.3	44.3	100.0
	Total	140	100.0	100.0	

Years of Company Establishment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	7	5.0	5.0	5.0
	2	14	10.0	10.0	15.0
	3	16	11.4	11.4	26.4
	4	12	8.6	8.6	35.0
	5	23	16.4	16.4	51.4
	6	4	2.9	2.9	54.3
	7	4	2.9	2.9	57.1
	8	13	9.3	9.3	66.4
	9	1	.7	.7	67.1
	10	15	10.7	10.7	77.9
	11	1	.7	.7	78.6
	12	2	1.4	1.4	80.0
	13	1	.7	.7	80.7
	15	4	2.9	2.9	83.6
	16	1	.7	.7	84.3
	18	1	.7	.7	85.0
	20	3	2.1	2.1	87.1
	24	1	.7	.7	87.9
	25	3	2.1	2.1	90.0
	26	1	.7	.7	90.7
	27	1	.7	.7	91.4
	30	8	5.7	5.7	97.1
	32	1	.7	.7	97.9
	39	1	.7	.7	98.6
	40	2	1.4	1.4	100.0
	Total	140	100.0	100.0	

Number of full-time employees (Company size)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	1	.7	.7	.7
	2	5	3.6	3.6	4.3
	3	6	4.3	4.3	8.6
	5	9	6.4	6.4	15.0
	6	2	1.4	1.4	16.4
	7	2	1.4	1.4	17.9
	8	3	2.1	2.1	20.0
	9	1	.7	.7	20.7
	10	7	5.0	5.0	25.7
	11	3	2.1	2.1	27.9
	12	2	1.4	1.4	29.3
	13	2	1.4	1.4	30.7
	15	3	2.1	2.1	32.9
	18	2	1.4	1.4	34.3
	20	4	2.9	2.9	37.1
	21	1	.7	.7	37.9
	23	2	1.4	1.4	39.3
	25	3	2.1	2.1	41.4
	27	1	.7	.7	42.1
	30	6	4.3	4.3	46.4
	33	1	.7	.7	47.1
	35	4	2.9	2.9	50.0
	38	1	.7	.7	50.7
	40	6	4.3	4.3	55.0
	47	1	.7	.7	57.1
	50	19	13.6	13.6	70.7
	51	1	.7	.7	71.4
	52	1	.7	.7	72.1
	55	1	.7	.7	72.9
	56	3	2.1	2.1	75.0
	57	1	.7	.7	75.7
	58	1	.7	.7	76.4
	60	9	6.4	6.4	82.9
	64	1	.7	.7	83.6
	65	3	2.1	2.1	85.7
	66	2	1.4	1.4	87.1
	67	2	1.4	1.4	88.6
	69	1	.7	.7	89.3
	70	12	8.6	8.6	97.9
	75	3	2.1	2.1	100.0
	Total	140	100.0	100.0	

3. Output of Descriptive Statistics

Descriptive Statistics

	Mean	Std. Deviation	N
IV1	4.1629	.58597	140
IV2	4.1012	.64957	140
MV	4.1100	.65583	140
DV	4.2024	.58004	140

4. Output of Cronbach's Alpha Reliability Test

<u>Technology Orientation</u>

Case Processing Summary

		N	%
Cases	Valid	140	100.0
	Excluded[a]	0	.0
	Total	140	100.0

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.773	.773	5

<u>BDA Adoption</u>

Case Processing Summary

		N	%
Cases	Valid	140	100.0
	Excluded[a]	0	.0
	Total	140	100.0

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.854	.855	6

Competitive Advantage

Case Processing Summary

		N	%
Cases	Valid	140	100.0
	Excluded[a]	0	.0
	Total	140	100.0

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.808	.809	5

Business Performance

Case Processing Summary

		N	%
Cases	Valid	140	100.0
	Excluded[a]	0	.0
	Total	140	100.0

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.785	.784	6

5. Output of Pearson's Correlation Analysis

Correlations

		IV1	IV2	MV	DV
IV1	Pearson Correlation	1	.660[**]	.703[**]	.665[**]
	Sig. (2-tailed)		<.001	<.001	<.001
	N	140	140	140	140
IV2	Pearson Correlation	.660[**]	1	.563[**]	.688[**]
	Sig. (2-tailed)	<.001		<.001	<.001
	N	140	140	140	140
MV	Pearson Correlation	.703[**]	.563[**]	1	.568[**]
	Sig. (2-tailed)	<.001	<.001		<.001
	N	140	140	140	140
DV	Pearson Correlation	.665[**]	.688[**]	.568[**]	1
	Sig. (2-tailed)	<.001	<.001	<.001	
	N	140	140	140	140

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

6. Output of PROCESS Macro Mediation Analysis

TO, CA, and BP

```
*************** TOTAL, DIRECT, AND INDIRECT EFFECTS OF X ON Y ***************

Total effect of X on Y
     Effect         se          t          p        LLCI        ULCI        c_cs
      .6583      .0629    10.4611      .0000       .5339       .7827       .6650

Direct effect of X on Y
     Effect         se          t          p        LLCI        ULCI       c'_cs
      .5204      .0872     5.9704      .0000       .3480       .6927       .5257

Indirect effect(s) of X on Y:
        Effect     BootSE   BootLLCI   BootULCI
MV       .1379      .0840     -.0050       .3247

Completely standardized indirect effect(s) of X on Y:
        Effect     BootSE   BootLLCI   BootULCI
MV       .1393      .0828     -.0051       .3242
```

BDAA, CA, and BP

```
*************** TOTAL, DIRECT, AND INDIRECT EFFECTS OF X ON Y ***************

Total effect of X on Y
     Effect         se          t          p        LLCI        ULCI        c_cs
      .6142      .0552    11.1310      .0000       .5051       .7233       .6878

Direct effect of X on Y
     Effect         se          t          p        LLCI        ULCI       c'_cs
      .4814      .0639     7.5323      .0000       .3550       .6078       .5391

Indirect effect(s) of X on Y:
        Effect     BootSE   BootLLCI   BootULCI
MV       .1328      .0471      .0535       .2418

Completely standardized indirect effect(s) of X on Y:
        Effect     BootSE   BootLLCI   BootULCI
MV       .1487      .0497      .0617       .2587
```