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Original Article

Factors Affecting to Manager's Intention of the Applying Big Data Analytics

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Abstract: *The purpose of this study was to identify the variables that influence a manager's decision to look for and implement Big Data Analytics (BDA) into their business model. The information was gathered utilizing questionnaires with a sample size of 100 business managers. Online research and interviews were conducted in addition to the questionnaire. The participants were asked to give their point of view on factors that decide whether they will apply BDA such as (1) Ability, (2) Motivation, (3)Opportunity, (4)Challenge, (5)Behavioral Intention. The research found that motivation, and opportunity are strongly correlated. The challenges factor has a negative correlation with the factors Ability, Motivation, and Opportunity. However, it has been negligible with the Behavior Intention. For the dependent variable (behavioral intention), it also is strongly correlated with the variables A, M, O. Prove that the factors Ability, Motivation, and Opportunity have an influence and impact on the application of Big Data for Business.*

Keywords: *Applying BDA, Ability, Motivation, Opportunity, Motivation, Opportunity, Challenge, Behavioral Intention.*

I. INTRODUCTION

The size of a data set serves as the primary determinant of big data. Big data sets are often enormous, tens of terabytes in size, and occasionally exceeding one petabyte. Very large databases that were controlled by database management systems came before the term "big data." According to Gartner's definition, "Big Data is an information asset, which has large amounts of data, high-speed, and diverse data, requiring new technologies to effectively process in order to make effective decisions, uncover hidden elements in data, and optimize data processing" (Zuech, 2015). 'Big data' as a notion is new and has ambiguous roots, despite the fact that it is pervasive today. According to (Diebold, 2012), the phrase "big data" most likely first appeared in Silicon Graphics Inc. employees' lunchroom chats. Gandomi (2015). In the 4.0 era, big data is an integral part, and analyzing this big data is currently a trend. Anton Dziatkovskii, Founder of Micro Money, shared about Big Data in 2020: "The main data is the best brand" for businesses today. Companies that do not recognize the importance of Big Data will soon have their progress delayed. According to research from Forrester, it is expected that 70% of companies will adopt artificial intelligence (AI) and Big Data and business models, and it expected that this number will increase even more. This new wave of technology has an important role, technological innovations need to come from managers, not workers. We must therefore educate ourselves on the variables that affect the choice to use Big Data technology.

Numerous studies on the use of big data analysis in various sectors, including e-commerce, supply chain management, and consumer markets, have been conducted. In the past, functioning in a data-scarce environment was the main difficulty that firms had to deal with. Many other forms of the technique have also been applied to analyze such factors. For example, the DANP Technique was applied in order to analyze the influencing factors of Big Data Adoption in Chinese Enterprises, the author of the research is Lei Wang and several other researchers on 12 September 2018. Their research article was then accepted on 26 October 2018 and became published on 30 October 2018. They have identified numerous aspects in that study that will help build a system that determines the influencing factors for Chinese businesses to adopt big data. Few academics have focused on the variables that affect the adoption of big data. For instance, Brinkhues (2015) argued that financial support, IT infrastructure, data resources, and cost and earnings expectations are some of the elements that affect data capabilities. However, there are still very little researches on the adaptation of Big Data for Manager.

Making decisions was based on data that was insufficient, incomplete, and outdated. Due to social networking, the internet, mobile phones, and a variety of other new technologies that create and capture data, the usage of big data in e-commerce is clearly on the rise. Big data today makes it easy for businesses to save expenses and generate profits thanks to cost-effective storage and processing capacity and cutting-edge analytical tools.

According to Facebook data from 2012, their members shared approximately 690,000 pieces of information every minute. A staggering 2.46 million pieces of material were produced every minute by the time that figure had tripled in 2014,

according to data. However, the vast amount of information currently in the market will be considered worthless unless they are either analyzed or applied for a specific target.

Therefore, the study's goal is to investigate the variables that affect managers' choices regarding the use of big data analytics in their organizations.

II. LITERATURE REVIEW

A) Big Data analytics

Big data and advanced analytics are generating increasing amounts of interest around the globe, not only because of the size of the data involved but also because of the potential magnitude of their effects. A significant volume of both organised and unstructured data that is so large that it is challenging to process using conventional database and software techniques is referred to as "big data." In most business circumstances, the amount of data is either excessively large, moving too quickly, or beyond the speed of present processing. (Beal, https://www.webopedia.com/TERM/B/big_data.html)

It has offered fresh ideas and innovative methods of operation to create a competitive edge (Watson, 2019; Wedel, 2016). In order to profit from their customers' insights, businesses are increasing their investments in technology and big data information resources. Particularly, Big Data Analytics gives businesses the ability to focus their Big Data on the most pertinent data and analyse it to support important business decisions. Because it empowers analysts and decision-makers to act with the greatest information and insights available, frequently in real-time, this proactive approach to business is transformative (Galetto, 2016).

Studies show that using BDA for business intelligence (Sun, 2018)and to maintain customer privacy (Palmatier, 2019) creates important assets in relationship marketing.

B) Acceptance Models of Big Data analytics

For a modern business to success, adopting new and advanced technology is a critical factor. There has been a vast amount of technology created especially for this purpose. However, it is without a doubt that the UTAUT model is the most comprehensive model (V. Venkatesh, Morris, M. G., Davis, G. B., & Davis, F. D. (2003).

We have taken four independent variables from the UTAUT model and incorporated them into our suggested model. First, the word "performance expectancy" refers to how much the organization is anticipating to gain from using technology. Secondly, we measure how easy it is to use the new technology and label it under effort expectancy. Thirdly, by collecting the rate of agreement from the individual's friends and family on whether or not they should apply the new technology, we get the measurement of social influence. Lastly, the extent to which a consumer understanding and support towards the resources are used to define the facilitating conditions.

The UTAUT components were expanded to include resistance to use and perceived risk. According to Kim (2009), resistance to usage takes the form of objections to change or the deployment of new systems. According to Featherman (2003), perceived risk is the possibility of losses as a result of implementing new technology or information systems.

