

**INVESTIGATION OF INTERNAL FACTORS IN BIG DATA ADOPTION
TO ACHIEVE COMPETITIVE ADVANTAGE IN INDONESIAN
COMPANY**

A THESIS

**Presented as a Partial Fulfilment of the Requirements to Obtain Bachelor
Degree in Accounting Department**



By:

IHSAN MANSHUR PUTRA

Student Number: 14312052

INTERNATIONAL PROGRAM

BUSINESS AND ECONOMICS DEPARTMENT

FACULTY OF ECONOMICS UNIVERSITAS ISLAM INDONESIA

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Written by:

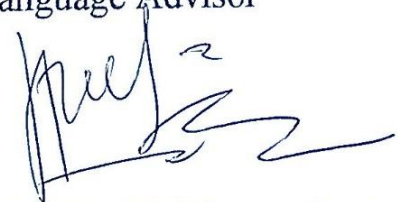


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COMPANY**

A BACHELOR DEGREE THESIS

By:

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Defended Before the Board of Examiners
On March 15th, 2018 and Declare Acceptable

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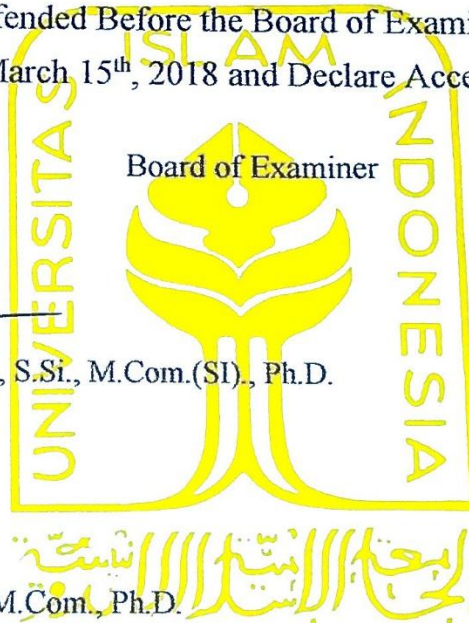
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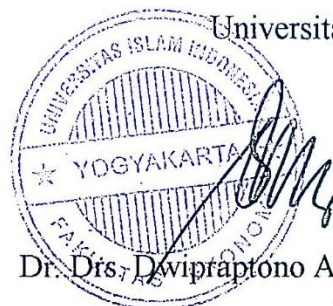
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DECLARATION OF AUTHENTICITY

Hereby I declare the originality of the thesis; I have not presented someone else's work to obtain my university degree, nor I have presented someone else's words, ideas or expressions without any of the acknowledgements. All quotations are cited and listed in the bibliography.

If in the future this statement is proven to be false, I am willing to accept any sanction complying with the determined regulation or its consequence.



Sleman, February 28th, 2018



Ihsan Manshur Putra

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Assalamu 'alaikum warrahmatullahi wabarakatuh,

Alhamdulillah rabbil 'aalamin. All praises be to Allah swt that finally i have finished my thesis entitled **“INVESTIGATION OF INTERNAL FACTORS IN BIG DATA ADOPTION TO ACHIEVE COMPETITIVE ADVANTAGE IN INDONESIAN COMPANY”** Shalawat and Salam are giving to our beloved prophet Muhammad saw, who guided ummah from the darkness to the lightness.

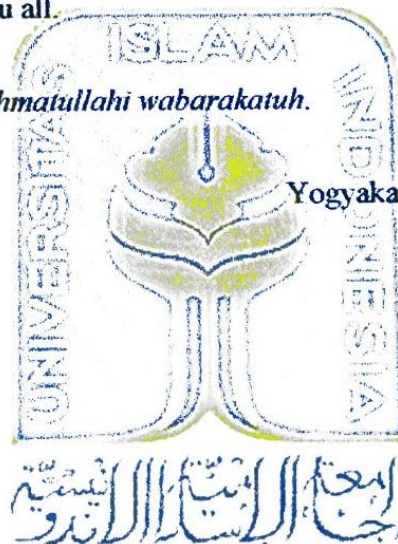
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Yogyakarta, February 28th, 2018


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ABSTRACT

This study has an objective to investigate whether there is internal factors that is affecting the big data adoption in order to achieve competitive advantage in Indonesia. The internal factors that will be invetigate are top management support, organizational change, infrastructure, and required skillset. In this research, the researcher is using the structured questionnaire to collect the data. Moreover, the data that have been collected will be processed by using SmartPLS 3.0. The total sample of this research are 32 employees at all levels within the Indonesian company which already adopting big data. Moreover, the researcher found that the the infrastructure and required skillset are having significant impact to the big data adoption. However, the top management support and organizational change do not have significant impact on the big data adoption and big data adoption do not have impact to the competitive advantages. This study shows that infrastructure and required skillset are relevant for the big data adoption. Therefore, the manager should focus on this two factors to adopt big data in order to achieve competitive advantage.

Keywords:top management support, organizational change, infrastructure, required skillset, big data adoption, competitive advantage

ABSTRAK

Penelitian ini bertujuan untuk mengetahui apakah ada faktor internal yang mempengaruhi adopsi big data agar dapat mencapai keunggulan kompetitif di Indonesia. Faktor internal yang akan diteliti adalah dukungan manajemen puncak, perubahan organisasi, infrastruktur, dan keterampilan yang dibutuhkan. Dalam penelitian ini, peneliti menggunakan kuesioner yang terstruktur untuk mengumpulkan data. Data yang telah dikumpulkan akan diproses menggunakan SmartPLS 3.0. Total sampel dalam penelitian ini adalah 32 karyawan di semua tingkatan di perusahaan Indonesia yang telah mengadopsi big data. Kemudian, peneliti menemukan bahwa infrastruktur dan keterampilan yang dibutuhkan memiliki pengaruh yang signifikan terhadap adopsi big data. Namun, top dukungan manajemen puncak dan perubahan organisasi tidak berpengaruh signifikan terhadap adopsi big data dan adopsi big data tidak berdampak pada keunggulan kompetitif. Studi ini menunjukkan bahwa infrastruktur dan keterampilan yang dibutuhkan relevan untuk adopsi big data. Oleh karena itu, manajer harus fokus pada dua faktor ini untuk mengadopsi big data agar dapat mencapai keunggulan kompetitif.

Kata kunci: *dukungan manajemen puncak, perubahan organisasi, infrastruktur, keterampilan yang dibutuhkan, adopsi big data, keunggulan kompetitif.*

CHAPTER I

INTRODUCTION

1.1 Background of Study

Currently, there is new technology in the area of Information Systems/Information Technology (IS/IT) which is big data. In the current era, big data become essential for the company, because big data can improve the company's performance. The example of companies that are successfully improved their performance after the companies adopt big data are Amazon and Starbucks (O'Neill, 2016, September 23). The indication that Amazon is succeed in adopting big data is Amazon can know the detail information about their customer, for example the customer's name, the customer's address, and the customer's payment method. In addition to that, it is the strategy of Amazon to show their attention to the customer. As a result, there will be new customers that are coming to Amazon. The other company that is successfully adopting big data is Starbucks, because Starbucks can identify the potential success of their new branches location, such as information about the traffic, demographic area, and customer behaviour on the new branches location. Therefore, most of Starbucks' branches are attractive for the customer.

Futhermore, the terminology of big data was first introduced by Roger Magoulas as a great amount of data that cannot be managed and processed using traditional data management applications (Ularu, Puican, Apostu, and Velicanu , 2012). Likewise, Ularuet al. (2012) added that big data is defined by its size,

comprising a large, complex and independent collection of data sets, each with the potential to interact. Based on the previous definition of big data, it can be summarized that big data is very large and complex data which needs special data management applications in order to be able to be managed and processed. Moreover, the company have the opportunity to store large and complex data in the multiple forms of storage, because of their ability to manage and process it. The example of multiple forms of storage that can be used to store large and complex data can be seen in the Table 1.1.

Table 1. 1 Type of Storage

No.	Type of Storage	Example
1	Cloud	Google drive & Dropbox
2	Computer-Based	Random Access Memory (RAM)
3	External-Based	Flashdisk & Harddisk

Hence, company such as Amazon is able to store data that is related to the detail information of their customer and Starbucks is able to store data that is related to their new potential branches location. Consequently, after the company is able to store data as much as the company needed, the company can analyze the data in order to extract the information from the data by using special data management applications, for instance NoSQL Databases, MapReduce, Hadoop, Hive, PIG, PLATFORA, HDFS, HPPCC, and Storm (Shukla & Dubey, 2014). The information that is extracted will be used by the company to take a decision in order to create a competitive advantage (Ey, 2014). The example of the competitive advantage that can be created by the company are improving security and troubleshooting, enhancing customer satisfaction, and improving services and

products through the use of social media content (Ularu et al., 2012). In the case of Amazon, the competitive advantage that is created by Amazon is the new customer that is coming to Amazon. Meanwhile, in the case of Starbucks, the competitive advantage that is created by Starbucks is most of the Starbucks' branches is attractive to the customer. Even though, big data can improve the company's performance, adopting big data is difficult. There are several obstacles that should be tackled by the company in order to adopt big data, such as top management support, organizational change, infrastructure, and required skillset (Halaweh & Massry, 2015).

Top management support is essential for any IS/IT adoption not limited to big data (Halaweh & Massry, 2015). Without top management support, the company cannot get competitive advantage from certain IS/IT adoption. Besides, company which is adopting big data should have the top management support from the beginning of the stage which is in the decision whether the company wants to adopt big data or not.

As mentioned by Halaweh and Massry (2015) the terminology of organizational change is referred to the ability of the company to change their daily operations, their culture, and their Information Technology (IT). In the organizational change, the company is required to be as flexible as it is possible after the adoption of big data. The flexibility of the company is needed in order to avoid pitfalls during the adoption of big data.

Big data cannot be processed by using conventional data management applications, because of its complexity and its size. That is why, big data adoption

requires special data management applications. As mentioned previously, the special data management applications that can be used by the company are NoSQL Databases, MapReduce, Hadoop, Hive, PIG, PLATFORA, HDFS, HPCC, and Storm. Halaweh and Massry (2015) stated that storing and analyzing massive amount of data should be supported by a comprehensive technological infrastructure, including high-capacity storage, server, and powerful processors for huge data analysis. That is why, before adopting big data, the company should have the infrastructure. Nevertheless, the infrastructure to adopt big data will cost the organization extra cost.

Since big data is new in the area of IS/IT, there will be lack of big data professionals (Halaweh & Massry, 2015). Even though, there will be lack of big data professionals, the availability of staff with the required skillset, for example skill to handle big data and competencies are the basic requirements for the company which is wanted to adopt big data (Halaweh & Massry, 2015).

The obstacles that should be handled by the company will be the factors in big data adoption. The factors that has been mentioned previously is related to the internal factors. Internal factors is the first factors that should be tackled by the company. In this research, the researcher is examining the internal factors that are affecting big data adoption in order to achieve the competitive advantage. This research is different compared to the previous research, because the previous research has not been empirically tested. Additionally, there is very limited researches that were studying the relationship between internal factors with big data adoption in Indonesian company and there is also very limited researches that

were studying the relationship between big data adoption with competitive advantage in Indonesian company. The theories that will be used in this research are based on the combination of the Technology Acceptance Model (TAM) combined with the external factors taken from the model proposed by Halaweh and Massry (2015), the Information Systems (IS) success model, and the theory of competitive advantage developed Porter (1985). Therefore, the title of this research is **"Investigation of Internal Factors in big data Adoption to Achieve Competitive Advantage in Indonesian Company "**.