C) Hypotheses of The Proposed Model

Based on the UTAUT model and the usage of BDA in companies, we have proposed several hypotheses.

Ability refers to the usefulness of BDA technology and the rate of applying it to businesses.

We start by looking for the capacity to predict product demand. Utilizing large data sets from consumer purchasing patterns, culture, politics, and forthcoming events that e-commerce corporations can forecast in each location. The results of (Hofmann, 2018) have demonstrated that the established framework might act as a road map for significant BDA supply chain projects. Several studies (Wang, 2016) and (Roßmann, 2018)) support this idea in various forms and field of application.

a. Ability

Ability refers to the skills, the knowledge, the capability that show the potential of BDA to businesses(Terho, 2017). The superior technology of BDA allows businesses to process data quickly(Akter, 2016), accurately, and create quality output. Furthermore, it is worth noticing that the infrastructure of IT gave way to the basis of big data, which makes it a crucial factor (Brinkhues, 2015). By evaluating the ability level, we will understand why BDA becomes an indispensable tool in industry 4.0 and Vietnam can't stand out of this potential market.

A.1: Data talent determines the usefulness and the rate of applying Big Data technology

Businesses are always concerned about thecapabilities of BDA in usage. The first factor they always consider is the usefulness and practical applicability of this technology. Is it worth the investment and does it help the company in its

business? These will be the first questions from the managers.

A.2: Technical capability shows the potential to use, upgrade and develop
Managers must be able to manage, integrate, and exchange data stored in many public and private clouds. The concept of aggregating data into centralized data warehouses or data lakes appears to be out of date. This is where the first potential application for BDA since it can manage data platforms on multiple clouds. With the proper classification, BDA can also select the right data integration platform for the job.

A.3: IT Infrastructure provides the basis forthe execution of big data, making it an essential element along with the Capability to maintain, maintain, upgrade, and repair systems in accordance with your business strategy and changes plans. Big data infrastructure includes the devices and software that gather data, the hardware and networks that transmit it, the application environments that house the analytics tools that analyses it, and the backup or archive infrastructure that stores it after analysis. It is necessary that we take a close look at the cost of maintaining multi-Terabyte storage and the problems of suboptimal data transformation.

A.4: Data Resources display the impressiveness of the vast data source and enterprise information storage capability
The amount of data that is available is exploding due to the development of smart devices, applications, and networks worldwide. By using big data, you can overcome the difficulty of finding and storing a great amount of data. The Cloud is the answer to that problem. It processes or stores data that a single server cannot handle using the processing and storage capacities of millions of servers (Guojun Wang, 2016.)

A.5: Financial Support explains how BDA technology helps your business save and manage finances better
Everyone knows that investing in equipment as well as people is not a small amount of investment for the company. This will also be a challenge for managers where they need to balance and calculate whether the investment cost of BDA technology is really reasonable for the business. The ultimate goal of data mining is to help businesses make more money. Therefore, if the implementation process makes you incur too much expense and cannot compensate, you may have misunderstood the benefits of this data and do not know how to operate it effectively.

A.6: Management Ability illustrates the effectiveness of the data management capability of Big Data analytics
Many businesses have developed big data analytics capabilities as a result of the growing interest in big data in order to improve business performance. Eighty-seven percent of businesses believe Big Data analytics will change the competitive landscape of their sectors within the next three years, according to a recent survey by Accenture and General Electric (Columbus, 2014). Companies that don't implement a big data analytics plan in the upcoming year risk losing market share and momentum, according to 89% of respondents.

Accordingly, the following hypothesis is suggested:

Hypothesis (H_1): Behavioral intention is positively correlated with the ability to utilize big data analytics.

b. Motivation

Motivation refers to impulse and the enthusiasm for doing something (Johnson, 2017) in this research it refers to the impulse of adoption of BDA in Vietnamese businesses. In this era, the thorough use of technologies for business, customer analysis, or product has become a war between companies. There are many factors that are becoming the motivation for these companies such as competitors pressure, environment culture (Izhar, 2016) and corporate culture(Wamba, 2015). Additionally, perceived utility and perceived usability are crucial elements in determining if a BDA will be adopted.

M.1: Competitors pressure depicts how applying BDA help businesses compete with competitors in their field
Business competition is always the biggest motivation among businesses. We have witnessed a lot of technological and technical competence among the largest corporations in the world. It is not a bad thing to update and learn the techniques of the rival company. If you know how to learn from your opponent, you will be putting your company in a better position. "Keep your friend close, your enemy closer".

M.2: Perceived Usefulness depicts how company believes that applying BDA can increase their business efficiency
Developing profitability for the company requires businesses to further develop their products. How to reduce production costs but still maintainquality. And the only answer is focusing on technical development. With the success of BDA, this will be a great motivation for influencing BDA adoption decisions for their businesses.
BDA can offer companies the following services in addition to product development: (1) client analysis. Companies can review consumer data to improve customer service, increase conversion rates, and retain existing clients. (2) Analysis of activity. Many businesses want to increase operational effectiveness and make better use of their resources. Big data analysis can boost performance and make firms run more smoothly. (3) Improve the price. Big data analytics can be used

by businesses to improve product and service pricing, resulting in more sales.
Back in 2018, the Data analysis center of Viettel Telecom uses an intensive machine to read the customer and solve the problem of understanding customers and give suggestions, products suitable for small groups of customers. As a result of 2019, the additional revenue is actually generated from the raw data of Viettel. Specifically, in 11 months, Viettel Telecom increased by VND 737 billion, or nearly VND 70 billion per month (nearly US $ 3 million) (Trà, 2020).

M.3: Perceived Easy to use displays how company believes that using BDA will not take a lot of effort
Friendly configuration, easy to use will be an advantage for BDA. Although it requires experts and engineers to handle machines, the simple, easy-to-use configuration will make BDA more friendly to employees. Staff training will also be easier for businesses, hence saving costs, time and manpower.