1.2 Problem Formulation

Based on the explanation in the research background that has been explained before, the problem formulation that will be analyzed in this research are:

1. Is there any relationship between top management support as organizational factor with big data adoption?
2. Is there any relationship between organizational changes as organizational factor with big data adoption?
3. Is there any relationship between infrastructures as organizational factor with big data adoption?
4. Is there any relationship between required skillset as individual factor with big data adoption?
5. Is there any relationship between big data adoption with competitive advantage?

1.3 Research Objective

Based on the explanation in the problem formulation, the purposes of this research are to understand the factors that are affecting big data adoption and to understand whether big data adoption can affect competitive advantage. Thus, there are several objectives that would like to be achieved, which are:

1. To know whether there is relationship between top management support as organizational factor with big data adoption.
2. To know whether there is relationship between organizational change as organizational factor with the big data adoption.
3. To know whether there is relationship between infrastructure as organizational factor with big data adoption.
4. To know whether there is relationship between required skillset as individual factor with the big data adoption.
5. To know whether there is relationship between big data adoption with competitive advantage.

1.4 Research Contributions

The contribution of this research is to test the factors that is affecting the adoption of big data to achieve competitive advantage on the practical basis and theoretical basis. Accordingly, below are the contributions of the research:

1. The first contribution of this research is the result of this research is expected to help the development of knowledge in the area of IS/IT by giving opportunities to the other researchers to prove whether there are

several parts of the research design that can be applied to another topic in the future. The second contribution of this research is that the result of the research can give additional knowledge that is beneficial as references for the future researchers that are choosing the topic of IS/IT especially related to big data, for example the big data adoption in the world or in the specific country.

2. The first implication of this research is the result of this research is expected to give recommendations to the company which is wanted to adopt big data. The second implication of this research is the result of this research is expected to help the company in preparing the strategies to handle the internal factors before adopting big. The last implication of this research is the result of this research is expected to determine whether the big data adoption can create competitive advantage to the company which is adopting big data.

1.5 Systematics of Writing

The writing systems of this research are:

Chapter I: Introduction

In this chapter, the researchers are giving a brief explanation about the research background, problem formulation, study objective, significance of the research and writing system

Chapter II: Theoretical Review

In this chapter, the researchers are giving a brief explanation about the review of literature about the big data, factors in big data adoption, competitive

advantage of big data adoption, and development of the hypothesis.

Chapter III: Research Methodology

In this chapter, the researchers are giving a brief explanation about methods that are going to use in this research and how the data that collected being processed.

Chapter IV: Data Analysis and Discussions

In this chapter, the researchers are giving a brief explanation about the data collecting, description of the data, result of the validity and reliability, result of test and result of hypothesis after being test.

Chapter V: Conclusions and Recommendations

In this chapter, the researchers are giving a brief explanation about the conclusion based on the research, the limitation during the research progress, and also suggestion and recommendation.

CHAPTER II

THEORETICAL REVIEW

2.1 Technology Acceptance Model (TAM)

TAM has been used by many researchers in the area of IS/IT (Chuttur, 2009). Mensah, Vera, and Jianing (2017) that is discussing the predictors of government e-services adoption in China and Wawan (2013) which is discussing the adoption of e-commerce in Indonesia were the example of the researchers that were using TAM as their research model. Furthermore, TAM is used to explain the reason of user acceptance or rejection toward Information Technology (IT) by adapting Theory of Reasoned Action (TRA) (Ajzen and Fishbein, 1980; Davis, 1989; Davis, Bagozzi, and Warshaw, 1989). In TAM, there are two cognitive beliefs which are perceived usefulness and perceived ease of use. Perceived usefulness is user's perceptions concerning usefulness of IT (Davis, 1986). Meanwhile, perceived ease of use is the degree to which a person believes that using a particular system would be free from effort (Davis, 1989). Moreover, the perceived usefulness and perceived ease of use will affect the use of certain IS/IT technologies. Nonetheless, in this research, the researcher is only using the external variables that have a direct relationship toward the actual use. The external variables are top management support, organizational change, infrastructure, and required skillset. Besides, the actual use is represented by the big data adoption. The model of TAM developed by Davis can be seen in the Figure 2.1.

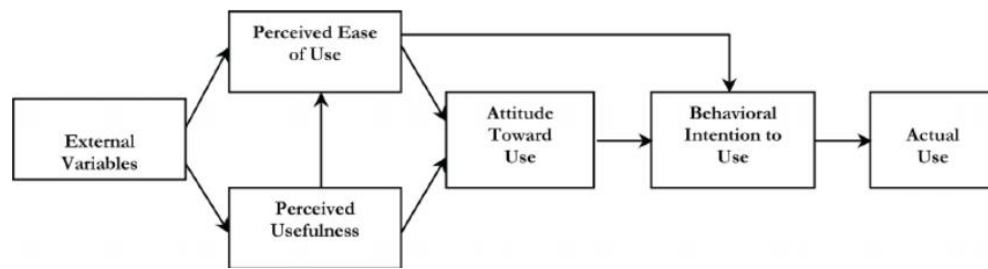


Figure 2. 1The Technology Acceptance Model (TAM) (Davis, 1989)

Related to the external variables that are used in this research, the external variables are taken from the proposed model in big data adoption developed by Halaweh and Massry (2015). According to Halaweh and Massry (2015), there are five external variables to adopt big data, which are top management support, organizational change, data availability and quality, the required skillset, privacy and security. However, due to the fact that the researcher want to investigate the internal factor in big data adoption to achieve competitive advantage, the researcher is choosing the external variables developed by Halaweh and Massry (2015) which are related to internal factors, for example top management support, organizational change, infrastructure, and required skillset.

2.2The Information System Success Model

The Information System (IS) success model is successfully developed by McLean and DeLone (2003). Additionally, The IS success model have been used by several researchers in the area of IS/IT, such as Post (2009) entitled e-Learning success model: an Information systems perspective and Lin, Hsu, and Ting (2006) entitled ERP system success: An Integration of IS Success Model and Balanced Scorecard. The objective of IS success model is to assess the success of IS/IT. In the IS success model, one of the criteria to determine whether company is succeed

in adopting certain IS/IT project is when the company can achieve the net benefit. Furthermore, the net benefit in this research is represented by competitive advantage which is developed by Michael Porter in 1985. Similarly with TAM and IS success model, the theory of competitive advantage developed by Michael Porter also has been used by many researchers. One of the example of the researcher that is using competitive advantage theory is Shin (2001) that is researching the strategies for competitive advantage in electronic commerce.

Competitive advantage is a condition when company have better performance compare to the other company. However, the criteria of company achieving competitive advantage are varied, for example the ability of the company to offer competitive pice, the ability of the company to offer products that are highly reliable, the ability of the company to offer high quality products to customers, the ability of the company to deliver the product to customers on time, the ability of the company to deliver the product that is needed by the customers, the ability of the company to provide customized products, the ability of the company to give good respons toward customer demand for new features, the ability of the company to deliver products to market quickly, the ability of the company to have fast product development. That is why, if company have competitive advantage, company will have the power to win the market. Consequently, the IS success model developed by McLean and DeLone is shown in the Figure 2.2.

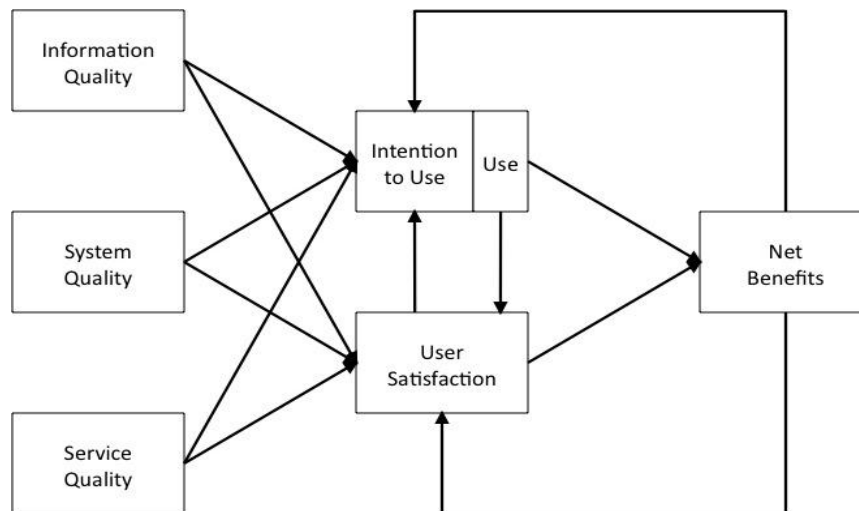


Figure 2. 2The Information System Success Model (McLean & DeLone, 2003)

2.3 Big data

As mentioned by Poleto, Carvalho, and Costa (2015), big data is a tool to support the decision making process by using technology to rapidly analyze large amounts of data of different types from a variety of sources to produce a stream of actionable knowledge. The data that can be stored by company are structured data, for example relational databases and unstructured data, for example images, videos, emails, transaction data, and social media interactions. By adopting big data, the company can organize the management decision by creating a business analysis based on the collection of important data.

Big data have a specific characteristics in order to differentiate between other analysis tool for business intelligence and analysis. The specific characteristics of big data are volume, velocity, and variety (Swapnil, Anil, & Gupta, 2016). The first characteristic of big data is volume. Volume refers to the quantities of the data that are collected by company (Hadi, Shnain, Hadishaheed, & Ahmad, 2015).

The data that can be collected can come from various source, such as internet, business transactions, and social media. This characteristic will help the company to gather as much as informations that are needed by the company for several purposes. The company will not have any difficulties in storing data as much as possible, because big data will help the company to manage large amount of data that are collected by company.

The second characteristic of big data is velocity. Velocity means the capability of understanding and responding to events when it is occurred (Sonka, 2016). The example of velocity is Google Maps can suggest alternative routes in real-time to ensure faster and smoother drive based on the changing traffic status and extensive analysis of factors that affect congestion. Additionally, velocity is more important compare to volume, because all of the data gathered by the company may not be used by the company to make strategic management decision. The data that will be used by the company to make strategic management decision is data that is reliabled and real-time.

The last characteristic of big data is variety. Variety represents the type of data that is stored, analyzed and used (Tole, 2013). After adopting big data, company will have several type of data. The challenge is how the company can sort several type of data into “readable” by all users that access the data and does not create ambiguous results. For example, when the company wants to create a new prototype of a product or keep produce the same product (McAfee & Brynjolfsson, n.d.). The company should collect the data from many sources of the sales area related to the previous product and compare the sales related to the

previous product with the new product sales. Moreover, collecting the data from many sources will make the data that is collected to be more reliable to be used by the company and the data will increase the quality of the decision related to the strategic management, for example to improve the sales of the company and increase the net income of the company.

2.4 Big data Adoption in the World

In the world, big data has been used widely by many industries. Big data has been used by many industries, because big data adoption can give contributions to many industries. That is why, there are many industries that are adopting big data. The industries that are adopting big data in the world are public services, learning services, insurance services, industrialized and natural resources, transportation services, and banking sectors and fraud detection (Intellipaat, 2016, July 13).

In public services, big data can be used for several things, such as for the development of the smart cities, taxation, and citizen security (Tomar, Guicheney, Kyarisiima, & Zimani, 2016). Related to the development of smart cities, the city that is already adopting big data to develop smart city is London, the capital of England, by Smart London Board (SLB). SLB is a panel of academics, business leaders, and entrepreneurs, to advise the Mayor and the London Enterprise Panel on how to make London smarter by integrating data and technology. Likewise, the example of the country that is already adopting big data for the purposes of the taxation is China. China adopts big data to verify business information by using multi-referencing and cross-referencing in order to avoid the use of fake documentation that will enable the tax evasion. Lastly, for the purposes of the

citizen security, one of the government institution that is adopting big data is New York Police Department (NYPD). NYPD is using an application called COMPSTAT to reduce the high criminal rates and increase citizen security. COMPSTAT is a system that allows police agencies to adopt innovative technologies and problem-solving techniques while updating traditional police structures.

The example of big data adoption in the learning services is the uses of cloud computing that will help students to access low-cost content, online instructors, and communities of fellow learners (Bughin, Chui, & Manyika, 2010). The example of cloud computing is Bubble Score. Bubble score will allow teachers to convey multiple-choice assessments through mobile devices and notch up paper tests through the cameras of the mobile phones. That is why, the learning services can improve, because of big data adoption.

Big data adoption provide several benefits to the insurance service company, for example reducing fraud, smarter finance, and customer retention (Ibm, n.d.). In the insurance service company, big data can be used to reduce fraud by verifying whether certain claim is valid or not by checking claimant's recent activities on social media sites whenever claim is submitted, for example the insurance service company can check whether the claimant of motor accident really connected to the person with whom they had an accident via social media or check whether the third party mobile phone information, such as GPS can confirm that the claimant was at the point of the accident. Related to the smarter finance,

big data can offer the insurance service company ability to make daily automatic adjustments to reinsurance strategies, premium rates and underwriting limits by combining structured internal data, such as actuarial, finance and policy with unstructured external data, such as press and analyst comments from Twitter, blogs and websites. The last benefits that big data provided to the insurance service company is the customer retention. Customer retention means that the insurance service company can decide which customers should be retained and when should a renewal offer be put to that customer. The insurance service company can decide the customer retention through social media, such as when someone post the photos of university graduation, this certain people will need more insurance as this people will work.

The contribution of big data in the industrialized and natural resources is the high demand of natural resources requiring the high volume as well as the velocity of big data. Furthermore, the great quantity of data in the industrialized and natural resources commencing the built-up industry. Also, In the natural wealth industry, big data will enable the company to do an analytical modelling that can be used to create judgment about the information from geographical information, graphical information, manuscript and chronological statistics (Intellipaat, 2016, July 13).

Meanwhile, the example of the big data adoption in transportation services is the use of big data in transjakarta (Unglobalpulse, 2017). Transjakarta will be fitted with GPS that has a function to analyze bus' speeds, number of buses

operating and bottleneck ratios in 12 dedicated corridors. This concept will enable Jakarta Smart City to map problematic lines and locations throughout the city in order to detect anomalies and reduce traffic bottlenecks on the affected bus routes.

Finally, the last industries that is receiving the benefits from big data adoption is banking sectors and fraud detection. The benefits provided by big data adoption for the banking sectors and fraud detection are improving wealth management, customers intimacy, and improving fraud detection (Oracle, 2015). Big data can improve wealth management, because big data will help the portfolio managers to make sure that the shift in allocations are warranted by giving quick analytical capabilities, such as detect changes in financial conversations about company in the portfolio, investigate the conversations to determine source of information, compare social information with internal information, and identify all funds and also identify the allocations. Furthermore, big data can improve customer intimacy by using Internet of Things (IoT). IoT will give the customer several options to connect the customers with other service providers such as retailers, airlines, and hotels. Financial services company is developing the partnerships with many of these to extend their reach and integrate their products into all areas of their customers' lives in order to enhance the revenue opportunities. The last benefits that is provided by big data adoption for the banking sectors and fraud detection is the improvement of fraud detection. Big data can improve the fraud detection, because big data will analyze the transactional data and interdicting an incoming real-time stream of transactions against well known set of patterns by adding new data related to the geographic

location, for example there is an ATM card being used in New York to withdraw cash while the mobile device of the customer is active in London. This example is an indication of fraudulent activity.

2.5 Big data Adoption in the Indonesia

The big data adoption in Indonesia still limited. The big data adoption in Indonesia is limited, because the amount of Indonesian company that is already adopting big data is limited. However, if there is an Indonesian company that is already adopting big data, the Indonesian company just started to adopt big data in few recent years. Furthermore, the big data adoption is still limited to the Information Technology (IT) employee. Big data adoption in Indonesia is still limited, because in Indonesia the human handle big data is still limited. The human resource that is responsible to handle big data called data analyst. Data analyst will responsible for importing, transforming, validating and modeling data with the purpose of understanding or drawing conclusions from the data to create better decision making that can lead the company to achieve competitive advantage. Data analyst is required in big data adoption, because the data in big data adoption is huge and big data adoption requires special data management applications. That is why, the amount of Indonesian company that are already adopting big data is less compare to the company that already adopting big data in the world.

2.6 Factors in Big data Adoption

Adopting big data offer benefits to the company, which is competitive advantage. The competitive advantage that company will obtain after adopting big

data are improving security and troubleshooting, enhancing customer satisfaction, improving services and products through the use of social media content (Ularu, et al., 2012). However, adopting big data is difficult. In big data adoption, there will be several obstacles. Besides, in order for the company to succeed in adopting big data, the company needs to overcome the obstacles. Hence, the obstacles will become the factors for success in big data adoption.

The example of the factors in big data adoption is internal factors that is divided into organizational factors and individual factors. The example of organizational factors are top management support, organizational change, and infrastructure. Related to the top management support, To adopt big data, the company needs 100% support from the top management, because if the top management do not support the project of the big data adoption, the project will be failed. Also, The big data adoption will affect changes in the company, such as the cultural changes of the company. That is why, before adopting big data, the company has to be ready to face the organizational change, in order to avoid the failure of the big data project. The last factors related to organizational factors that should be overcome by the company is infrastructure. Due to huge amount of data that is exceeding the conventional database system, adopting big data needs a special and advanced technologies that are including high capacity storage and powerful processor. This technologies will be used to run the proper database system for big data adoption, such as Hadoop.

The individual factor that should be handled by company in big data adoption is required Skillset. Required skillset represents the employee of the company

who has the competencies in big data. Nevertheless, since big data is new in the area of Information System/Information Technology (IS/IT), there will be difficulties in finding employees who has the competencies in big data. Employee who has the competencies in big data are often called as data analyst. As mentioned previously, data analyst will be responsible for importing, transforming, validating or modeling data with the purpose of understanding or drawing conclusions from the data for a better decision making that can lead the company in achieving competitive advantage.

2.7 Competitive Advantage of Big data Adoption

According to Wang (2014) the competitive advantage can be acquired after the company develops or acquires a set of attributes (or executes actions) that allow it to outperform its competitors. Besides, according to Ularu, et al. (2012) the detail competitive advantage that can be achieved by company after adopting big data are:

1. Improve security and troubleshooting: After adopting big data, company can improve security and trouble shooting, because big data will help the company in analysing pattern related to existing logs.
2. Enhance customer satisfaction: The ability of the company to use the information from the calls centre in order to gather the customer pattern can help the company to enhance the customer satisfaction.
3. Improving services and products through the use of social media content: The Company can gather the information about the current services and products that are needed and wanted by the customers. Thus, the company can improve

their services and products.

2.8 Previous Research

The previous researches which were discussing the factors that are influencing the big data adoption to achieve competitive advantage can be seen in Table 2.1 in the next page.

Table 2. 1 Previous researches

No	Researcher (Year)	Variable		Sample	Result
		Independent	Dependent		
1.	Halaweah & Massry (2015)	1. Top Management Support 2. Organizational Change 3. Data Availibility and Quality 4. Infrastructure 5. Required Skillset 6. Privacy and Security	1. Big data Adoption 2. Competitive Advantage	IT manager.	-
2.	Zailani, Dahlan, and Jallaludin (2009)	1. Administrative Innovation 2. System Innovation 3. IS Usage 4. External Pressure 5. Customer Pressure 6. Top Management Support 7. Knowledge Sources	1. Adoption of e-business among SME	54 malaysian SMEs.	Every relationship between independent variable and dependent variable is negative except the relationship between knowledge sources with adoption of e-business among SME.

Table 2.1 Previous researches (Continued)

No	Researcher (Year)	Variable		Sample	Result
		Independent	Dependent		
3.	Shah, Khan, and Xu (2009)	1. Organizational Flexibility 2. Fast and Response Product and Services 3. Expansion Services 4. System and Services Integration	1. E-banking Success Adoption	114 employees from Financial Industry.	Every relationship between independent variable and dependent variable is negative except the relationship between kn System and Services Integration with E-banking Success Adoption.
4.	Kenneth, Rebecca, and Eunice (2012)	1. Leadership Style 2. Resources of the Enterprise 3. Infrastructure 4. Competition 5. Technological Positioning	1. Adoption of e-commerce	35 managers of Kenya SME.	Every relationship between independent variable and dependent variable is positive.
5.	Rajan and Baral (2015)	1. Computer Self Efficacy 2. Organizational Support 3. Training 4. Complexity 5. Compatibility	1. Perceived Ease of Use of ERP System 2. Perceived Usefulness of ERP System	154 end users of ERP in Indian organization.	Every relationship between independent variable and dependent variable is positive, except the relationship between complexity with perceived usefulness and perceived ease of use.

Table 2.1 Previous researches (Continued)

No	Researcher (Year)	Variable		Sample	Result
		Independent	Dependent		
6.	Cheng, Lam, and Yeung (2005)	1. Perceived Ease of Use 2. Perceived Usefulness 3. Perceived Web Security	1. Attitude 2. Intention to Use	193 bank customer in Hongkong who use internet banking.	Every relationship between independent variable and dependent variable is positive, except the relationship between perceived ease of use and perceived web security with attitude.
7.	Li, Nathan, and Rao (2006)	1. Supply Chain Management 2. Competitive Advantage	1. Organizational Performance	196 employees of random organization.	Every relationship between independent variable and dependent variable is positive.

2.9 Development of the Hypothesis

2.9.1 Top Management Support and Big Data Adoption

As explained previously, the researcher is combining TAM with the model proposed by Halaweh and Massry (2015) by taking the external variables proposed by Halaweh and Massry (2015) that is related to the internal factors to the external variables of TAM. Moreover, the first external variables mentioned by Halaweh and Massry (2015) that is related to internal factors is top management support. Furthermore, the external variables which is taken from the model proposed by Halaweh and Massry (2015) will have a direct relationship to the actual use. In this case, the actual use is represented by big data adoption. Hence, the top management support will have relationship with big data adoption.

Additionally, top management support is the main factors to achieve success in IS/IT project (Iqbal, Long, Fei, and Bukhari, 2015). Also, Meredith and Mantel (2010) were stated that even though the project managers is having an excellent skills and having good experience, the project will not be survived if the top management do not support the project. The statement from Meredith and Mantel (2010) are strengthen by the statement from McComb, Kennedy, Green, and Compton (2008), Naranjo-gil (2008), and Young and Jordan (2008) which is the existence of top management support is considered as valuable template for project success. Top management support is very important for the project, because:

1. As mentioned by Staehr (2010), top management support will play the role as the resource's provider and facilitator.

2. According to Boonstra (2013), the top management support will play an important role in defining the scope of project.

Besides, Guimareas and Igbaria (1995) mentioned that top management interests, understandings, and encouragements is also important for the project. Therefore, it is important for a project to have the top management support that are including the top management interests, understandings, and encouragements. The previous study done by Halaweh and Massry (2015) proposing a research hypothesis which is top management support has positive relationship with big data adoption. However, the research written by Zailani, et al.(2009) shows that top management support have negative relationship with adoption of e-business among SME. Thus, the proposed hypothesis in this research is as follows:

H1: There is positive relationship between top management support as organizational factor with big data adoption.