M.4: Leadership Support exhibits the level to which businesses/individuals believe that using Big Data will help assist in quality management and control
The current businesses have realized the importance of employees. They focus on caring and increasing the coordination between their employees, thereforebringing greater efficiency to work. The use of BDA in businesses will be a great motivation and potential to help develop management control or leadership support.
Besides processing and storing customer, product and business data, BDA can alsothe assist manager in storing employees's information in the enterprise. This helps the HR department to better manage its personnel, store information longer and make better use of human resources.

M.5: Corporate Culture demonstrates the level to which businesses believe that using Big Data will promote corporate culture, support business structure building, evaluation and rewarding
Many businesses employ big data analytics to increase operational effectiveness as well as to foster a data-driven corporate culture throughout the entire organisation.
Companies in Vietnam are now familiar with the multicultural working environment. The use of BDA is also a hope of developing the culture in the enterprise, building a more efficient and scientific organizational structure. The issue of evaluation and reward has always been very mechanical and emotional.With BDA, the results will be more accurate and fairer to employees which employee engagement will then be increased.

Hypothesis (H_2): Big Data analytics motivation is favourably correlated with behavioural intention.

c. Opportunity

Opportunities refer to a set of circumstances that makes it possible to do something which is not controlled by the subject nor the elements (Baranowski, 1997).It was due to the fact that policies and laws have made way for the legal terms of adopting Big Data (Jetzek, 2014), all while the development of information pool from the industrial core is affected.

The opportunities also greatly influence the adoption, use and selection of BDAs for businesses. Suitability of Vietnamese Government Policies and Law, Regulation Merchandise, ... are factors that are looked at and considered a lot. Also, reduce business risk is also a great opportunity when applying BDA.

O.1: Policies and Law presents the suitability of Vietnamese Government towards Bid Data technology
Through a number of policy measures, including the Prime Minister's Directive No. 16/CT-TTg on enhancing robust access to the IR4.0, the Government of Vietnam is fostering the development of the digital economy.
Some localities have seen significant changes in the area of digital administration; Quang Ninh is a good example. Quang Ninh has saved time and cut administrative costs for State administrative agencies worth roughly VND50 billion thanks to the effective implementation of its e-government system. (Khanh, 2019)

O.2: Regulation Merchandise explains the question of are regulations and policies on trading (merchandise), doing business in Vietnam and Vietnam with countries in the world suitable for the use of Big Data technology?
The ministry has established a goal of researching and creating applications and technology to produce particular goods. Such studies are supported by the Government to improve the capability of our own technology. A shared machine system will also be built to further the knowledge and experience for those that require (Duy, 2019). The World Bank also provides assistance to the Government of Vietnam in a variety of areas, such as supporting the State Bank of Vietnam in developing comprehensive digital governance reforms and assistance with digital payments.

O.3: Risk determines the helpfulness of Big Data in reducing business risk
With fast and accurate data processing, BDA is the hope for businesses to assess risk. Businesses can verify customer data using customer data analysis to improve customer experience, increase conversion rates, maintain customer loyalty better, or review and monitor future initiatives.This will minimize risks and damages to businesses in the course of business.

O.4: Development of Industry layout the opportunities for development and expansion of enterprises when applying Big data technology

In the field of finance - commerce: analyzes on large amounts of data contribute to the optimization and improvement of the decision-making process, in order to minimize risks and create added values for enterprises. By exploiting Big Data information, businesses can get an overview of customers' buying behavior, in addition, to see the products that customers are interested in, or what they do when accessing the website. From there, customers can be classified, set goals and business methods, and introduce the right products and services to each type of customer automatically. Well-known e-commerce website Amazon has adopted an item-to-item collaborative filtering match system, which is basically a system that introduces products related to the products purchased, in 2012, As a result, sales increased 29% compared to the same period last year. In the field of entertainment, social networks: Big Data data helps giants like Facebook and YouTube to shape and classify user groups. Applying a form of item-to-item collaborative filtering match to bring out relevant information such as the information displayed on your Facebook, had to undergo a selection process thanks to machine learning algorithms and an enormous Big Data system.

O.5: Information Level analyzes opportunities to access and decentralize many levels of information for businesses when applying Big Data

There are three fundamental models for where the analytics function should be located within the company, and each one has well-known centralization vs. decentralisation tradeoffs. In order to effectively deploy various statistical, predictive, and data-mining models, they want to reach a critical mass, gather the essential data, drive an integrated infrastructure, and develop the necessary skills. (Grossman, 2014)

Hypothesis (H_3): Big Data analytics applications have a good relationship with behavioral intention.

d. Challenge

Challenges refer to the difficultythe business may encounter in the process of using BDA for businesses. Factors such as HR, financial, quality as mentioned require businesses to be really careful and wise.(data, 2019)

According to a Sync Sort survey, the second major challenges for developing raw data storage were large data availability and a lack of human resources. In addition, scientists and data analysts must make sure the information they are using is reliable, pertinent, and in the proper format for analysis before leveraging big data for analytical activities. 'Cleaning' data actually consumes more than half of an analyst's work.

C.1: Human Resource describes the level of difficulty in finding human resources and experts when applying BDA to businesses

To find BDA experts in the present time is quite difficult for every business. There are many IT experts or Data Scientistbut BDA experts in Vietnam is still a new concept, therefore the numbers of experts in this field are still at a significantly small proportion. If businesses want to invite people to train their employees, they can choose to invite foreign experts but this is also interrupted by COVID-19. Businesses can refer to sending employees abroad for training, but there are also many risks.Therefore, many famous Institutes have organized their own training program for Big Data and Open Source Technology. For example, theFranco phone International Institute (IFI) - Hanoi National University organizes a training program for Big Data and Open Source Technology in June 2019. They specialize in Big Data and open source technologies, the Hadoop ecosystem, Kubernetes platform. It was plain to see that not only well-known institutes are starting their training program, major corporations are also interested in creating their own source of experts. Vingroup Big Data Institute (VinBDI) was established in August 2018 by Vingroup to research key fields in Big Data.