2.9.2 Organizational Change and Big Data Adoption

The second external variable proposed by Halaweh and Massry (2015) that is related to the internal factors is organizational change. Moreover, due to the fact that in this research the external variable proposed by Halaweh and Massry (2015) will be the external variable in TAM. Therefore, the organizational change will be the external variable of TAM. Furthermore, the external variable of TAM, organizational change, will have direct relationship to the actual use which is represented by big data adoption. That is why, organizational change will have relationship with big data adoption.

Organizational change is an activity that is making changes within an

organization that will affect the way individuals and groups operate and interact (Daptivblogs, 2013, March 5). Moreover, Organizational change is a factors that cannot be separated from any project. Organizational change cannot be separated from any project in order to make sure that the project will run successfully. Additionally, Parker, Charlton, Ribeiro, and Pathak (2013) suggested that it is important for organizations to use project based initiatives as levers for organizational change to ensure success. Still, to ensure the project success, the company should analyse the organizational change's impact and make planning for the organizational change (Daptivblogs, 2013, March 5). The previous study done by Halaweh and Massry (2015) was proposing research hypothesis which is organizational change has positive relationship with big data adoption. Contradictory, Shah, et al. (2009) found that organizational change is having negative relationship toward the e-banking success adoption. Therefore, the proposed hypothesis is as follows:

H2: There is positive relationship between organizational change as organizational factor with big data adoption.

2.9.3 Infrastructure and Big Data Adoption

The third external variables proposed by Halaweh and Massry (2015) that is related to the internal factors is infrastructure. Infrastructure will be the external variables in TAM, because the external variable proposed by Halaweh and Massry (2015) will be the external variables in TAM. Additionally, infrastructure will have the direct relationship with big data adoption as the actual use in TAM.

Infrastructure in the project of big data adoption is very essential, because to manage big data the company cannot use the conventional data management applications. Therefore, to adopt big data company needs special data management applications, for example NoSql, MapReduce, Hadoop, Hive, PIG, PLATFORA, HDFS, HPCC, and STORM. Otherwise, without using the special data management applications, big data cannot be adopted. The previous study done by Halaweh and Massry (2015) was having a research hypothesis which was infrastructure has positive relationship with big data adoption. It is supported with the research done by Kenneth, et al. (2012) which is infrastructure have positive relationship with adoption of e-commerce. Thus, the proposed hypothesis is as follows:

H3: There is positive relationship between the infrastructures as organizational factor with big data adoption.

2.9.4 Required skillset and Big Data Adoption

The last external variables proposed by Halaweh and Massry (2015) that is related to the internal factors is required skillset. Similar with top management support, organizational change, and infrastructure, the required skillset will be the external variables of TAM, because external variables proposed by Halaweh and Massry (2015) which is related to internal factors will be the external variable of TAM. Moreover, required skillset will have direct relationship with big data adoption as actual use in TAM.

Since big data is categorized as a new technology and big data is complicated to be adopted, there will be lack of big data expertise. Additionally,

according to Mckinsey on their study about big data called “Big data: The next frontier for innovation” (cited in Ularu, et al., 2012), there is a need for up to 190,000 employees with analytical expertise and 1.5 million more data-literate managers in the United States. Ularu, et al., (2012) mentioned that company need to hire experts or train the company’s existing employees on big data, because of big data is new in the area of IS/IT and big data is complicated to be adopted. The previous study done by Halaweh and Massry (2015) proposed research hypothesis which was required skillset has positive relationship with big data adoption. Moreover, Rajan and Baral (2015) also found that required skillset has positive relationship with the adoption of ERP. Therefore, the proposed hypothesis is as follows

H4: There is positive relationship between required skillset as individual factor with big data adoption.

2.9.5 Big Data Adoption and Competitive Advantage

The second theory that is used is the IS success model. Similar with TAM, the researcher will not use the whole IS success model, because the researcher only take the relationship between use to the net benefit. Additionally, the terminology of use in the IS success model will be represented by big data adoption. Meanwhile, the terminology of net benefit in the IS success model, will be represented by competitive advantage. Therefore, big data adoption will have relationship to the competitive advantage.

The competitive advantage that company will receive after adopting big data are improving security and troubleshooting, enhancing customer satisfaction,

and Improving services and products through the use of social media content (Ularu, et al., 2012). Moreover, the previous study done by Halaweh and Massry (2015) was proposing research hypothesis which was big data adoption has positive relationship competitive advantage. Similarly, Li, et al. (2006) are conducting a research about the relationship of Supply Chain Management Practices (SCM) with competitive advantage that shows SCM has positive relationship with competitive advantage. Hence, the proposed hypothesis is as follows:

H5: There is positive relationship between big data adoption with competitive advantage.

2.10 Theoretical Framework

From the explanations and hypothesis that are already explained previously, the proposed research model of this research are as follows:

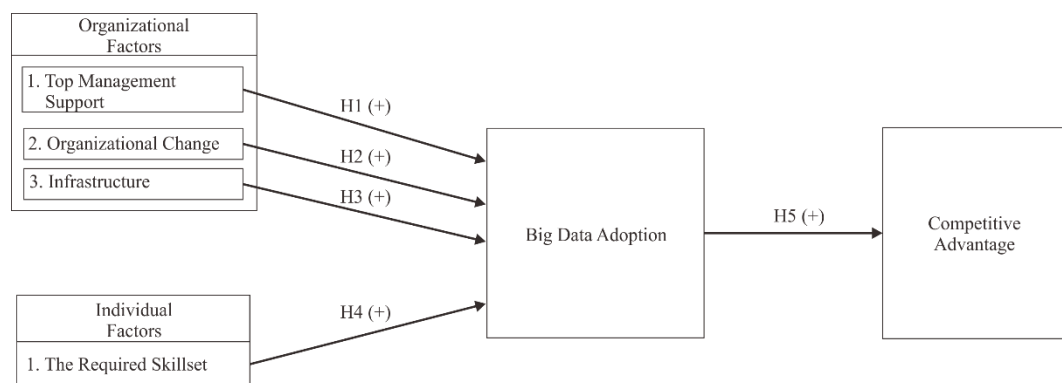


Figure 2. 3The Research Framework

CHAPTER III

RESEARCH METHODOLOGY

3.1 Research Design

The researcher is using quantitative approach to conduct the research. Besides, the data in this research are taken directly from the sample by using survey method and questionnaire technique. Hence, the data that is used in this research are considered as primary data. The type of questions in the questionnaire are close ended question. That is why, the respondents will choose the option of an answers in the questionnaire that has been prepared by the researcher.

3.2 Population and Sample

Population is the general area of object or subject that has certain qualities and characteristics that are set up by the researcher (Sugiyono, 2008). In this research, the population of this research is the Indonesian company that is already adopting big data.

Meanwhile, sample is part population which is used in the population's area which is being researched and could represent the research's population. Furthermore, the sample in this research is the employee of the Indonesian company that is already adopting big data such as president director, director, general manager, senior manager, manager, and staff whose understand big data.

3.3 Data Collection Method

The data collection technique that is used in this research is convenience sampling. Convenience sampling is a type of nonprobability or non-random sampling where members of the target population that meet certain practical criteria, such as easy accessibility, geographical proximity, availability at a given time, or the willingness to participate can be chosen as the sample for the research (Etikan, Musa, Alkassim, 2015). In this research, to ensure the privacy of the respondents, the respondents are not required to input their identity in the questionnaire.

As mentioned previously, the respondents in this research are the employee of the Indonesian company which is already adopting big data whose understand big data. During data collection, the researcher will choose one representative from the company that is targeted to be the population in this research and the researcher will have an intense communication with the representative in order to distribute the questionnaire to the employee of the Indonesian company which is already adopting big data whose understand about big data. Furthermore, Gay and Diehl (1992) and Roscoe (1975) mentioned that the minimum respondent in order to be able to conduct the validity test, reliability test, and hypothesis testing is 30 respondents.

3.4 Definition of Operational and Measurement of Variables

Variable can be defined as something that is varied, such as weight, height, anxiety levels, income, body temperature, demographic, physical or social such as

religion, income, occupation, temperature, humidity, language, food, and fashion (Kaur, 2013).

As mentioned previously, the objectives of this research is to determine the internal factors, such as top management support, organizational change, infrastructure, and required skillset that are affecting the big data adoption to obtain competitive advantage. That is why, the variables that will be used in this research are top management support, organizational change, infrastructure, required skillset, big data adoption, and competitive advantage. The detail explanation about each of the variables can be seen below.

3.4.1 Top Management Support

As stated by Zwikael (2008), top management support is considered to have impact on the project success. Thus, it is important to have top management support on every project. It is important to have top management support on every project, because top management support will help the company in dealing with hurdles, exhibiting commitment to the work, and encouraging the subordinates (Kandelousi, Ooi, & Abdollahi, 2011).

Likewise, top management support is needed in small scale project as well as in big scale project. Related to big data project, big data project is categorized as a big scale project. Big data is categorized as a big scale project, because big data need a lot of funds in order to purchase the infrastructure that is able to handle the massive amount of data. Furthermore, big data is considered as new technology in the area of IS/IT. Hence, big data adoption needs the top management support

(Halaweh and Massry, 2015). The measurement indicators for top management support can be seen in the Table 3.1 in the next page.

Table 3. 1 Measurement Indicators of Top Management Support

Variable	Item	References
Top Management Support	1. Top management emphasizes the effective management and control for the big data development in the company. 2. Top management has taken an active role in deciding the priority of big data in the company. 3. Top management emphasizes the effective management and control for the big data operation in the company. 4. Top management in participating actively in planning process of big data operation in the company.	(Zailani, Dahlan & Jallaludin, 2009)

3.4.2Organizational Change

Similar with top management support, organizational change is also essential for big data adoption (Halaweh & Massry, 2015). Organizational change is essential for big data adoption, because organizational change will help the company to ensure the project's success. As mentioned previously, organizational change is an activity that will affect the way how individuals and groups operate and interact by changing the organization (Daptivblogs, 2013, March 5).

Big data adoption will require changes in the daily operation and changes in the organization's culture in order to ensure success in big data adoption (Halaweh & Massry, 2015). Hence, organizational change is important in big

data adoption. The measurement indicators for organizational changes can be seen in the next page in the Table 3.2.

Table 3. 2 Measurement Indicators of Organizational Change

Variable	Item	References
Organizational Change	1. Changeable (flexible) organizational structure 2. Promoting big data culture within an organisation 3. Flexible workforce ready to adapt changes	(Shah, Khan, & Xu, 2009)

3.4.3 Infrastructure

Big data adoption will make the company to deal with massive amount of data. Furthermore, to handle big data, the company needs a special data management application, for example NoSQL Databases, MapReduce, Hadoop, Hive, PIG, PLATFORA, HDFS, HPCC, and Storm. Thus, in big data adoption there will be infrastructural change that will give extra cost to the company (Halaweh and Massry, 2015). Additionally, Demchenko, Zhao, Grosso, Wibisono, and de Laat (2012) mentioned that there are several requirements of infrastructure that are needed to adopt big data, which are:

1. Support long - running experiments and large data volumes generated at high speed,
2. Multi-tier data distribution and replication,
3. Support of virtual scientists' communities,
4. Trusted environment for data storage and processing,
5. Data integrity, confidentiality, accountability,

6. Policy binding to data to protect privacy.

Therefore, it is important for the company which starts to adopt big data to change their infrastructure into infrastructure that is suited with big data adoption.