C.2: Budget Requirement is to clarify the level of difficulty in the financial of installation, maintenance and maintenance of BDA when businesses use it

Basically, the costs of operating and processing data can be reduced through Big Data. However, the maintenance costs for BDA alone is still quite an investment. Like many other multi-cloud services, open-source technology is still the first source for companies that are developing big data tools. Effective as it is, businesses may still find themselves dealing with the extravagant amount of investment, along with human resources and related services problems.

It is relatively expensive to build and operate physical server systems for data storage, networks for data transit, and systems for resource analysis and calculation. Cloud-based analytics is one method that companies frequently utilise to address issues, but this does not guarantee that infrastructure issues have been resolved. Data security is still facing the risk of being breached.

C.3: Master in Analysis demonstrates the level of difficulty in analyzing big data when using big data for businesses

One of the difficulties worthy of mentioning when using BDA is the difficulty in assessing data. Despite BDA being a state-of-the-art technology, data errors are inevitable. Errors can occur from the original data before processing or occur

during processing. Businesses must check the correct input data source, consistent with the analysis format to avoid losing time later in the process to find errors. Here, the role of the experts mentioned above is also important, requiring experience to find errors…

C.4: Data Quality presents the level of difficulty in assessing and selecting data in a large pool when applying big data.

Data quality is also a problem that many businesses need to pay attention to. The huge investment in machinery and equipment is expected to return high profits. Assessing and selecting data in a large data pool is a difficult thing. Data engineer FPT said, Big Data is a huge resource, but to use it in real projects is a big problem for developers. "Data is everywhere like a water source, if properly exploited, this will become a valuable resource for the owner. On the contrary, if you only keep it, do not share it, unreasonable exploitation, the most unfortunate thing that can happen is that your water will turn into the mud "(Trần, 2019).

Hypothesis (H_4): Challenges of applying Big Data analytics is negatively associated with behavioral intention.

e. Behavioral Intention

This idea can be characterized as the consumer's readiness to adopt particular types of behaviors in the context of retailing (Zeithaml, 1996). A behavioral intention is a goal-oriented plan to carry out a particular future behavior. It can be seen as the intention to acquire a specific behavior in the future (Esteves, 2013). Behavioral Intention can also be interpreted as a crucial element between the relationship of specific system adoption and predictors(V. Venkatesh, & Davis, F. D. , 2000).

D) Research Model

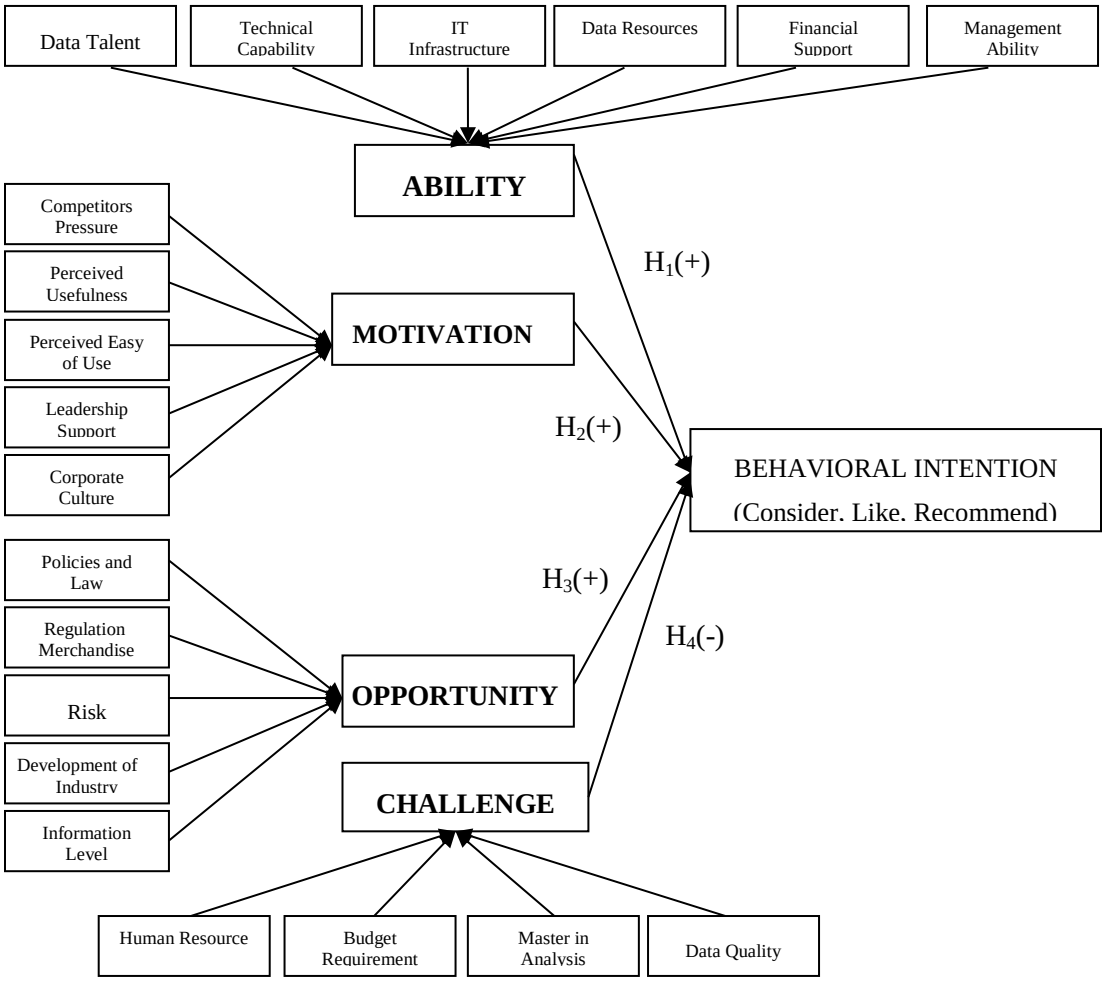

Figure 1: The Research Model

The motivation-opportunity-abilities (MOA) model, put forth by ThØgersen (1995), is a well-known framework for developing a model to learn about elements affecting behavior. Figure 1 depicts the study model. In the research model, there are four independent variables: Motivation (M), Opportunity (O), Ability (A) and Challenges (C).