The measurement indicators for infrastructure can be seen in the Table 3.3.

Table 3. 3 Measurement Indicators of Infrastructure

Variable	Item	References
Infrastructure	1. Efficient big data infrastructure is a requisite for the adoption of big data 2. Good technology support and a sound physical infrastructure, is necessary, though not sufficient, condition for big data adoption 3. Big data adoption determine the creation of new local, regional and international supply chains and markets 4. Reliability and cost of equipment determine the adoption of big data.	(Kenneth, Rebecca & Eunice, 2012)

3.4.4 The Required Skillset

Due to the fact that big data is new technology in the area of IS/IT, new skillset is required to adopt big data (Halaweh & Massry, 2015). Specifically, Davenport, Barth, and Bean (2013) mentioned that big data is needing creative IT skills. So, company that wants to adopt big data has hire employees that are having creative IT skills or train the current employees to have creative IT skills. Besides, it can be concluded that employee that able to manage big data is employee that is having creative IT skills. Employee that is having creative IT skills is called as data scientist. Another skill that may own by data scientist are programming, mathematical and statistical skills. However, at this moment, it is difficult to find a data scientist. Therefore, it is important for the company to be

able to hire data scientist or train the employee to be data scientist in order to adopt the big data. The measurement indicators for required skillset can be seen in the Table 3.4.

Table 3. 4 Measurement Indicators of Required Skillset

Variable	Item	References
Required Skillset	1. someone showed me how to handle big data at first 2. The ability of the employee to call someone for help if the employee got stuck 3. The employee had big data software manuals for reference 4. The availability of built-in help facility for assistance 5. The experience of using big data software before this one to do the same job	(Rajan & Baral, 2015)

3.4.5 Big data Adoption

After considering about the internal factors that are affecting the big data adoption, such as top management support, organizational change, infrastructure, and required skillset, the company is ready to adopt big data in order to achieve the competitive advantage. Additionally, Kuketz (2013) mentioned that big data adoption can give competitive advantage to the business sectors, such as banking/credit sector, finance and control sector, healthcare sector, manufacturing sector, oil and gas sector, pharmaceutical sector, public sector, recalls sector, retail sector, telecom sector, and utilities sector. Therefore, big data adoption is really important in order to lead the market competition. The measurement indicators for Big data adoption can be seen in the Table 3.5.

Table 3. 5 Measurement Indicators of Big Data Adoption

Variable	Item	References
Big data Adoption	1. Adopt big data for my company needs 2. Adopt big data to handle all of the data within the company is soothing the company would to do 3. The company would see theirself using big data to handle the all of the data within the company	(Cheng, Lam, & Yeung, 2005)

3.4.6 Competitive Advantage

As mentioned previously by the researcher, the competitive advantage that company can create after adopting big data are improving security and troubleshooting, enhancing customer satisfaction, and Improving services and products through the use of social media content. However, adopting big data is difficult, the company have to handle the factors to adopt big data. Moreover, the first factors that should be handled by company is internal factors, which are top management support, organizational change, infrastructure, and required skillset. The measurement indicators for competitive advantage can be seen in the Table 3.6.

Table 3. 6 Measurement Indicators of Competitive Advantage

Variable	Item	References
Competitive Advantage	1. Ability to offer competitive price 2. Offer products that are highly reliable 3. Offer high quality products to customers 4. Provide customized products 5. Good respond toward customer demand for “new” features 6. Deliver product to market quickly 7. Have fast product development	(Li, Nathan, Nathan, & Rao, 2006)

3.4 Data Analysis Technique

3.4.1 Method of Structural Equation Model (SEM)

The method of Structural Equation Model (SEM) will be used as a model for the quantitative analysis. SEM is a powerful technique that can combine complex path models with latent variables (Hox and Bechger, n.d.). Thus, from the explanation given by Hox and Bechger (n.d.) SEM will allow the researcher to develop a model that has a complex relationship, because SEM is a set of statistical techniques.

The software that will be used in this research is Smart PLS 3.0. This software will be used to process the data that is related to SEM which is based on variance. This type of SEM is very powerful and does not require any complex assumption.

3.5 Validity and Reliability Test

3.5.1 Validity Test

Validity is related to reliability (Kimberlin & Winterstein, 2008). The terminology of reliability means that the validity test will examine whether certain data can be trusted or certain data is in accordance with the reality. Moreover, the data can be considered as assurance enough, if certain data has high validity. Additionally, the validity test will be conducted for all of the questions in the questionnaire. The reason why the researcher will do a validity test for all of the questions in the questionnaire is to test the validity of each question in the research variable.

The researcher is measuring the validity of each question in the questionnaire by discovering whether the unobserved variable can be measured using observed variable or not. Likewise, if the unobserved variable can be measured by using the observed variable, it can be concluded that the questionnaire is having high validity.

AVE (average variance extracted) will be used to examine the result of validity test. Moreover, the question in research variable can be considered as valid if the value of loading factor from each construct is more than 0.5 ($\lambda > 0.5$), with the significant level of p-value is less than 5% ($p < 0.05$) (Fornell & Lacker, 1981).

3.5.2 Reliability test

The purposes of reliability test is to evaluate the stability of measures administered at different times to the same individuals or using the same standard (test–retest reliability) or to evaluate the equivalence of sets of items from the same test (internal consistency) or of different observers scoring a behavior or event using the same instrument (interrater reliability) (Kimberlin & Winterstein, 2008).

The researcher are using the PLS to perform reliability test. The value of alpha will be considered to be reliabled if the value of alpha is above 0.70 (Wells & Wollack, 2003). The reliability test is dependend on the seriousness of respondents in fulfilling the questionnaires.

3.6 Hypothesis Testing

Moreover, the hypothesis will be tested by using inner model or structural model testing. The inner model or structural model testing is made to test the relationship between R-square, T-statistic, path coefficient, and p-value.

3.6.1 R-Square (R^2)

R-Square (R^2) will measure the ability of the model to explain the variation of dependent variable. The terminology of R^2 is referred to coefficient of determination. the ability of the model to explain the variation of dependent variable is indicated by the R^2 that is resulting the score between one and zero.

3.6.2 T-Statistic Test

T-Statistic Test (T-test) is a test that is used to examine whether the independent variable is affecting the dependent variable or not. In this research, the t-test will be helped by PLS software program. Furthermore, the result of the test will be accepted if the value of t-count > t-table (1.64) in the significance level of 5%.

3.6.3 Path Coefficient Test

Path coefficient test is path analysis model that is providing a systematic comparison about various pathway in relation with the independent variable that may influence the dependent variable. In path coefficient test there is structural model and measurement model.

3.6.4P-Value Test

P- value test is one of the techniques to determine the significance level of independent variable and dependent variable. The p-value test will be done by observing the output using the application of Smart PLS 3.0. Furthermore, if the p- value test is one way testing, the α is not required to be divided by two.

CHAPTER IV

DATA ANALYSIS AND DISCUSSIONS

In this chapter, the researcher will discuss the result of the research which is the investigation of internal factors which are affecting the big data adoption to achieve competitive advantage. The researcher was distributing 50 questionnaires to PT Telekomunikasi Indonesia, PT Bank Negara Indonesia (Persero) TBK, and PT Bank Rakyat Indonesia (Persero) TBK, and PT Bank Central Asia TBK which are the companies in Indonesia that are already adopting big data. Moreover, the researcher will analyse the data that has been collected based on the problem formulation and hypothesis formulation that has been mentioned previously. The result of data processing will be used to check whether the hypothesis can be supported or not.

The analysis is divided into four parts. The first part is the result of data collection which is explaining how many data that were readied to be analyzed. The second part will discuss the description of respondents based on the gender as well as the level of individuals within the company's hierarchy. Furthermore, the third part is the result of data testing that is related with test of validity and reliability. Finally, the last part of analysis will discuss the result of the research which is related t test of hypothesis.

4.1 The Result of Data Collection

Convenience sampling is the sampling technique that was used by the researcher to collect the data. Convenience sampling is a technique to gather information from population that is willing to share the information (Sekaran, 2011). That is why, the population will not be forced to fulfill the questionnaire. Moreover, the respondents in this research are the employee of companies that already adopting big data which are PT Telekomunikasi Indonesia, PT Bank Negara Indonesia (Persero) TBK, and PT Bank Rakyat Indonesia (Persero) TBK, and PT Bank Central Asia TBK whose understand about big data. Furthermore, the result of the data collection which is questionnaire that was successfully collected can be seen in the Table 4.1.

Table 4. 1 The Classification of Data Collection

Description	Amount	%
Questionnaires being distributed	50	100
Questionnaires that is returned	32	64
Questionnaires that is fulfilling the requirement	32	100

4.2 The Description of Respondent

4.2.1 Based on the Gender

The respondents are categorized into male and female. In the data collection, the amount of male respondents are 29 people (90.63%). Meanwhile, the female respondents are 3 people (9.38%). The most respondents that are met are female respondents. The classification of the data collection based on gender can be seen in the Table 4.2.

Table 4. 2 The Classification of Respondent Based on the Gender

Description	Amount	%
Male	29	90.63
Female	3	9.38
Total	32	100

4.2.2 Based on the Level of Individuals in Corporate

The respondent is parted into President Director, Director, General Manager, Senior Manager, Manager, and Staff. In this data collection, the respondents which are General Manager are 4 people (12.50%), Senior Manager are 7 people (21.88%), Manager are 16 people (50.00%) and staff are 5 people (15.63%). Nevertheless, the respondents whose work as President Director and Director are 0. Thus, the respondents which are met the most are manager with 16 people (50.00%). The classification of this data can be seen in the Table 4.3.

Table 4. 3The Classification of Respondent

Description	Amount	%
President Director	0	0
Director	0	0
General Manager	4	12.50
Senior Manager	7	21.88
Manager	16	50.00
Staff	5	15.63
Total	32	100

4.3. Evaluation of Measurement (Outer Model)

4.3.1 Test of Validity

In this research, validity test that will be used is convergent validity and discriminant validity. Convergent validity is taken from the measurement model that is using reflective indicator which is based on the correlation using item score or component score with construct score that is calculated using SMARTPLS. The reflective measurement can be considered as high if the correlation is more than 0.5 (with significant level of 0.05 and T statistic > 1.64).

Meanwhile, discriminant Validity will be used by comparing the value of square root of average variance extracted (AVE) in every construct with the correlation between one construct and another construct in the model. The good value of discriminant validity can be found if the square root of AVE in every construct is bigger compare to the value of correlation between one construct to the other construct in the model. Furthermore, the initial item loading and AVE in initial model can be seen in the Table 4.4.

Table 4. 4 Initial Item Loadings and AVE in Initial Model

Category	No	Code	Outer Loading	AVE
Top Management Support	1	TMS 1	0.915	0.839
	2	TMS 2	0.924	
	3	TMS 3	0.927	
	4	TMS 4	0.898	
Organizational Change	1	ORC 1	0.864	0.744
	2	ORC 2	0.802	
	3	ORC 3	0.918	
Infrastructure	1	INF 1	0.860	0.766
	2	INF 2	0.944	
	3	INF 3	0.880	
	4	INF 4	0.811	
Required Skillset	1	RQS 1	0.906	0.777
	2	RQS 2	0.920	
	3	RQS 3	0.919	
	4	RQS 4	0.913	
	5	RQS 5	0.713	
Big data Adoption	1	BDA 1	0.860	0.683
	2	BDA 2	0.871	
	3	BDA 3	0.741	
Competitive Advantage	1	CAV 1	0.898	0.828
	2	CAV 2	0.900	
	3	CAV 3	0.936	
	4	CAV 4	0.911	
	5	CAV 5	0.950	
	6	CAV 6	0.880	
	7	CAV 7	0.892	

The table above describes that AVE in every construct Top Management Support (TMS), Organizational Change (ORC), Infrastructure (INF), Required Skillset (RQS), Big Data Adoption (BDA), and Competitive Advantage (CAV) are already above 0.5. Thus, the indicator that is used in this research are valid or already fulfilling the convergent validity. Meanwhile, related to the cross loading, it can be seen in the Table 4.5.

Table 4. 5 Cross Loading

	TMS	ORC	INF	RQS	BDA	CAV
TMS1	0.915	0.571	0.711	0.474	0.521	0.245
TMS2	0.942	0.779	0.746	0.365	0.479	0.142
TMS3	0.927	0.624	0.763	0.519	0.673	0.301
TMS4	0.898	0.793	0.711	0.467	0.567	0.197
ORC1	0.607	0.864	0.441	0.281	0.333	-0.032
ORC2	0.716	0.802	0.551	0.198	0.343	0.039
ORC3	0.620	0.918	0.591	0.328	0.363	0.093
INF1	0.659	0.512	0.880	0.404	0.630	0.168
INF2	0.735	0.533	0.944	0.405	0.702	0.325
INF3	0.747	0.673	0.880	0.388	0.560	0.319
INF4	0.670	0.433	0.811	0.410	0.480	0.300
RQS1	0.472	0.329	0.372	0.906	0.644	0.172
RQS2	0.497	0.297	0.442	0.920	0.691	0.261
RQS3	0.437	0.199	0.428	0.919	0.727	0.083
RQS4	0.607	0.477	0.544	0.931	0.757	0.211
RQS5	0.066	-0.063	0.110	0.713	0.393	0.052
BDA1	0.476	0.340	0.538	0.639	0.860	0.039
BDA2	0.503	0.311	0.576	0.693	0.871	0.338
BDA3	0.565	0.351	0.589	0.508	0.741	0.234
CAV1	0.240	0.030	0.310	0.104	0.222	0.898
CAV2	0.231	0.067	0.325	0.075	0.157	0.900
CAV3	0.278	0.097	0.355	0.078	0.197	0.936
CAV4	0.248	0.078	0.311	-0.008	0.122	0.911
CAV5	0.293	0.020	0.355	0.287	0.337	0.950
CAV6	0.177	0.075	0.191	0.218	0.250	0.880
CAV7	0.106	-0.067	0.168	0.243	0.221	0.892

In the table above, discriminant validity with cross loading will be used to test the reflective indicator. The indicator can be considered as valid if the loading factor is the highest compared to the construct that is appointed as compared to the other construct.

4.3.2 Test of Reliability

To test the variability of the construct, the researcher will use the composite reliability. The construct can be considered as reliable if the value of composite reliability is higher than 0.70. The result of the calculation of construct as summarize in the internal composite reliability and correlation among constructs can be seen in the Table 4.6.

Table 4. 6 Internal Composite Reliability and Correlation among Constructs

	CR	TMS	ORC	INF	RQS	BDA	CAV
TMS	0.954	0.916	-	-	-	-	-
ORC	0.897	0.751	0.863	-	-	-	-
INF	0.929	0.801	0.614	0.875	-	-	-
RQS	0.945	0.505	0.313	0.457	0.882	-	-
BDA	0.865	0.622	0.402	0.687	0.749	0.826	-
CAV	0.971	0.248	0.041	0.315	0.185	0.257	0.910

TMS: Top Management Support

RQS: Required Skillset

ORC: Organizational Change

BDA: Big Data Adoption

INF : Infrastructure

CAV: Competitive Advantage

The above table shows that the value of composite reliability for every constructs are already above 0.70 which is shown that every constructs in the model that has been estimated fulfilling the criteria of discriminant validity. The lowest value of composite reliability is 0.865 in the construct of Big Data Adoption (BDA).

4.4 Result of the Research

After the model that was estimated to fulfill the criteria of outer model. The next step was conducting test of structural model (inner model).

4.4.1 Test of R-Square (R^2)

From the data that are analyzed, the value of R-Square (R^2) can be seen in the Table 4.7.

Table 4. 7 R^2 Value

Construct	R Square
Big Data Adoption	0.713
Competitive Advantage	0.066

The table above shows that the value of 0.713 for construct Big Data Adoption (BDA) is indicating that Top Management Support (TMS), Organizational Change (ORC), Infrastructure (INF), Required Skillset (RQS) able to describe the variance of Big Data Adoption (BDA) by 71.3 %. Meanwhile, the value of R-Square of Competitive Advantage (CAV) is 0.066 which is indicating that Big Data Adoption (BDA) can describe the variance of Competitive Advantage (CAV) by 6.6%.

4.4.2 Test of T-Statistic

Based on the data that has been processed, the result of T-statistic test that was used to test the hypothesis can be seen in the Table 4.8.

Table 4. 8 The conclusion of Hypothesis (T-statistic)

Hypothesis	Relation	B	T-Statistic	Status
H1	TMS > BDA	0.044	0.18	Not Accepted
H2	ORC > BDA	-0.078	0.434	Not Accepted
H3	INF > BDA	0.452	2.335	Accepted
H4	RQS > BDA	0.544	4.378	Accepted
H5	BDA > CAV	0.257	0.856	Not Accepted

4.4.2.1 The test of Hypothesis 1 H1 (The Relationship Between Top Management Support as Organizational Factor with Big Data Adoption)

The Table 4.9 shows that the relationship between TMS and BDA is not significant in path coefficient which is by 0.044 and in t-value which is by 0.18 (< 1.64). The result of the hypothesis test of first hypothesis shows that the top management support do not have any impact to the big data adoption. Hence, if the company want to adopt Big data, the company does not need to put the top management support as their highest consideration to adopt big data.

4.4.2.2 The Test of Hypothesis 2 H2 (The Relationship Between Organizational Change as Organizational Factor with Big Data Adoption)

In the table 4.9, it shows that the relationship of ORC and BDA is not significant in path coefficient which is by -0.078 and in t-value which is by 0.434 (< 1.64). The result of the hypothesis test of second hypothesis shows that the organizational change do not have impact toward the big data Adoption. Therefore, if the company want to adopt big data, the organizational change should not be worried by the company.

4.4.2.3 The Test of Hypothesis 3 H3 (The Relationship Between Infrastructure as Organizational Factor with Big Data Adoption)

The table 4.9 shows that the relationship between INF and BDA is significant in path coefficient which is by 0.452 and in t-value which is by 2.335 (> 1.64). The result of hypothesis testing of third hypothesis shows that the infrastructure have impact to big data Adoption. Thus, company which want to

adopt big data should consider about the infrastructure, because infrastructure is the key in big data adoption.

4.4.2.4 The Test of Hypothesis 4 H4 (The Relationship Between Required Skillset as Individual Factor with Big Data Adoption)

The table 4.9 shows that the relationship between RQS and BDA is significant in path coefficient which is by 0.544 and in t-value which is by 4.378 (> 1.64). The result of hypothesis testing of fourth hypothesis shows that required skillset is essential for big data adoption. Therefore, if the company wants to adopt big data, the company should have the human resource that is able to operate special data management application.

4.4.2.5 The Test of Hypothesis 5 H5 (The Relationship Between Big data Adoption with Competitive Advantage)

The table 4.9 shows that the relationship between BDA and CAV is not significant in path coefficient which is by 0.257 and in t-value which is by 0.856 (< 1.64). The result of hypothesis testing of fifth hypothesis shows that if the company want to achieve competitive advantage, the company does not need to adopt big data, because big data do not warrant the achievement of competitive advantage. The reason why big data do not warrant the achievement of competitive advantage can be seen in the discussion.

4.4.3 Discussion

In this part, result of the analysis will be interpreted and discussed. In the first part, there will be interpretation and discussion of the result which have correlation with the factor to the big data adoption as competitive advantage. On

the second part, there will be the result of discussion with moderate effect from demographic factor in this research.

In the previous part, the researcher already explained the research process which led to the research result, which are development of Hypothesis on second chapter based on the research model design, hypothesis testing will be done by identifying T-Value and Path Coefficient (β). Additionally, as stated on Table 4.8, two hypothesis are accepted and three hypothesis are not accepted.

4.4.3.1 Perception of Top Management Support to Big Data Adoption (H1)

From the hypothesis that is explaining the relationship between top management support with big data adoption, the result shows that top management support do not have positive relationship with big data adoption. The result of this research is not consistent with the proposed hypothesis developed by Halaweh and Massry (2015). However, the result of this research is in conformance with the study conducted by Zailani, et al. (2009) which is top management support affect the adoption of e-business among SME.

Even though, the company do not have the full top management support, the company can still adopt big data. The reason why the top management support do not have positive relationship to big data adoption, because big data in Indonesia is still in the early stage of the adoption. The company that already adopted big data is less than five company. That is why, top management do not fully support the big data adoption, because the top management want to check the result of big data first in order to check whether big data can actually bring competitive advantage to the company or not. Furthermore, the competitive

advantage that the company wants to achieve by adopting big data can be achieved in the long term basis, not in the short term basis.

4.4.3.2 Perception of Organizational Change to Big Data Adoption (H2)

From the hypothesis that is explaining the relationship between organizational change with big data adoption, the result shows that organizational change do not have positive relationship with big data adoption. The result of this research is not consistent with the proposed hypothesis developed by Halaweh and Massry (2015). However, Shah, et al. (2009) found that organizational change do not have positive effect to the e-banking success adoption. The result found by Shah, et al. (2009) is consistent with the result of this research, even though the scope of the research is different.

Every IS/IT adoption need organizational change in order to make the company to adopt certain IS/IT adoption at its best. However, based on this research, the organizational change do not have positive relationship to big data adoption which is indicating that organizational change is not needed when adopting big data. The organizational change is not needed in adopting big data, because big data is in the early adoption stage, so big data will not make changes in the company as fast as it is expected.

4.4.3.3. Perception of Infrastructure to Big Data Adoption (H3)

From the hypothesis that is explaining the relationship between infrastructure with big data adoption, the result shows that infrastructure have positive relationship with big data adoption. The result of the third hypothesis is consistent with the hypothesis proposed by Halaweh and Massry (2015) which

is infrastructure have impact to the big data adoption. Besides, Kenneth, et al. (2012) also found that infrastructure is having an impact to the adoption of e-commerce, which is consistent to this research's finding.

Additionally, The infrastructure have positive relationship with big data adoption, because to adopt big data the company need a special data management applications. That is why, if the company wants to adopt big data, the company have to deal with the infrastructure, because big data cannot be processed without special data management application. Thus, the result of this research shows that infrastructure is one of the most important internal factors that should be prepared by the company in order to adopt big data.

4.4.3.4 Perception of Required Skillset to Big Data Adoption (H4)

From the hypothesis that is explaining the relationship between required skillset with big data adoption, the result shows that required skillset have positive relationship with big data adoption. The result of the fourth hypothesis is consistent with the proposed hypothesis developed by Halaweh and Massry (2015). Furthermore, the result of the fourth hypothesis is also consistent with the result of the study done by Rajan and Baran (2015) which is infrastructure have positive impact to the use of ERP.

Since big data adoption need special data management applications, big data adoption also needs the employees with specific required skillset to handle the special data management applications. Thus, before adopting big data, the

company have to prepare their human resource by giving training to use the special data management applications.