Based on the reading of the related literature and studies, this research analysis and make evaluation independent variables and from there can give a summary and recommend to Managers are exploring and intending to use BDA. Independent variables include 2 parts: (1) Company's profile: Applied BDA or not yet; (2) Manager's Perception: Ability, Motivation, Opportunity, Challenge. These independent variables can have an impact on the dependent variable: Behavioral Intention. If during the later evaluation, any variable that has no effect significant on the dependent variable can be omitted.

III. RESEARCH METHODOLOGY

A) Research Design

The factors influencing the use of Big Data technologies are identified and analyzed in the study using descriptive research methodologies. Analyzing both quantitative and qualitative data is part of this. This method was applied to the research due to its ability to illustrate and identify patterns or characteristics of variables in specific cases or events. It allows researchers to fully and comprehensively interpret data, information and results. The study also used the Motivation-Opportunity-Ability Model (MOA) model proposed by Ölander and Thøgersen (ThØgersen, 1995). In addition, the team has actively developed this model by adding a variable (Challenge) to be able to analyze the factors affecting the application of Big Data technology.

B) Sample Size

The formula of (Tabachnick, 1996) is used to determine the required minimum number of samples for the investigation. Using Multivariate Statistics (3rd ed.). New York: Harper Collins.)

n=50 + 8*m
Where n: is the minimum number of samples to collect
m: is the number of independent variables
With an independent variable of 4 (n = 4), we can calculate the minimum number of samples to collect:
n=50 + 8*m = 50 + 8*4 = 82

Data were collected from 100 managers in Vietnam and the researcher made sure that the information obtained was accurate and clearly showed that the research subjects were managers.

C) Data Collection Technique

Data collection aims to obtain the necessary information in order to achieve the research objectives. The research team has collected data from the research object - business managers in Vietnam, through a survey designed with 2 main parts:

Part 1: Include questions about the manager's business profile such as: field of work, department, number of years of operation, whether Big data technology has been applied to the business or not.
Part 2: Include questions related to factors affecting managers in applying Big Data technology. The main content of this section is built on the variables presented in part 2.

The scale using in the survey is:
A,O, M: From 1 to 10 with1 as not useful and 10 as extremely useful
C: From 1 to 10with 1 as extremely difficult and 10 as not at all difficult
B: From 1 to 10 with 1 as very unlikely and 10 as very likely

IV. RESULTS

A) Big Data Adoption Related to Industry

Table 1. The relationship between industry and Big Data application

Big Data Industry \ Apply	Applied	Unapplied
Information Technology	17	13
Education	8	17
Media&Entertainment	7	6
Services, Tourism &Hospitality	4	4
Real Estate	3	4
Food & Beverage	2	5
Distribution& Retail	2	4
Medical &Health Care	2	2
Insurance	1	3
Transportation	1	0
Others	5	7

The table provides information about the difference in applying Big Data related to industries. The result reported that the IT industry tends to apply big data the most. In contrast to this, although the number of survey participants belongs to the Education industry accounted for the second position, more than two-thirds of the participants worked in companies that did not use Big Data yet. This shows that Big Data application needs of the education industry are not high. Similarity, according to the figures shown in the table, Big Data application is also not popular with the rest industries.

B) Reliability Analysis

Table 2. Reliability Analysis of Factors Test

No	Factors	Cronbach's Alpha	Lowest Corrected Item-Total Correlation
1	Abilities	0.933	0.754
2	Motivation	0.906	0.694
3	Opportunities	0.900	0.684
4	Challenges	0.916	0.736
5	Behavior Intentions	0.872	0.704

After collecting data from managers, the team conducted a reliability test of the research. All variables in the group have Cronbach's Alpha values larger than 0.6, and the lowest adjusted item-total correlations were higher than 0.3, according to the reliability analysis (Cronbach's Alpha, Cronbach's Alpha, and item-total correlation, which is a correlation between a factor and its variables). Nunnally and Bernstein (Nunnally, 1994) state that the factor can be used if it has a Cronbach's Alpha of at least 0.6 and that any questions with a Corrected Item-Total Correlation of less than 0.3 would be eliminated. From the results obtained in the table above, it can be seen that all of the variables are not only tested (qualified for research) but also show that its accuracy is very high. (Cronbach's Alpha >0.9 and The Lowest Corrected Item-Total Correlation > 0.6). From this, we can see that no questions and elements have to be removed from the questionnaire and all variables can continue to analyze and study them.

C) Factors Affecting the Adoption of BDA

Table 3. Mean Distribution of Factors Affecting the Adoption of BDA

No.	Factors	Description	Weighted Mean
A	**Ability**		**7.665**
A1	Data Talent	The applicability of BDA Technology to the business.	7.730
A2	Technical capability	The potential of using, upgrading and developing BDA for business.	7.810
A3	IT Infrastructure	The ability to maintain, repair, changing systems suitable for BDA for business strategy plan.	7.230
A4	Data Resources	The capability storage of data source and information of BDA to business.	7.920
A5	Financial Support	The potential of saving and manage finances of BDA to business.	7.500

A6	Management Ability	The capability of data management of BDA to business.	7.800
M	**Motivation**		**7.560**
M1	Competitors Pressure	The competitiveness of business success when using BDA.	7.550
M2	Perceived Usefulness	Thereliability of business that applying BDA can increase efficiency.	7.990
M3	Perceived Easy to use	The reliability of business that applying BDA Technology is friendly to use and apply.	7.260
M4	Leadership Support	The reliability of business that applying BDA can assist in management and quality control.	7.750
M5	Corporate Culture	The reliability of business that applying BDA can promote corporate culture, support business structure building, evaluation and rewarding.	7.250
O	**Opportunity**		**7.480**
O1	Policies and Law	The appropriateness of the Government policies and laws to business using BDA technology.	7.230
O2	Regulation Merchandise	The appropriateness of the regulations and policies on trading (mechanization) of Vietnam with foreign countries using BDA technology.	7.330
O3	Risk	The capability of BDA in reducing business risk.	7.200
O4	Development of Industry	The opportunities for development and expansion of business of applying BDA technology.	7.900
O5	Information Level	The opportunities to access and decentralize many levels of information for business of applying BDA.	7.740
C	**Challenge**		**3.273**
C1	Human Resource	The difficulty level of finding human resources and BDA's experts for business.	2.910
C2	Budget Requirement	The difficulty level in the financial of installation, maintenance of BDA of business.	3.120
C3	Master in Analysis	The difficulty level of analyzing data of BDA.	3.580
C4	Data Quality	The difficulty level ofassessing and selecting data in the big datasourceof BDA.	3.480

As shown in table 3, the mean score of Ability is the appearance from7.230 to7.920. The highest mean score reported is Data Resource (7.920) and the lowest is IT Infrastructure (7.230).

The component of motivation includes pressure from rivals, perceived utility, perceived usability, leadership support, and corporate culture. From the data results, the highest mean score of Motivation is Perceived Usefulness (7.990) and the lowest is Corporate Culture (7.250).

Opportunity is the possibility of applying Big Data. According to the table, the average Weighted Mean of Opportunity is 7.480.The highest mean score is the Development of Industry (7.900) while the lowest is Risk (7.200).

Challenge is a negative variable, a negative factor. It is the difficulties faced by the company when applying Big Data. Therefore, the mean value is usually less than 5. For the mean score of Challenge, the highest score is Master in Analysis (3.580) and the lowest is Human Resource (2.910).

D) Adoption of BDA

The table shows Behavioral Intention Weighted Mean. It related to consider, likely and recommend factors. The average mean of Behavior Intention is 8.347. Therein, the highest score is he/she will very likely to apply BDA for the company if it is useful (8.470) and the lowest of it is he/she would recommend other companies to apply BDA (8.200).

Table 4. Behavioral Intention Weighted Mean

B	Factor	Description	Weighted Mean
B1	Consider	I would consider to apply BDA for company as possible.	8.370
B2	Likely	I will very likely to apply BDA for company if it is useful.	8.470
B3	Recommend	I would recommend other companies to apply BDA.	8.200
Average mean			**8.347**

Table 5. Mean Summary of Factors Affecting the Adoption of BDA

No.	Factors	Ave. Weighted Mean
A	Ability	7.665
M	Motivation	7.560
O	Opportunity	7.480
C	Challenge	3.273

From the mean summary of factors affecting the adoption of BDA results, the highest mean score of Factors affecting the adoption of BDA is Ability (7.665) and the lowest score is Challenge (3.273).

E) Mean Comparison

Independent sample T-test was used to comparethe mean between different demographic characteristics and behavioral intention.

Table 6. T-test results by applying BDA and behavioral intention

Demographic	Characteristics	Mean	*t-value*	*p*-value
Group	Applied	8.920	3.382**	0.001
	Unapplied	7.858		

*Note: * p<0.05, ** p< 0.01, *** p<0.001*

To find out more about the Behavior Intention of managers, we conducted an analysis and compared the results obtained between the two groups: Applied and unapplied.

Table 6 obviously shows that, there is a significant difference in behavior intention between-group applied BDA (N = 46, M = 8.920, SD = 1.829) and group unapplied BDA (N = 54, M = 7.858, SD = 1.300), t = 3.382, p = 0.001. This result concludes that there is a difference in the Intention behavior of these two groups and the applied group has higher behavior intention than the unapplied group.

F) Correlation and Regression Analysis

Table 7. Correlation among variables

	Mean	Std	A	M	O	C	B
A - Ability	7.665	1.707	1				
M - Motivation	7.560	1.660	0.811**	1			
O - Opportunity	7.480	1.592	0.795**	0.797**	1		
C - Challenge	3.273	2.033	-0.231*	-0.228*	-0.254*	1	
B- Behavior	8.347	1.686	0.745**	0.738**	0.723**	-0.184	1

*Note: * p<0.05, ** p< 0.01, *** p<0.001*

Table 7 shows the correlation between variables in the research model.Easily, We can see that the correlation coefficients between the variables Abilities(A), Motivations (B), Opportunities(O) are 88.1% (A and M), 79.5% (A and O), 79.7% (M and O). However, with the Challenge (C) variable, we get negative correlation values for other variables, specifically -23.1% (C and A), -22.8% (C and M), 25.4% (C and O). This means that the variable C is inversed to the rest of the variables. For the Behavior Intention (B), the Challenges variable has a Significant index of 0.66> 0.05. Therefore, the correlation of variable C with B is not significant. Similarly, we can also see the correlation of the variables with dependent variable Behavior Intention (B). Variable A has the greatest correlation with B (74.5%), followed by variables M (73.8%) and variables O (72.3%).These results indicate that Abilities has the greatest impact on Behavioral Intention while Challenges has no significant influence on behavior intention.

Table 8. Regression Analysis

Model Summary										
Model	R	R Square	Adjusted R Square	Std. Error of the Est.	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	0.745[a]	0.556	0.551	1.12958	0.556	122.475	1	98	0.000	2.208
2	0.779[b]	0.608	0.600	1.06678	0.052	12.878	1	97	0.001	
3	0.790[c]	0.625	0.613	1.04871	0.017	4.371	1	96	0.039	

a. Predictors: (Constant), A
b. Predictors: (Constant), A, M
c. Predictors: (Constant), A, M, O

Coefficient value, p-value – VIF

Table 8 shows a summary of the regression analysis. By using the stepwise method, we can see that if only using variable A, it is possible to express 55.1% dependent variables. When we put in the variable M, they explained 60% and when we added all 3 variables A, M, O, they explained 61.3% of the Behavior Intention variable. The results show the correlation with correlation analysis in the previous section when variable A has the largest correlation with B then to M and to O. It indicates that these factors are quite good and valid predictors. Ability (A), Motivation (M), and Opportunity (O) are good predictors of Behavioral Intention. In regression analysis, all three variables have VIF index range from 1-5 (A = 3.558, M = 3.580, O = 3.327). It means that there is no multi collinear phenomenon.