4.4.3.5 Perception of Big Data Adoption and Competitive Advantage (H5)

From the hypothesis that is explaining the relationship between big data adoption with competitive advantage, the result shows that big data adoption do not have positive relationship with competitive advantage. However, the result of this research is not consistent with model proposed by Halaweh and Massry (2015) which was stated that big data adoption has positive relationship with competitive advantage and the result of this research is also not consistent with the previous study conducted by Li, et al (2006) which was stated that supply chain management practices have positive impact toward competitive advantage.

The inconsistency with the previous study existed, because the companies that are chosen as the population and sample are adopting big data in a few recent years. It is indicating that the companies will not create the competitive advantage immediately, because the companies adopt big data in a few recent years. Moreover, Based on the result of this research, the competitive advantage cannot be created in the short term basis, but the competitive advantage can be created in the long term basis.

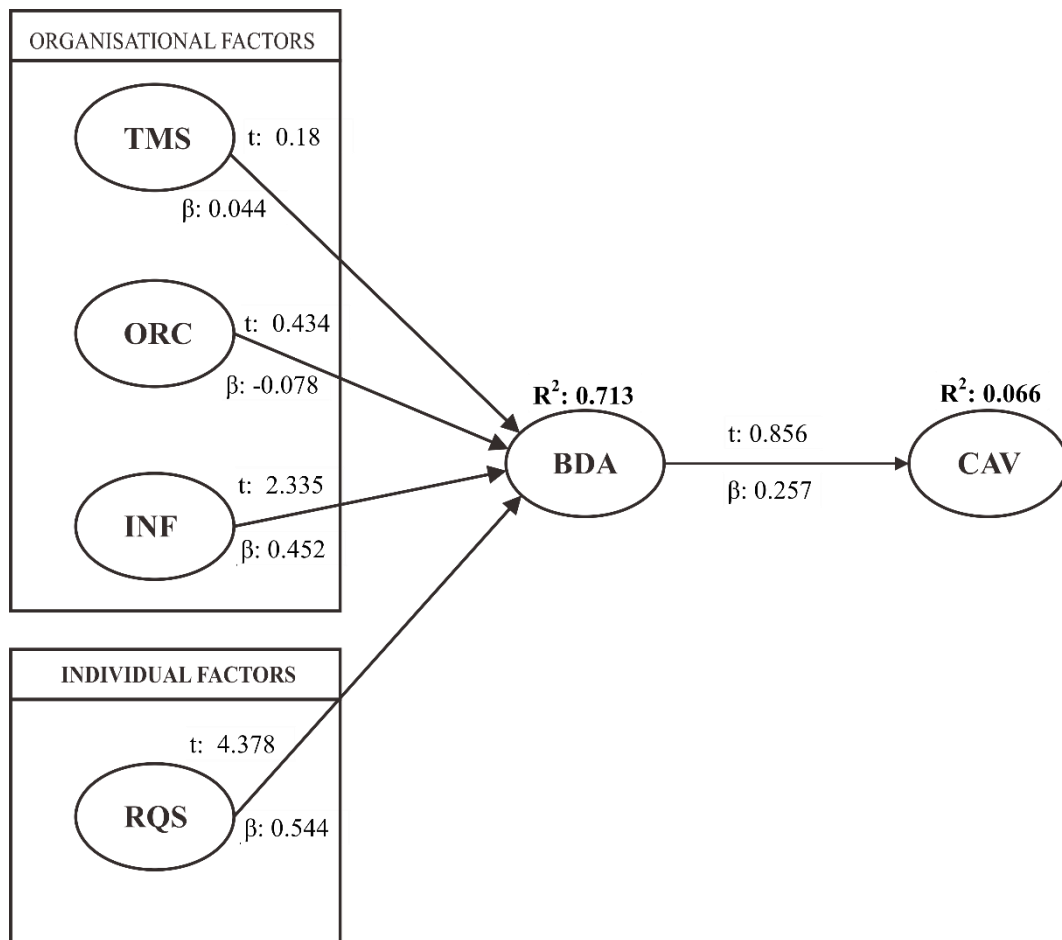


Figure 4. 1Research Result Diagram

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

In this final chapter, the contents of this chapter are the summary of the research, research contributions and implications, and research limitations. Moreover, the research limitations will be followed by therecommendations from the researcher to the readers of this research and to the future researchers which are having the same topic or relevant topics.

5.1 Conclusions

This research has objectives to investigate the relationship between top management support with big data adoption,organizationalchange with big data adoption, infrastructure with big data adoption,required skillset withbig data adoption, and big data adoption with competitive advantage. Futhermore, the results of the research are:

1. Top management support do not have positive relationship withbig data adoption. That is why, top management support do not affect the big data adoption.
2. Organizational change do not have positive relationship withbig data adoption. That is why,organizational change do not affect the adoption of big data.
3. Infrastructure have positive relationship withbig data adoption. That is why, infrastructure will affect the big data adoption.

4. Required skillset have positive relationship with big data adoption. Hence, required skillset will affect the big data adoption.
5. Big data adoption do not have positive relationship with competitive advantage. Hence, big data adoption will not create competitive advantage.

5.2 Research Contributions

The researcher is expecting that the results of this research will have contributions to the future, which are:

1. For Academics

The results of this research are expected to help the academics to improve the development of knowledge in the area of IS/IT. Additionally, the results of this research are also expected to give opportunities to the other researchers to prove whether several parts of the research design in this research can be applied to another topic in the future.

2. For Practitioners

The results of this research are expected to help the company that is wanted to adopt big data by giving knowledge related to the internal factors in big data adoption that should be considered by the company. Moreover, the results of this research are also expected to determine whether big data adoption can create competitive advantage to the company which is adopting big data.

5.3 Future Direction of the Research

In this research, there were several limitations that were occurred during the research. Related to the limitations that were occurred during the research, the researcher have several recommendations for the future researchers. The research limitations and research recommendations are:

5.3.1 Research Limitations

Regardless of the results in this research, this research have several limitations. The limitations of this research are considered as uncontrollable limitations. The limitations of this research are:

1. There are only four companies in Indonesia that are already adopting big data.
2. The respondents of this research are limited, because there are only few people inside the Indonesian company which are already adopting big data who are understanding big data.
3. There are limited previous research related to big data adoption. That is why, the researcher was combining the previous research related to big data adoption with the other IS/IT project adoption.

5.3.2 Recommendations

1. In the next few years, there will be more Indonesian company which is adopting big data. Thus, the future researchers can increase the amount of company that will be used as the population.

2. The amount of respondent will be increased, because there will be more people inside the Indonesian company which is already adopting big data who understand about big data. Hence, the future researchers can increase the amount of the respondents.
3. There will be more research discussing big data adoption. Hence, the future researchers can improve and give additional factors that can influence the results of the research and give additional value in the future researches.

By investigating the internal factors that will affect the big data adoption to achieve competitive advantage, this research is expected to give benefits to the company that is wanted to adopt big data. However, the future researchers that are wanted to conduct research in this topic should consider the recommendations that are stated in this research.

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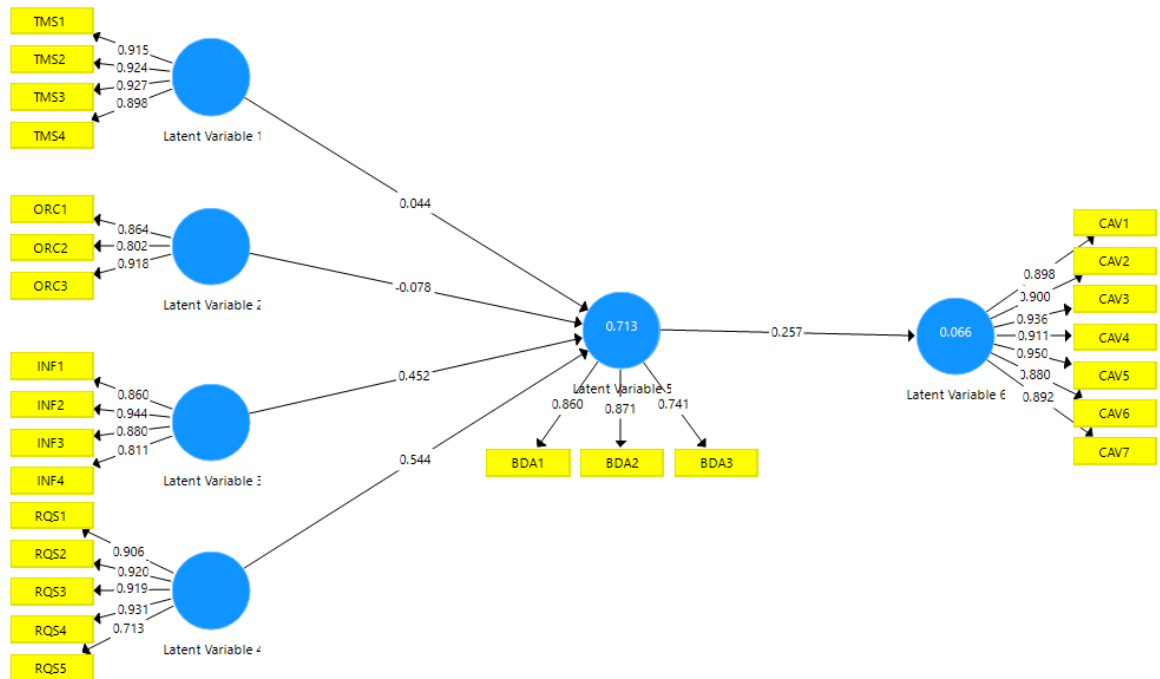
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ATTACHMENT

APPENDIX 1

Results of the Research



APPENDIX 2

The Example of Questionnaire

Kuesioner Mengenai Penggunaan Big data

Kuesioner ini dirancang untuk mengetahui faktor-faktor internal yang mempengaruhi penggunaan Big data di Indonesia. Untuk kepentingan itu, kami sangat menghargai dan berterima kasih, jika anda dapat meluangkan waktu sekitar dua puluh menit untuk menyelesaikan kuesioner ini. Partisipasi anda sangat berharga untuk membantu kami menyelesaikan penelitian ini.

Kuesioner ini tanpa identitas dan sifatnya sukarela. Partisipan mempunyai kebebasan untuk membatalkannya kapan saja, tanpa konsekuensi. Semua jawaban hanya akan digunakan untuk penelitian akademik dan aksesnya terbatas bagi peneliti dan supervisor.

Silahkan memilih jawaban yang paling sesuai dengan kondisi anda. Tidak ada jawaban benar atau salah. Bila anda memerlukan ringkasan hasil studi ini, silahkan mengisi formulir pada pada lembar terakhir kuesioner ini. Jika ada pertanyaan terkait dengan kuesioner ini, anda dapat menghubungi kami, melalui:

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Hormat Saya,

Ihsan Manshur Putra

Fakultas Ekonomi,

Universitas Islam Indonesia

Kuesioner Mengenai Penggunaan Big data

Dalam studi ini, Big data didefinisikan sebagai penyedia fasilitas pengolahan data guna membantu perusahaan / organisasi dalam mengolah data yang di manfaatkan untuk membantu mengambil keputusan oleh menejemen.

Tujuan utama dari kuesioner ini adalah untuk mengidentifikasi faktor-faktor internal yang dapat mempengaruhi perusahaan / organisasi dalam mengadopsi penggunaan Big data pada Perusahaan / Organisasi anda.

Kuesioner ini terdiri dari 7 (tujuh) bagian. Dimana 6 (enam) bagian pertama berisi aspek-aspek yang mempengaruhi pengadopsian Big data di perusahaan, sedangkan bagian 6 (enam) berisi tentang info demografi.

Silahkan jawab pernyataan-pernyataan di bawah dengan memberikan tanda silang (X) pada tempat yang tersedia () untuk jawaban yang paling sesuai dengan kondisi anda.

Untuk menjawab bagian 1 – 5 silahkan menggunakan skala sebagai berikut:

1.	2.	3.	4.	5.	6.
Sangat Tidak Setuju	Tidak Setuju	Agak Tidak Setuju	Agak Setuju	Setuju	Sangat Setuju

Sejauh mana anda setuju atas pernyataan-pernyataan di bawah ini. Silahkan menggunakan skala di atas.

Dalam merespon pernyataan-pernyataan di bawah ini, silahkan merujuk pada BIG DATA yang biasa anda gunakan.

Bagian 1		Kode: TMS		1	2	3	4	5	6
1.	Pimpinan menekankan manajemen yang efektif dan kontrol untuk pengembangan BIG DATA di perusahaan			☐	☐	☐	☐	☐	☐
2.	Pimpinan telah mengambil peran aktif dalam menentukan prioritas BIG DATA di perusahaan			☐	☐	☐	☐	☐	☐
3.	Atasan menekankan manajemen yang efektif dan kontrol untuk operasi BIG DATA di perusahaan			☐	☐	☐	☐	☐	☐
4.	Atasan berpartisipasi secara aktif dalam proses perencanaan operasi BIG DATA di perusahaan			☐	☐	☐	☐	☐	☐

1.	2.	3.	4.	5.	6.
Sangat Tidak Setuju	Tidak Setuju	Agak Tidak Setuju	Agak Setuju	Setuju	Sangat Setuju

Sejauh mana anda setuju atas pernyataan-pernyataan di bawah ini. Silahkan menggunakan skala di atas.

Dalam merespon pernyataan-pernyataan di bawah ini, silahkan merujuk pada BIG DATA yang biasa anda gunakan.

Bagian 2 Kode: ORC		1	2	3	4	5	6
1.	Struktur organisasi yang fleksibel	☐	☐	☐	☐	☐	☐
2.	Mempromosikan budaya BIG DATA dalam sebuah organisasi	☐	☐	☐	☐	☐	☐
3.	Tenaga kerja yang fleksibel siap untuk beradaptasi perubahan	☐	☐	☐	☐	☐	☐
Bagian 3 Kode: INF		1	2	3	4	5	6
1.	Efisien infrastruktur BIG DATA merupakan syarat untuk adopsi BIG DATA	☐	☐	☐	☐	☐	☐
2.	Dukungan teknologi yang baik dan infrastruktur fisik suara, diperlukan, meskipun tidak cukup, kondisi untuk adopsi BIG DATA	☐	☐	☐	☐	☐	☐
3.	Adopsi Big data menentukan penciptaan rantai pasokan baru lokal, regional dan internasional dan pasar	☐	☐	☐	☐	☐	☐
4.	Keandalan dan biaya peralatan menentukan adopsi BIG DATA	☐	☐	☐	☐	☐	☐
Bagian 4 Kode: RQS		1	2	3	4	5	6
1.	seseorang menunjukkan bagaimana menangani BIG DATA pada awalnya	☐	☐	☐	☐	☐	☐
2.	Kemampuan karyawan untuk memanggil seseorang untuk membantu jika karyawan tidak paham	☐	☐	☐	☐	☐	☐
3.	Karyawan memiliki manual software BIG DATA untuk referensi	☐	☐	☐	☐	☐	☐
4.	Ketersediaan built-in bantuan fasilitas untuk bantuan	☐	☐	☐	☐	☐	☐
5.	Pengalaman menggunakan software BIG DATA sebelum ini untuk melakukan pekerjaan yang sama	☐	☐	☐	☐	☐	☐

1.	2.	3.	4.	5.	6.
Sangat Tidak Setuju	Tidak Setuju	Agak Tidak Setuju	Agak Setuju	Setuju	Sangat Setuju

Sejauh mana anda setuju atas pernyataan-pernyataan di bawah ini. Silahkan menggunakan skala di atas.

Dalam merespon pernyataan-pernyataan di bawah ini, silahkan merujuk pada BIG DATA yang biasa anda gunakan.

Bagian 5 Kode: BDA		1	2	3	4	5	6
1.	Perusahaan akan menggunakan Big data untuk kebutuhan perusahaan.	☐	☐	☐	☐	☐	☐
2.	Menggunakan Big data untuk menangani transaksi perusahaan yang membuat perusahaan untuk melakukan.	☐	☐	☐	☐	☐	☐
3.	Perusahaan akan melihat perusahaan menggunakan Big data untuk menangani pengambilan keputusan perusahaan.	☐	☐	☐	☐	☐	☐
Bagian 6 Kode: CAV		1	2	3	4	5	6
1.	Kemampuan untuk menawarkan harga yang kompetitif	☐	☐	☐	☐	☐	☐
2.	Menawarkan produk yang berhubungan	☐	☐	☐	☐	☐	☐
3.	Menawarkan kualitas produk yang sangat baik kepada kostumer	☐	☐	☐	☐	☐	☐
4.	Mengirimkan pesanan kepada konsumen tepat waktu	☐	☐	☐	☐	☐	☐
5.	Respon yang baik kepada permintaan konsumen untuk fitur baru	☐	☐	☐	☐	☐	☐
6.	Mengirimkan produk ke pasar dengan cepat	☐	☐	☐	☐	☐	☐
7.	Memiliki perkembangan produk yang cepat	☐	☐	☐	☐	☐	☐

Bagian 7

Informasi

Demografi

1. Jenis kelamin:

- ☐ Laki-laki
- ☐ Perempuan

2. Kelompok Umur:

- | | |
|---|---|
| ☐ 25+ s/d 30 tahun | ☐ 40+ s/d 45 tahun |
| ☐ 30+ s/d 35 tahun | ☐ 45+ s/d 50 tahun |
| ☐ 35+ s/d 40 tahun | ☐ 50+ s/d 56 tahun |

3. Apakah pendidikan terakhir anda:

- ☐ Sekolah Menengah Atas atau yang sederajat
- ☐ Diploma atau yang sederajat
- ☐ Sarjana atau yang sederajat
- ☐ Master atau yang sederajat
- ☐ Doktoral atau yang sederajat
- ☐ Profesi
- ☐ Lain – lain. Harap sebutkan _____

4. Latar belakang pendidikan anda:

- ☐ Sains dan Teknik (Komputer, Matematika, Informatika, Industri)
- ☐ Seni, Sosisal, dan Humaniora (Sosial, Politik, Budaya, Psikologi, Bahasa, Seni)
- ☐ Bisnis (Akuntansi, Manajemen, Keuangan, Ekonomi Pembangunan)
- ☐ Hukum
- ☐ Pendidikan
- ☐ Lain – lain. Harap sebutkan _____

5. Posisi di perusahaan:

- | | |
|--|--|
| ☐ Presiden Direktur | ☐ Senior Manager |
| ☐ Direktur | ☐ Manager |
| ☐ General Manager | ☐ Junior/ Asisten Manager |

6. bekerja di perusahaan:

- | | |
|--|--|
| ☐ < 5 tahun | ☐ 20 – 25 tahun |
| ☐ 5 – 10 tahun | ☐ 25 – 30 tahun |
| ☐ 11 – 15 tahun | ☐ > 30 tahun |
| ☐ 16 – 20 tahun | |

7. Pengalaman bekerja di posisi saat ini pada perusahaan:

- | | |
|--------------------------------------|--------------------------------------|
| ☐ < 1 tahun | ☐ 3 – 5 tahun |
| ☐ 1 – 2 tahun | ☐ > 5 tahun |
| ☐ 2 – 3 tahun | |

8. Pengalaman penggunaan Big Data:

- ☐ < 1 tahun
- ☐ 1 – 2 tahun
- ☐ 2 – 3 tahun
- ☐ 3 – 5 tahun
- ☐ > 5 tahun

APPENDIX 3

Result of Questionnaire

No	TMS 1	TMS 2	TMS 3	TMS 4	ORC 1	ORC 2	ORC 3	INF 1	INF 2	INF 3	INF 4	RQS 1	RQS 2	RQS 3	RQS 4	RQS 5	BDA 1	BDA 2	BDA 3	CAV 1	CAV 2	CAV 3	CAV 4	CAV 5	CAV 6	CAV 7
1	6	5	6	5	5	5	5	6	6	4	5	6	5	5	5	5	5	5	5	4	4	4	4	5	4	4
2	5	5	5	5	5	5	5	5	5	6	6	5	6	5	5	5	6	5	5	5	5	5	5	5	5	5
3	5	5	4	4	6	3	5	6	5	4	5	2	2	3	3	2	5	4	2	4	5	5	6	3	3	4
4	5	5	5	5	5	5	5	5	5	5	5	5	4	4	5	4	5	5	4	5	5	5	5	5	5	5
5	5	5	5	5	4	5	3	6	4	5	5	5	6	6	5	6	5	5	4	6	4	5	5	5	4	5
6	5	5	5	5	5	5	4	6	5	5	5	4	3	3	3	2	5	5	5	4	3	4	4	4	5	4
7	2	2	1	2	3	3	3	2	1	2	2	3	3	2	2	999	2	2	2	2	2	2	2	2	4	4
8	5	5	5	5	5	5	5	6	6	6	6	4	4	4	4	5	5	4	5	4	4	4	4	4	4	4
9	6	6	6	6	4	6	4	6	6	6	6	2	4	3	3	3	5	5	4	5	5	5	5	5	5	5
10	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
11	5	5	5	5	5	5	5	6	5	5	5	5	5	4	4	3	5	5	5	6	6	6	6	6	6	5
12	6	6	6	6	5	6	6	6	6	6	6	6	6	6	6	5	6	6	5	5	6	5	6	6	6	5
13	5	5	5	4	3	6	5	5	6	6	5	2	2	2	2	1	2	2	6	6	6	6	6	5	4	4
14	5	5	6	5	6	5	5	6	6	6	6	4	5	6	6	3	6	6	6	5	5	4	4	5	4	4
15	4	4	4	4	5	4	5	5	5	5	5	4	5	4	4	4	4	4	4	6	6	6	6	6	6	6
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17	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
18	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
19	3	3	3	3	3	3	3	5	5	5	5	3	3	3	3	3	3	3	3	5	5	5	5	5	5	5
20	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	4	6	4	6	1	1	1	1	1	1	1
21	6	4	6	4	4	3	6	6	6	6	6	6	6	6	6	6	6	6	5	5	6	6	5	5	6	6
22	6	6	6	6	6	6	6	6	6	6	6	6	3	6	1	4	4	6	6	6	6	6	6	6	6	6
23	5	5	4	4	3	5	4	4	5	5	6	5	4	4	4	5	4	4	5	3	5	3	5	5	5	5
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28	5	5	5	5	4	4	3	5	5	5	3	5	5	5	5	3	5	5	5	5	5	5	5	5	5	5
29	5	4	4	2	4	3	3	5	3	3	5	3	3	4	3	3	4	2	3	4	5	3	4	4	2	2
30	6	4	6	4	4	3	3	3	4	4	6	4	4	4	4	3	3	3	5	6	6	6	6	6	6	6
31	5	4	4	3	2	2	2	6	6	4	6	6	6	6	5	6	6	6	6	5	5	5	5	6	5	6
32	5	5	6	6	6	5	5	4	6	5	5	4	5	5	5	5	5	5	5	5	5	5	5	5	5	6