The positive relationship between Ability and behavior intention (H_1: β_1=0.321, t = 2.753, p = 0.007) indicated that H_1 was supported. Regarding to H_2, Motivation also has a positive effect on behavior intention (H_2: β_2= 0.289, t =2.407, p = 0.018),so H_2 was supported. With the Opportunity variable, With the Opportunity variable, it also has a positive relationship with the Intention behavior (H_3: β_3= 0.252, t =2.091, p = 0.039), thus H_3 was supported. The variable C is not included in the regression analysis because the above we have shown that the correlation of C with B is not significant when Sig. = 0.066> 0.05(H_4 is not supported).

Table 9. The coefficients of the variables

Variables	Coefficient (β)	t-value	p-value	Hypothesis	Hypothesis support
(Constant)	1.814	3.419	0.001		
Ability (A)	0.321	2.753	0.007	H_1	Supported
Motivation (M)	0.289	2.407	0.018	H_2	Supported
Opportunity (O)	0.252	2.091	0.039	H_3	Supported
Challenge (C)			0.066	H_4	Not Supported

Also, from the results of the regression analysis, we obtain the coefficient of the independent variables with the dependent variable are 0.321(Ability), 0.289(Motivation), 0.252 (Opportunity) and Constant coefficients is 1.814. Consequently, we have:

BDA= 1.814 + 0.321 A + 0289 M + 0.252 O

With $R^2adj = 0.613$

V. CONCLUSION AND RECOMMENDATION

A) Conclusion

According to the summary of the finding, the following conclusions were drawn.

BDA develops slowly in Vietnam. Information Technology industry has the highest number of respondents applying BDA probably because this is a data-related industry and Big Data research is also a hot career in information technology in industry 4.0. Over 10 years of operation which are the perennial businesses apply Big Data more than other groups. They have a solid business foundation, high sales, large available customer resources, flexible capital structure and a high position in the industry. That is why there are many potential conditions for exploiting Big Data.

Ability was the highest appreciated by respondents. On the other hand, Challenge was a negative factor that effects on the decision to use BDA had the lowest appreciated. Managers/businesses that have used BDA technology often have better and higher Behavior Intention than those haven't applied.

From the result of regression analysis, we know that the independent factors Ability, Motivation, and Opportunity are strongly correlated. The challenges factor has a negative correlation with the factors Ability, Motivation, and Opportunity. However, it has been negligible with the Behavior Intention. Therefore, this element (Challenge) will be removed from the model research. For the dependent variable (behavior intention), it also is strongly correlated with the variables A, M, O. Prove that the factors Ability, Motivation, and Opportunity have an influence and impact on the application of Big Data for Business.

From the result of regression analysis, we have a coefficient of the independent variables with the dependent variable are 0.321(Ability), 0.289(Motivation), 0.252 (Opportunity) and Constant coefficients is 1.814. Consequently, we have:

BDA= 1.814 + 0.321 A + 0289 M + 0.252 O

With $R^2adj = 0.613$

Therefore, we can show that the Ability factor of BDA technology is the biggest factor affecting managers when they consider applying Big Data technology to businesses. Our Challenge element added to the original framework for the purpose of making a negative impact on the application of Big Data technology removed from the model after analysis.

B) Recommendation

Understand data mining goals: The management and use of data to predict consumer behavior, help businesses build better business plans. Cost savings, time savings, greater product development and optimisation time, and assistance in business decision-making are all advantages of big data.Remember, the ultimate goal of data mining is to help businesses make more money.

Surprisingly, many business executives are completely ambiguous about the purpose of collecting customer data or understanding why business strategies are created - resulting from data analysis. Big Data. Some managers let others control a high-tech program regardless of the content.

Besides, those who are responsible for analyzing Big Data or running campaigns created from the results of data surveys should explain everything clearly so that the management can understand - in their language, and use them best.
Help employees understand Big Data exactly: One of the ways to help the management limit misunderstandings or remove barriers in the business process is to present exactly the purpose and goals of the plan so that employees can understand so that the response suitable and effective use.

Be mindful of the data quality: Businesses must rely on data sources, the timing of data collection, and the correctness of the data to determine data quality. The results or forecasts derived from "junk data" or data that has not been adequately analysed and pooled are not accurate.

Measure frequently: Businesses should frequently create and utilise KPIs and data relevant to marketing objectives. To make it simple for organisations to seize emerging trends and opportunities, the results are regularly reported. Each business generates distinctive data that gives them a competitive edge.

Consider carefully: Vietnamese businesses need to determine what they want and what the goal of using big data is for. Every enterprise needs to find out what stage its business is in the process of collecting and deploying big data. Different companies will fit different technology solutions, so before deciding on which technology solution - such as AI or machine learning, businesses need to dig into it. Whether it is appropriate to the business model, the scope of the application, and produces the results you want.

C) Limitation and Future Research

Despite having made significant contributions, this study still has some shortcomings.

First off, just 100 samples were used in this investigation, which used a limited number of sample sets. Collecting research data from managers is quite difficult. Although the research team has been active with the help of the school and used many ways to search for data, the number of samples the group collected is still quite small. Larger sample sizes might in the future have a more useful meaning. It might also enable more research to produce findings with broader applicability.

Secondly, the study was conducted in Vietnam so most of the data collected were from businesses in Vietnam. Vietnam is an Asian country so the economy is developing at a very fast pace in recent years. Therefore, businesses in Vietnam will have differences from businesses in the world. Besides, 90% of businesses in Vietnam are small and medium enterprises, so the approach and application for businesses in Vietnam will be different. However, this will also be a good platform for future research when they can compare, go into depth, and research in different countries.

Finally, the team's research model has not been able to go deeper than the study of BDA. Therefore, future studies may develop a research model or go deeper into issues that the group has not yet identified and analyzed.

VI. REFERENCES

[1] Akter, S., & Wamba, S. F. . (2016). Big data analytics in E-commerce: a systematic review and agenda for future research. . Electronic Markets, 26(2), 173-194.

[2] Baranowski, T., Smith, M., Baranowski, J., Wang, D. T., Doyle, C., Lin, L. S., ... & Resnicow, K. . (1997). Low validity of a seven-item fruit and vegetable food frequency questionnaire among third-grade students. Journal of the American Dietetic Association, 97(1), 66-68.

[3] Beal, V. (https://www.webopedia.com/TERM/B/big_data.html)

[4] Brinkhues, R., Freitas Junior, J. C., & Maçada, A. C. . (2015). Information management capability as competitive imperfection in the strategic factor market of big data.

[5] Columbus, L. (2014). Of Enterprises See Big Data Analytics Changing Their Industries' Competitive Landscapes In The Next Year. In Forbes.

[6] data, T. n. k. ứ. d. c. n. b. (2019). https://ifactory.com.vn/tro-ngai-khi-ung-dung-cong-nghe-big-data/.

[7] Duy, B. (2019). Big Data vital for AI development: MOST. Retrieved 25 April 2020, from https://vietnamnews.vn/economy/534965/big-data-vital-for-ai-development-most.html

[8] Esteves, J., & Curto, J. . (2013). A risk and benefits behavioral model to assess intentions to adopt big data. . In Proceedings of the 10th International Conference on Intellectual Capital, Knowledge Management and Organisational Learning.

[9] Featherman, M. S., & Pavlou, P. A. (2003). . (2003). Predicting e-services adoption: a perceived risk facets perspective. International journal of human-computer studies, 59(4), 451-474.

[10] Galetto, M. (2016). NGDATA | What is Big Data Analytics? Learn About Tools and Trends. https://www.ngdata.com/what-is-big-data-analytics/.
[11] Grossman, R. S., Kevin. . (2014). Organizational Models for Big Data and Analytics. Journal of Organizational Design. 3. 20-25. 10.7146/jod.9799.
[12] Guojun Wang, C. s. I. R. J. M. A. C. S. M. T. (2016.). Security, privacy, and anonymity in computation, communication, and storage.
[13] Hofmann, E., & Rutschmann, E. (2018). . (2018). Big data analytics and demand forecasting in supply chains: a conceptual analysis. The international journal of logistics management.
[14] Izhar, T. A. T., & Shoid, M. M. (2016). A Research Framework on Big Data awareness and Success Factors toward the Implication of Knowledge Management: Critical Review and Theoretical Extension. . nternational Journal of Academic Research in Business and Social Sciences, 6(4), 325-338.
[15] Jetzek, T., Avital, M., & Bjorn-Andersen, N. . (2014). Data-driven innovation through open government data. Journal of theoretical and applied electronic commerce research, 9(2), 100-120.
[16] Johnson, J. S., & Sohi, R. S. . (2017). Getting business-to-business salespeople to implement strategies associated with introducing new products and services. Industrial Marketing Management, 62, 137-149.
[17] Khanh, A. (2019). Vietnam on the verge of digital transformation. Retrieved 25 April 2020, from https://en.nhandan.com.vn/scitech/item/7409402-vietnam-on-the-verge-of-digital-transformation.html.
[18] Kim, H. W., & Kankanhalli, A. (2009). . (2009). Investigating user resistance to information systems implementation: A status quo bias perspective. MIS quarterly, 567-582.
[19] Nunnally, J. C. (1994). Psychometric theory 3E. Tata McGraw-Hill Education.
[20] Palmatier, R. W., & Martin, K. D. (2019). (2019). Understanding and valuing customer data. . In The Intelligent Marketer's Guide to Data Privacy (pp. 133-151). Palgrave Macmillan, Cham.
[21] Roßmann, B., Canzaniello, A., von der Gracht, H., & Hartmann, E. (2018). . (2018). The future and social impact of Big Data Analytics in Supply Chain Management: Results from a Delphi study. Technological Forecasting and Social Change, 130, 135-149.
[22] Sun, Z., Sun, L., & Strang, K. (2018). . (2018). Big data analytics services for enhancing business intelligence. . Journal of Computer Information Systems, 58(2), 162-169.
[23] Tabachnick, B. G., & Fidell, L. S. (1996). Using multivariate statistics. Northridge. Cal.: Harper Collins.
[24] Terho, H., Eggert, A., Ulaga, W., Haas, A., & Böhm, E. . (2017). Selling value in business markets: Individual and organizational factors for turning the idea into action. Industrial Marketing Management, 66, 42-55.
[25] ThØgersen, J. (1995). Understanding of consumer behaviour as a prerequisite for environmental protection. Journal of consumer policy, 18(4), 345-385.
[26] Trà, M. (2020). https://zingnews.vn/doanh-thu-viettel-telecom-tang-them-3-trieu-usdthang-nho-big-data-post1038340.html.
[27] Trần, H. (2019). Kỹ sư dữ liệu FPT: 'Big Data không phải là công nghệ'. https://chungta.vn/cong-nghe/ky-su-du-lieu-fpt-big-data-khong-phai-la-cong-nghe-1126369.html.
[28] Venkatesh, V., & Davis, F. D. . (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. Management science, 46(2), 186-204.
[29] Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). . (2003). User acceptance of information technology: Toward a unified view. . MIS quarterly, 425-478.
[30] Wamba, S. F., Akter, S., Edwards, A., Chopin, G., & Gnanzou, D. . (2015). How 'big data'can make big impact: Findings from a systematic review and a longitudinal case study. International Journal of Production Economics, 165, 234-246.
[31] Wang, J., & Zhang, J. (2016). . (2016). Big data analytics for forecasting cycle time in semiconductor wafer fabrication system. International Journal of Production Research, 54(23), 7231-7244.
[32] Watson, H. J. (2019). Update tutorial: Big Data analytics: Concepts, technology, and applications. Communications of the Association for Information Systems, 44(1), 364-379.
[33] Wedel, M., & Kannan, P. K. . (2016). Marketing analytics for data-rich environments. Journal of Marketing, 80(6), 97-121.
[34] Zeithaml, V. A., Berry, L. L., & Parasuraman, A. . (1996). The behavioral consequences of service quality. Journal of marketing, 60(2), 31-46.